LONDONASSEMBLY

Environment Committee

Where there's Muck there's Brass

Waste to energy schemes in London

October 2009

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Terms of reference

- To set out and evaluate the new technologies in converting waste to renewable energy and heat (through site visits and company briefings)
- To discuss the potential of establishing these technologies in London and to identify the barriers and challenges to their development

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Chair's Foreword

With the new GLA Act, the Mayoralty has new powers in waste management. The Mayor needs to make the most of them if London and Londoners are to improve our recycling rates, reduce our carbon footprint and reduce our dependency in putting our rubbish in landfill sites just when the EU begins to fine us heavily.

In this report, the Environment Committee investigates the new technologies available in London, on the cutting edge of converting our waste into energy away from traditional incineration. On numerous site visits around London, we saw enough evidence to suggest that many of these new technologies, from non-thermal processes like anaerobic digestion (AD), mechanical biological treatment and advanced thermal treatment (ATT) technologies like gasification and pyrolysis are beginning to make themselves available in our city. Their potential impact is huge both environmentally and economically. For example, it is estimated that if all London's waste going to landfill were used to generate energy, it would heat up to 625,000 homes and supply electricity to up to 2 million homes.

In our report, we identify barriers that are preventing widespread use of new waste to energy technologies. The publication of the Mayor's Municipal Waste Strategy provides a timely opportunity for the Mayor to actively pursue fundamental changes to the way waste is managed in London. This report makes a number of practical recommendations to the Mayor and the London Waste and Recycling Board (LWaRB) that we believe could accelerate the development of the necessary infrastructure for converting waste to energy. We highlight, in particular, the long-term nature of municipal waste contracts which can limit the ability of local authorities to produce the waste streams needed for the new plants. The need for planning guidance as to where these plants could be sited and the role that the Mayor and LWaRB could play in supporting the development of these infant industries is also discussed. Inadequate infrastructure like the piping and grid connectivity should also not be forgotten. Finally, and not least, public concerns to any new technology require an effective communications strategy particularly if there are fears over possible health impacts.

We trust the Mayor will take on board the Committee's recommendations when putting together his waste management strategy this autumn.

Murad Qureshi AM

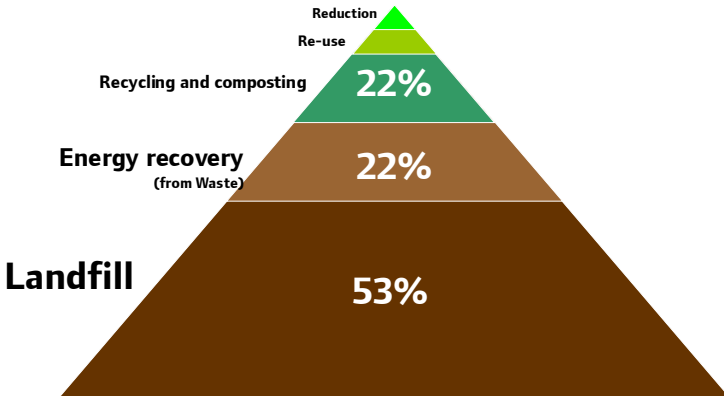
Chair of the Environment Committee

1 Introduction

Londoners produce 22 million tonnes of waste per year, over half of which is sent to landfill sites. This is both environmentally and economically unsustainable. As Londoners begin to reduce further their levels of waste that go to landfill there will be benefits from looking at ways to use parts of the waste stream as a resource, to produce both energy and heat for the benefit of local communities. This chapter provides a brief overview of schemes to generate energy from waste, the technologies involved and the potential benefits to London.

London's waste management is unsustainable and uneconomical. London produces about 22 million tonnes of waste per year, of which four million tones is municipal waste collected by London boroughs (3.3 million tonnes from households).[1] This is enough municipal waste to fill Canary Wharf tower every eight days.[2] Most of this waste is taken outside of London and buried in landfill sites.[3] Only 22 per cent of London's municipal waste is recycled, even though over 60 per cent of the rubbish we throw away could be.[4]

Chart 1: London municipal waste management hierarchy



London needs an alternative waste management strategy. According to the Mayor's draft Spatial Development Strategy (the London Plan) London's "waste arisings" are expected to increase to 34 million tonnes by 2031.[5] Landfill has always been the preferred disposal option due to its low cost compared with alternatives; however, it is no longer a sustainable option. The three main detrimental environmental effects are: production of greenhouse gases,

[1] London Waste and Recycling Board Business Plan, 2009/10
[2] Source: www.recycleforlondon.com
[3] Source: www.recycleforlondon.com
[4] The Mayor's Environment Programme: Leading to a greener London, page 36
[5] Consultation draft replacement London Plan, 5.66

(principally methane) from decomposing rubbish, the seeping of chemicals into surrounding aquifers and soil, and the lack of available space left in landfill sites.[6]

The Mayor and London Councils are now working towards a "zero waste to landfill" goal over the next 20 years. We welcome that commitment. Key to achieving that objective will be the public's commitment to, and government support for, minimising waste and boosting recycling rates. Mayoral targets, set out in the draft London Plan, are for a doubling in recycling rates to 45 per cent by 2015 and 50 per cent by 2020. This commitment is embedded in Policy 5.15 of the draft London Plan which aims to boost London's waste self-sufficiency.

The Mayor expects to publish a revised Waste Management Strategy in autumn 2009, which will address all of London's waste. The Mayor's stated aim is to support the boroughs in understanding better how waste can be used to derive an income and to catalyse development of London's waste infrastructure through the London Waste and Recycling Board (LWaRB).[7] To provide the necessary direction that London needs **we would welcome the explicit formulation of a regional waste to energy target in the revised Waste Management Strategy.** However, this should not take priority over efforts to improve the level of reuse, recycling and composting of household waste and therefore to reduce the volume of residual municipal solid waste (MSW) to a minimal level, even if this reduces the volume of material available to waste to energy plants.

The case for waste to energy conversion plants

Waste to energy conversion is a recognised approach to resolving two issues in one - waste management and sustainable energy. The rising costs of waste disposal and incentives to reduce landfill (landfill tax is set to increase by £8 per tonne per year, rising from £48 per tonne in 2010 to £72 in 2013) plus long term increasing energy prices from fossil fuels makes the economic argument of using waste to generate energy even stronger.

Where waste cannot be reused, recycled or composted, value should be recovered in the form of materials and energy. In the case of

[6] The Health Effects of Waste Incinerators, 4th Report of the British Society for Ecological Medicine, June 2008, Second Edition.
[7] Leading to a Greener London, op.cit, page 43

energy, this should be done using a process that is eligible for Renewable Obligation Certificates (ROCs) [8] and which maximises efficiency by using both the heat and the electric power, and minimises emissions of pollutants.

Defra's waste strategy for England 2007 states 'recovering energy from waste which cannot sensibly be recycled is an essential component of a well-balanced energy policy and…[Defra] expects energy from waste to account for 25 per cent of municipal waste by 2020/21.' [9]

The London Waste and Recycling Board was established under the Greater London Authority Act 2007 to facilitate waste management across London. The objective of the Board is to promote and encourage the production of less waste, an increase in the proportion of waste that is re-used or recycled and the use of methods of collection, treatment and disposal of waste that are more beneficial to the environment. The Board currently has funding of £84 million. This consists of £60 million over 3 years of government funding and up to £24 million over 4 years of London Development Agency funds for improving commercial and industrial waste management. The Board is currently reviewing a large number of tenders for support for projects designed to turn waste into energy.[10] A proposal for a new decentralised energy network in Barking is currently under consideration as one of the first projects to receive support.[11]

In the Environment Committee's investigation into air quality in London, we received written information about the harmful effects of $PM_{2.5}$ through incineration of waste. **We welcomed the statement by the London Waste and Recycling Board that it will not be investing in incineration projects, but focusing on new energy from waste technologies,** which may have a lower impact on air quality and CO_2 emissions.

[8] the UK requires electricity suppliers to source an increasing portion of their electricity from renewable sources and provides subsidies, in the form of Renewable Obligation Certificates (ROCs), to accredited generators of eligible renewable electricity. See Appendix 1 for more details

[9] http://www.defra.gov.uk/environment/waste/strategy/index.htm

[10] http://www.londoncouncils.gov.uk/Transport/lwarb/londonwasteandrecyclingboardwelcomeshugeresponsetofundingcall.htm

[11] http://www.london.gov.uk/view_press_release.jsp?releaseid=24038

While we welcome these on-going steps, our report sets out arguments for the Mayor to take further steps to help jump start the necessary reshaping of our waste management system. A vital piece of waste management infrastructure that is lacking in London is a mixed plastics recycling plant. The Committee's report about "On-the-go" recycling set out the arguments for such a facility in London. Having this plant in place will ensure that all mixed plastic is recycled and does not become part of the waste stream used to create energy.[12]

The rest of this report focuses on the new technological solutions that are being developed which could increase London's waste to energy capabilities. Our report, based on discussions with experts in the field, site visits and briefings, reviews a range of new technologies that manage this waste that would otherwise be sent to landfill. The Committee has reviewed non-thermal technology, anaerobic digestion (AD), mechanical biological treatment (MBT) and thermal technologies including pyrolysis and gasification to evaluate the potential for London.

Explanation of technologies

Non-thermal: Aerobic and anaerobic digestion is a mature and well-understood method of processing wet biological waste (food, sewage). Bacteria break down organic matter in the absence of oxygen (anaerobic) or with oxygen (aerobic) to produce biogas. This can be used as a renewable energy source, both for heat and power. Alternatively, the carbon dioxide and other impurities can be removed to produce biomethane which can be used as a transport fuel or injected into the gas grid. The treated material (or digestate) can be used as a fertiliser and soil conditioner.

Defra forecasts that by 2020 anaerobic digestion will be an established technology in the UK, playing an important role in reducing CO_2 emissions.[13] Estimates suggest the total amount of food waste available from domestic sources in the Greater London area is approximately 600,000 tonnes per annum[14] with a further 1,200,000 tonnes of commercial waste requiring disposal.[15] If this waste was treated by aerobic digestion and converted into electricity, it would

[12] http://www.london.gov.uk/assembly/reports/environment/on-the-go-may09.pdf
[13] http://www.defra.gov.uk/environment/waste/ad/pdf/ad-sharedgoals-090217.pdf
[14] This figure was produced by Eunomia in a report commissioned by the Government, information provided by Biogen
[15] Available commercial food waste from food retailers and restaurants is nationally on a 2:1 ratio to domestic, source: Biogen

provide enough power for approximately 75,000 homes.[16] The Mayor has an objective of getting an exemplar anaerobic digestion facility set up to convert, a modest, 30,000 tonnes of London food waste into vehicle fuel (or energy) and compost as soon as possible. We welcome that objective.

To find out more about aerobic digestion and how it could work in London, the Committee visited the Biogen plant in Bedfordshire. For further details please see the Committee's visit notes in Appendix 2.

Mechanical Biological Treatment involves two treatments: stage one mechanical sorting which involves shredding, screening and extraction to separate the oversized recyclables and biodegradable waste. A second stage applies to the biological waste fraction, where microbial activity breaks down the waste within a controlled and monitored environment. Mechanical biological treatment is seen as a pre-sort to other thermal technologies. Mechanical biological treatment is already being carried out in London: as part of its investigation, the Committee visited the Shanks plant in East London.[17] Further details are set out in Appendix 2 to this report.

Advanced Thermal Treatment (ATT) technologies are in their infancy in the UK, but some commercial scale plants are in operation in Europe, North America and Japan.[18] They include:

- **Gasification** which involves heating material to a high temperature (600 – 1200 degrees centigrade) with oxygen. A char residue plus synthetic gas is produced (syngas) - typically methane, carbon monoxide and hydrogen. This syngas can be used to produce heat, fuel for gas engines / turbines or for liquid fuel production.[19] The first gasification plant in London will be the Biossence plant in East London. Construction of the plant is due to start in

[16] Note: organic waste (including food) is one of the LWaRB priorities. Nineteen out of 33 boroughs offer a food waste scheme of which 3 are trial. The remaining 14 offer no organic collection at all. Of all food waste produced in London, 40 per cent is landfilled, 29 per cent recycled and 19 per cent incinerated. Source, London Waste and Recycling Board Business Plan, 2009/10

[17] http://www.shanks.co.uk/shanks-east-london/our-plans-for-the-area

[18] Costs of Incineration and Non-incineration Energy from Waste technologies, GLA, January 2008, page 49

[19] Costs of Incineration and Non-incineration Energy from Waste technologies, GLA, January 2008, page 49.

the next financial year, and the company will be looking to create an integrated local network taking waste materials from the neighbouring Shanks sorting facility and then providing the heat to nearby Ford factories.

- **Pyrolysis** involves indirect heating of the waste (400 – 1200 degrees centigrade) in an oxygen-free atmosphere. It produces char, tar and oils and a hydrocarbon gas. The organic material is converted into gases, which can be burnt to produce heat and electricity. The Committee visited a pyrolysis plant in Mitcham, South London to find out more about this process. See Appendix 2 for more detail.

The lack of an established track record of advanced thermal treatment plants operating in the UK on residual municipal solid waste is likely to be seen as posing a higher level of technologic risk by funding institutions.[20]

Incineration is where typically unsorted waste is burnt at high temperatures to reduce its volume and to produce heat and electricity. Plants have traditionally wasted this heat by exhausting it to the atmosphere. A purpose built Energy from Waste (EfW) plant is designed to provide usable electric heat and energy, unlike a conventional incinerator, which is designed primarily to reduce the volume of waste. The Environment Agency states this process produces acid gases, particulates, dioxins and heavy metals to air and ash residues. Since the end of 2005 all energy from waste plants have been subject to the European Waste Incineration Directive, with much tighter controls on emission limits and improved technology.[21] However, a report by Eunomia commissioned by Friends of the Earth states that "electricity only" incinerators emit one third more fossil CO_2 than gas power stations. The London Waste and Recycling board has committed it will not be providing funds to any incineration project.[22] It is important to note that incineration does not qualify for ROCs, and using this definition, is not a renewable energy source, unless operating in combined heat and power mode. The Committee visited

[20] http://www.london.gov.uk/mayor/environment/waste/docs/efwtechnologiesreport.pdf
[21] Overview by Environment Agency http://www.environment-agency.gov.uk/static/documents/Business/6_wip_key_facts_2147955.pdf
[22] Transcript of the Environment Committee meeting March 2009, Paul de Rivaz, Chief Operating Officer of LWaRB.

the SELCHP plant in South London, which still does not capture the heat produced from its incinerator.[23]

Recommendation 1

The Mayor is already committed to analysing the different waste collection streams within London and the overall implications for generating income from waste.[24] We welcome the proposed policy 5.17 in the draft London Plan which sets out the Mayor's commitment to identify opportunities for introducing new waste capacity, including sites for waste management and treatment. The Mayor's Waste Strategy should map out the potential capacity and possible locations for these non-incineration based technologies across London. The Waste strategy should also set out what role the Mayor could play to coordinate the development of an effective and cost efficient waste to energy infrastructure.

[23] A note of the Environment Committee's visit can be found at http://www.london.gov.uk/assembly/envmtgs/2009/envjul09/minutes/appendix-c.rtf

[24] Towards a Greener London, op.cit page 43

2 Potential Impacts

This chapter provides a summary of the impacts and benefits that waste to energy plants could bring to London. The environmental and economic benefits are set out below. However, there are significant concerns that we would like the Mayor to address in order to both reassure the public and ensure that the most efficient waste to energy processes are adopted in London.

Climate impacts of conversion technologies

The environmental benefits of converting London's waste to energy and heat are clear. If all of London's waste that cannot be recycled and currently goes to landfill were used to generate energy, it could generate enough electricity for up to two million homes and heat for up to 625,000 homes.[25] Waste to energy technologies could also help to provide much needed energy security. The National Grid has estimated that up to half of the UK's domestic gas heating could be met by turning waste into biogas.[26]

Indeed, non-incineration waste to energy technologies would help London to meet its various environmental targets, namely reducing greenhouse gases, reducing waste sent to landfill and increasing renewable energy generation:

The Mayor is committed to a target of reducing CO_2 emissions by 60 per cent of 1990 levels (18 million tonnes) by 2025.[27] He estimates that if London's waste were used to generate energy, this would reduce CO_2 by 1.2 million tones per year.[28]

Non-incineration waste to energy would significantly help to reduce waste sent to landfill. The government target is to reduce household waste that is not reused, composted or recycled by 50 per cent per person, between 2000 and 2020.[29] Boroughs have their own individual targets for reducing landfill and not meeting these could lead to expensive fines. Avoiding the landfill of municipal solid waste gives a climate change benefit in avoiding emissions of methane.

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[25] http://www.lda.gov.uk/server/show/ConWebDoc.2127 Note: heat is produced during the energy generation process, which should be captured and reused, in order to gain the maximum environmental benefit (it is up to three times as efficient as generating electricity only), Source Chartered Institute of Waste Management http://www.ciwm.co.uk/pma/3132
[26] http://www.nationalgrid.com/corporate/Our+Responsibility/News/newsbiogas.htm
[27] http://www.london.gov.uk/mayor/priorities/environment.jsp
[28] Leading to a greener London, July 2009
[29] http://www.defra.gov.uk/environment/waste/strategy/strategy07/pdf/waste07-strategy.pdf p109

Energy produced from these new technologies is potentially renewable (providing non-renewable materials such as petroleum derived plastic wastes are removed) and therefore eligible for ROCs, [30] which increases profitability and goes towards helping to achieve the central government target of 15 per cent of energy to be renewable by 2020. This was just 1.5 per cent in 2006.[31]

Benefits also extend to the economy and job creation. The waste management services market in the UK is currently valued at £6 billion and is projected to double by 2015. This would have a beneficial impact on job creation across the skill spectrum.[32] [33] In addition, HSBC reported that firms investing in climate-related activities have performed better than other companies on the stock market over the past five-and-a-half years despite the economic downturn.[34]

The LDA has committed to £18m in 2008/09 to start implementation of a suite of climate change programmes, which should support local job creation. The London Assembly's Budget and Performance Committee's Pre-Budget report raises concerns about the funding of these programmes.[35] This level of funding should be continuously monitored to ensure that these programmes are delivered as efficiently and effectively as possible. Furthermore, the Committee would welcome a statement from the Mayor in the Waste strategy as to the climate impacts of the different conversion methods. This would then help underpin the decisions by local authorities and developers as to which technologies to support and where they should be sited.

The potential health impacts of conversion technologies

The potential health impacts of these technologies are unclear. There is a gap in knowledge in the impact that waste to energy technologies have on air quality, especially if they are not subject to European directives. However, the Committee heard that it is very difficult to efficiently evaluate the air quality and other environmental impacts of the technologies because the performance of the schemes can be

[30] See Appendix 1 for an explanation
[31] Defra Anerobic Digestion: Shared Goals, February 2009.
[32] http://www.environmental-ktn.com/epicentric_portal/site/IPMNET/menuitem.2e04511a2f5b444d71e524100680e1a0/?mode=0
[33] 'Low carbon jobs for Europe: current opportunities and future prospects', WWF http://assets.panda.org/downloads/low_carbon_jobs_final.pdf
[34] HSBC quarterly review of climate change benchmark index www.endseurope.com/21570?referrer=bulletin
[35] http://www.london.gov.uk/assembly/reports/budget/pre-budget-report-09.pdf, page 63

different owing to differences in technology and the different mixes of waste used. A detailed study sponsored by Defra generated estimates of the health effects that might arise in the general population due to emissions from municipal waste facilities. The report concluded that "in view of the margin of uncertainty the presently available data does not allow us to say that one option for managing municipal solid waste is definitely better or worse than the other options".[36] The Committee would welcome publication of the Mayor's conclusions on the potential health of the new waste to energy technologies in the Waste strategy.

A risk to recycling rates?

At the Environment Committee's July meeting experts discussed the possibility that waste to energy plants could reduce recycling, as recyclable materials if not properly sorted will end up being processed at waste to energy plants. Plastic material is the main concern. WRAP state that mixed plastic recycling is economically viable, although there is no mixed plastics recycling plant in London. The Environment Committee has pressed for the establishment of a mixed plastics recycling plant in London to boost the self-sufficiency and effectiveness of London's recycling efforts.[37] WRAP states that "It is important to remember that the climate advantages of recycling plastics are much higher than the advantage of burning plastics for energy… Indeed, burning plastics inefficiently is much worse than landfilling." Friends of the Earth stated that if boroughs have fixed waste contracts, at a time when waste volumes are going down (for example in a recession), material that could have been recycled, is processed. This has happened in Denmark.[38]

Recommendation 2

The Mayor should set out in the Waste Strategy the GLA's conclusions as to the climate impacts and health effects of each of the waste to energy technologies. Publication of the evidence base upon which he bases his views could support a public communications strategy to promote the schemes to the public (see Recommendation 5).

[36] Review of Environmental and Health effects of waste management, Enviros, The University of Birmingham, Defra, May 2004
[37] http://www.london.gov.uk/assembly/reports/environment/on-the-go-may09.pdf
[38] Environment Committee meeting, July 2009, Friends of the Earth, p.5

3 Ways to overcome barriers to setting up waste to renewable energy plants

This chapter summarises the barriers that are preventing widespread use of waste to energy technologies and priorities for Mayoral action. The Committee recommends that the Mayor address the following points to ensure a successful waste to energy infrastructure is established in London.

Contracts

Contracts for the treatment of municipal waste are usually long term (20- 30 years). Nine of London's 16 Waste Disposal Authorities have long-term contracts in place that do not expire until 2014.[39] This can make it hard for potential companies to obtain waste material when boroughs are locked into long term contracts. This can also limit the type of material available to waste plants and it may not be collected in an ideal way. For example, aerobic digestion plants require food waste to be collected separately from green waste and other waste. Nevertheless, there are examples of creative joint working between waste collectors and waste disposal authorities that can bring forward innovative waste solutions. For example, the Royal Borough of Kensington and Chelsea in partnership with SITA UK recently announced the launch of its first refuse vehicle to be powered by landfill gas.[40]

Recommendation 3

The Committee recommends that the London Waste and Recycling Board should bring together information on all the contracts that boroughs have entered into and provide advice on how to ensure they will generate the waste streams necessary to support new waste to energy plants.

Planning

Planning can be one of the main barriers to setting up a plant. The additional powers granted to the Mayor under the 2007 Act have gone part of the way to addressing this, as the Mayor can take decisions on plants processing over 50,000 tonnes per year. However, smaller infrastructure, especially for advanced thermal treatment plants and

[39] http://www.london.gov.uk/mayor/environment/waste//docs/lswa/proposal.pdf
[40] http://www.rbkc.gov.uk/pressrelease/pressrelease.asp?id=3120

anaerobic digestion sites, will be under this threshold and subject to borough decisions. London will need a range of plant size and technology types and there will need to be coordination by the Mayor to ensure the right fit of location and energy/heat output; for example larger sites can not always maximise the opportunity of using heat, whereas smaller sites can be located amongst housing or industrial units and use the heat generated locally. EPI have sited their pyrolysis plant in a current waste treatment area, which underpinned their business model and helped during the planning process.

Our first recommendation calls for the Mayor's Waste Strategy (and London Plan) to map possible locations for the new technologies.

Unproven technology

Despite a small number of demonstrator projects, there is little evidence of these new technologies (especially gasification and pyrolysis) performing at full commercial scale in the UK. Therefore, gaining start-up finance and underwriting of the risk is very difficult. Financial assistance from the Mayor through the LWaRB is crucial to allow plants to demonstrate their effectiveness at scale and value for money. Whilst bigger companies can afford to take greater risks, the majority of emerging technologies are smaller companies or start ups, that do not have financial backing.

Recommendation 4

The London Waste and Recycling Board should sponsor due diligence, where outside consultants assess the site's capabilities, to reassure potential investors. In addition, the LWaRB should when considering tender offers look at using a specific proportion of its resources to underwrite start-up loans from private sector sources.

Public opposition

Public opposition is one of the greatest barriers to the uptake of waste to energy. Concerns include health effects from air pollution (Nitrogen Oxide (Nox), and Sulphur Dioxide (SO2), dioxins, fine particles) contamination of water, increased noise, accidents, extra traffic, odour and vermin. A lack of good public and stakeholder consultation in an

inclusive and open manner early on in the process is seen as a reason why many potential projects fail to get planning permission.[41]

Recommendation 5

LWaRB is already committed to support the Recycle for London campaign from 2010. LWaRB should work with waste to energy operators to ensure that public concerns are dealt with sufficiently, and that people are informed of the facts and benefits of waste to energy plants. A publicity campaign should be linked to the opening of the anaerobic digestor plant that the Mayor is promoting.

Inadequate infrastructure

Inadequate infrastructure including the inability to capture generated heat is a barrier to the efficiency of waste to energy plants. Increasing the use of heat generated from plants is one of the cheapest ways of reducing CO2 emissions. However, if the infrastructure is not included at the initial stages of a new development it is very expensive to retrofit. The Scottish Environmental Protection Agency (SEPA) is now requiring that a heat utilisation plan is included in any new applications to build a facility.[42]

Recommendation 6

The Mayor should incorporate a requirement for heat utilisation plans in the London Plan, particularly where this could feed into new housing developments.

Grid Connectivity

Grid connection is another barrier when selling excess energy generated back to the grid. It can be expensive to install and may also take a long time depending on the geographic location of the facility relative to sub stations. It is essential that connecting to the grid is

[41] http://www.environmental-ktn.com/epicentric_portal/site/IPMNET/menuitem.2e04511a2f5b444d71e524100680e1a0/?mode=0

[42] http://www.environmental-ktn.com/epicentric_portal/site/IPMNET/menuitem.2e04511a2f5b444d71e524100680e1a0/?mode=0 (p.25)

made simpler, otherwise valuable energy collected through these plants will be lost.

A district heating scheme in Sheffield is providing over 140 buildings of all sizes and types with a low carbon energy source generated locally. More than 44 kilometres of underground pipes deliver energy generated by energy recovery to some of the city's most prestigious and landmark buildings. On average every year, the District Energy Network prevents over 21,000 tonnes of CO_2 from being released across the city. However, some new developments are not linking up to the scheme because they do not want to pay the cost of installing the infrastructure.

Recommendation 7

The Mayor's Waste Strategy should state how grid connections will be financed in London.

Conclusion

This is an important time to take stock of how London is managing its waste. As the Mayor recognises consumer attitudes towards waste have started to shift. The exigencies of climate change and the state of public finances make the need to develop new techniques and ways of working, particularly non-incineration waste to energy technologies, a priority.

The Mayor has a unique opportunity with the publication of his Waste Strategy and his Spatial Development Strategy (the London Plan) to catalyse the rapid deployment of these new technologies. The Mayor has made a start in the right direction and we welcome his initiatives. However, more could be done. Our recommendations are pragmatic and short-term. Full implementation would help remove many of the barriers that are preventing a rapid roll-out of these new exciting technologies to turn waste into a useful valuable commodity, energy.

Appendix 1 Promoting renewable energy generation

Renewables Obligation (RO)?[43]

The RO is the main support scheme for renewable electricity projects in the UK. It places an obligation on UK suppliers of electricity to source an increasing proportion of their electricity from renewable sources. A Renewables Obligation Certificate (ROC) is a green certificate issued to an accredited generator for eligible renewable electricity generated within the United Kingdom and supplied to customers within the United Kingdom by a licensed electricity supplier. One ROC is issued for each megawatt hour (MWh) of eligible renewable output generated.

ROCs are designed to incentivise renewable generation into the electricity generation market. These schemes were introduced by the Department of Trade and Industry and are administered by the Gas and Electricity Markets Authority (whose day to day functions are performed by Ofgem).

The Renewables Obligation Order came into effect in April 2002. The Orders place an obligation on licensed electricity suppliers to source an increasing proportion of electricity from renewable sources. In 2005-06 it was 5.5 per cent. The current level is 9.1% for 2008/09 rising to 15.4% by 2015/16. This is set out in the Renewables Obligation Order.

Suppliers meet their obligations by presenting sufficient Renewables Obligation Certificates (ROCs). Where suppliers do not have sufficient ROCs to meet their obligations, they must pay an equivalent amount into a fund, the proceeds of which are paid back on a pro-rated basis to those suppliers that have presented ROCs. The Government intends that suppliers will be subject to a renewables obligation until 31 March 2027.

It is expected that the Obligation, together with exemption from the Climate Change Levy for electricity from renewables, will provide support to industry of up to £1bn per year by 2010.

At the end of 2007 generation from renewable sources eligible under the Obligation stood at 4.9%. This rises to 5% if non-eligible sources are included.

[43] Source: BERR Energy Trends June 2008

Under RO banding, which came into force in April this year, different technologies now receive different numbers of ROCs per MWh generated. Under the scheme, ATT and AD technologies producing power qualify for double ROCS and conventional EfW technologies using CHP qualify for 1 ROC. New plants based on some established technologies, such as landfill gas and sewage gas, qualify only for one or part of a ROC for each MWe generated. Where waste is mixed the ROC is only eligible on the biomass content and the RO order deems that municipal waste has a 50% biomass content unless further proof is given of higher content.

Appendix 2 Case Studies

Twinwoods Anaerobic Digestion (AD) Facility, Bedford

AD is a complex biological process using naturally occurring micro-organisms in the absence of oxygen to break down organic matter. The process results in the production of fertiliser and biogas. The biogas can be burnt to produce electricity and heat or could be compressed and used to power vehicles. The fertiliser produced is both rich in nutrients and consistent and has resulted in increases in yield of as much as 60 per cent on the company's own farm. The Twinwoods AD facility can handle 42,000 tonnes of waste per year: 12,000 tonnes of pig slurry and 30,000 tonnes of food waste.

New AD plants require normal planning permission, a waste management licence, an animal by-products licence, renewable electricity accreditation, and biofertiliser land use exemption. There had been little public opposition to the building of this facility and early engagement with the public was seen as being key to the positive response. Fifteen to eighteen months is usual to set up an AD facility from scratch and processing 30,000 tonnes per year is certainly considered to be commercially viable.

Participation in waste food recycling is high, with between 65 and 72 per cent of households taking part. Ealing Council collects between 1.93 and 2.01 kilogrammes of food waste per household each week. In terms of interest in AD in London, a number of other local authorities, including the London boroughs of Hackney, Hounslow, Richmond on Thames and Ealing are already working with BiogenGreenfinch to process food waste.

Vertal Plant ATAD process, Mitcham

The Vertal Autothermal Thermophilic Aerobic Digestion (ATAD) system uses a special process to take organic liquids and food waste to produce a high nutrient organic fertiliser as an alternative to fossil fuel based fertilisers.

The plant uses an innovative wet in-vessel aerobic process known as third generation ATAD that generates temperatures of up to 80°C to completely pasteurise and treat the food waste. The Vertal process has advantages over the usual in-vessel (IVC) and traditional composting methods as its has a small operating footprint (approx 35,000sq/ft); rapid processing times; is energy efficient and has a low carbon footprint as the process requires no external heat source as the food is broken down by bacteria. It is well suited to urban areas.

The Mitcham plant is due to open in October 2009 with a further nine plants planned through out the UK. The Mitcham plant would be capable of processing over 70,000 tonnes of food waste a year (currently 15 million tonnes of food waste are sent to landfill every year). The system accepts both loose food waste from the catering industry and packaged waste from food retails outlets so that food outlets do not have to separate food on site saving space and staff time.

EPi Pyrolysis plant, Mitcham

The plant takes mixed waste and following the removal of metals and glass, it is dried and shredded before being fed into the processor unit where it is heated to very high temperatures (circa 1,000 degrees centigrade) in an oxygen-free atmosphere. This produces a high quality gas ready for use in engines or to produce electricity. Any remaining energy is left behind as a carbon rich char - a coal-like substance, which can be burnt as fuel (like coal) or used in road building.

EPi is currently looking to establish a series of small modular pyrolysis units, each to operate on a different material stream, at various locations outside London. The Committee visited a test site on an industrial estate in Mitcham. It has a single processor unit, which can process 8,000 tonnes of waste a year and EPi is expecting to expand this by four additional units to process 40,000 tonnes per year (which is the average waste requirement for a typical county town). This would produce enough electricity to power an estimated 7,000-10,000 homes. This size of plant would require around 12,500 sq ft of covered space and a smaller version could be developed for use near to large buildings such as sports centres and hospitals, which can use both the heat and power produced. The long-term plan at Mitcham is to sell heat to other units (such as a 24 hour bakery) on the estate.

The benefits of this process are that as the waste is not burnt, more energy is captured than through the incineration process, there are no harmful emissions and there is no smoke to be released through a flue. The process is odourless and virtually noiseless. In addition, the size of the operation meant that recent planning applications for 40,000 tonne plants had been approved in 12 weeks. The current regulatory position for EPi, is that permitting is regulated by the Local Authority Environmental Health Department.

East London Sustainable Energy Facility Gasification Plant, Rainham

The East London Sustainable Energy Facility (ELSEF), which was granted planning permission in September 2006, will be situated near the Fairview Industrial Estate, Rainham. The plant will process approximately 98,000 tonnes per annum of solid recoverable fuel (SRF) under a long-term fuel supply contract from the nearby Frog Island and Jenkins Lane Mechanical Biological Treatment plants operated by Shanks East London.

ELSEF will use an Advanced Thermal Conversion gasification process to generate electricity. The plant will generate 18-20 megawatts of electrical power and approximately 10 megawatts of thermal power (subject to the agreement of a long term heat offtake contact). The electricity will either be sold to the near-by Ford plant or to the National Grid.

Gasification does not produce the tar which is produced by pyrolysis and although the gas is of a lower calorific value, it is cleaner than traditional pyrolysis processes. The opportunities of this process include the vast amounts of hot water produced so it would be beneficial to be linked to a district heating scheme. In addition, this technology, like pyrolysis, would work well alongside technologies that deal with food waste, as it needs dry waste to work effectively.

Shanks Bio-MRF, Frog Island, Rainham

The East London Waste Authority[44] (ELWA) and Shanks opened the £45million waste treatment facility on Frog Island, Rainham, in April 2007, in order to divert the amount of waste sent to landfill. This bio-Material Recycling Facility (MRF) is the first large scale recycling and recovery plant of its kind in the UK using Mechanical and Biological Treatment (MBT) technology. The process extract recyclates from the waste stream and treats up to 180,000 tonnes of household rubbish by shredding and then drying the residual waste to produce solid recovered fuel (SRF), which can then be used by local businesses in place of fossil fuels. It is a clean power source with a similar calorific value to coal. SRF is a source of renewable energy which displaces the need to burn fossil fuels. The fuel can be used in existing facilities in the UK.

[44] Responsible for the management of municipal waste disposal from the London Boroughs of Barking & Dagenham, Newham, Havering and Redbridge

The four boroughs served by the MRF are traditionally the lowest recyclers in the country and Shanks aim to divert 67 per cent of household waste from landfill by 2016. Planning permission for the site has been relatively easy to secure, as the plant was located on an industrial area. The fuel is currently burnt in cement kilns, but will be sent t the ELSEF plant once in operation. However, there is currently was no method to capture the heat produced by the process.

Appendix 3 Recommendations

Recommendation 1
The Mayor is already committed to analysing the different waste collection streams within London and the overall implications for generating income from waste.[45] We welcome the proposed policy 5.17 in the draft London Plan which sets out the Mayor's commitment to identify opportunities for introducing new waste capacity, including sites for waste management and treatment. The Mayor's Waste Strategy should map out the potential capacity and possible locations for these non-incineration based technologies across London. The Waste strategy should also set out what role the Mayor could play to coordinate the development of an effective and cost efficient waste to energy infrastructure.

Recommendation 2
The Mayor should set out in the Waste Strategy the GLA's conclusions as to the climate impacts and health effects of each of the waste to energy technologies. Publication of the evidence base upon which he bases his views could support a public communications strategy to promote the schemes to the public (see Recommendation 5).

Recommendation 3
The Committee recommends that the London Waste and Recycling Board should bring together information on all the contracts that boroughs have entered into and provide advice on how to ensure they will generate the waste streams necessary to support new waste to energy plants.

Recommendation 4

The London Waste and Recycling Board should sponsor due diligence, where outside consultants assess the site's capabilities, to reassure potential investors. In addition, the LWaRB should when considering tender offers look at using a specific proportion of its resources to underwrite start-up loans from private sector sources.

Recommendation 5

LWaRB is already committed to support the Recycle for London campaign from 2010. LWaRB should work with waste to energy operators to ensure that public concerns are dealt with sufficiently, and that people are informed of the facts and benefits of waste to

[45] Towards a Greener London, op.cit page 43

energy plants. A publicity campaign should be linked to the opening of the anaerobic digestor plant that the Mayor is promoting.

Recommendation 6
The Mayor should incorporate a requirement for heat utilisation plans in the London Plan, particularly where this could feed into new housing developments.

Recommendation 7
The Mayor's Waste Strategy should state how grid connections will be financed in London.

Appendix 4 Orders and translations

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Chinese

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Email 与我们联系。

Hindi

यदि आपको इस दस्तावेज का सारांश अपनी भाषा में
चाहिए तो उपर दिये हुए नंबर पर फोन करें या उपर दिये
गये डाक पते या ई मेल पते पर हम से संपर्क करें।

Vietnamese

Nếu ông (bà) muốn nội dung văn bản này được dịch sang
tiếng Việt, xin vui lòng liên hệ với chúng tôi bằng điện
thoại, thư hoặc thư điện tử theo địa chỉ ở trên.

Bengali

আপনি যদি এই দলিলের একটা সারাংশ নিজের ভাষায় পেতে চান,
তাহলে দয়া করে ফো করবেন অথবা উল্লেখিত ডাক ঠিকানায় বা
ই-মেইল ঠিকানায় আমাদের সাথে যোগাযোগ করবেন।

Greek

*Εάν επιθυμείτε περίληψη αυτού του κειμένου στην γλώσσα
σας, παρακαλώ καλέστε τον αριθμό ή επικοινωνήστε μαζί
μας στην ανωτέρω ταχυδρομική ή την ηλεκτρονική διεύθυνση.*

Urdu

اگر آپ کو اس دستاویز کا خلاصہ اپنی زبان میں
درکار ہو تو، براہ کرم نمبر پر فون کریں
یا مذکورہ بالا ڈاک کے پتے یا ای میل
پتے پر ہم سے رابطہ کریں۔

Turkish

Bu belgenin kendi dilinize çevrilmiş bir özetini
okumak isterseniz, lütfen yukarıdaki telefon
numarasını arayın, veya posta ya da e-posta
adresi aracılığıyla bizimle temasa geçin.

Arabic

الحصول على ملخص لهذا المستند بلغتك،
فرجاء الاتصال برقم الهاتف أو الاتصال على
العنوان البريدي العادي أو عنوان البريد
الإلكتروني أعلاه.

Punjabi

ਜੇ ਤੁਸੀਂ ਇਸ ਦਸਤਾਵੇਜ਼ ਦਾ ਸੰਖੇਪ ਆਪਣੀ ਭਾਸ਼ਾ ਵਿਚ ਲੈਣਾ
ਚਾਹੋ, ਤਾਂ ਕਿਰਪਾ ਕਰਕੇ ਇਸ ਨੰਬਰ 'ਤੇ ਫ਼ੋਨ ਕਰੋ ਜਾਂ
ਉਪਰ ਦਿੱਤੇ ਡਾਕ ਜਾਂ ਈਮੇਲ ਪਤੇ 'ਤੇ ਸਾਨੂੰ ਸੰਪਰਕ ਕਰੋ।

Gujarati

જો તમારે આ દસ્તાવેજનો સાર તમારી ભાષામાં
જોઈતો હોય તો ઉપર આપેલ નંબર પર ફોન કરો
અથવા ઉપર આપેલ ટપાલ અથવા ઈ-મેઈલ સરનામા
પર અમારો સંપર્ક કરો.

Appendix 5 Principles of scrutiny page

An aim for action
An Assembly scrutiny is not an end in itself. It aims for action to achieve improvement.

Independence
An Assembly scrutiny is conducted with objectivity; nothing should be done that could impair the independence of the process.

Holding the Mayor to account
The Assembly rigorously examines all aspects of the Mayor's strategies.

Inclusiveness
An Assembly scrutiny consults widely, having regard to issues of timeliness and cost.

Constructiveness
The Assembly conducts its scrutinies and investigations in a positive manner, recognising the need to work with stakeholders and the Mayor to achieve improvement.

Value for money
When conducting a scrutiny the Assembly is conscious of the need to spend public money effectively.

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