RESIDUAL WASTE MANAGEMENT IN THE UK

Dr Colin Brown CEng FIMechE

22 November 2013

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Improving the world through engineering

AGENDA.

01 An overview of current UK waste management

02 Comparisons and contrasts with Hong Kong

03 Composition and stored energy analysis

04 Installed UK waste treatment capacity

05 UK Legislation plans

06 Projected new UK treatment facilities

07 Conclusions

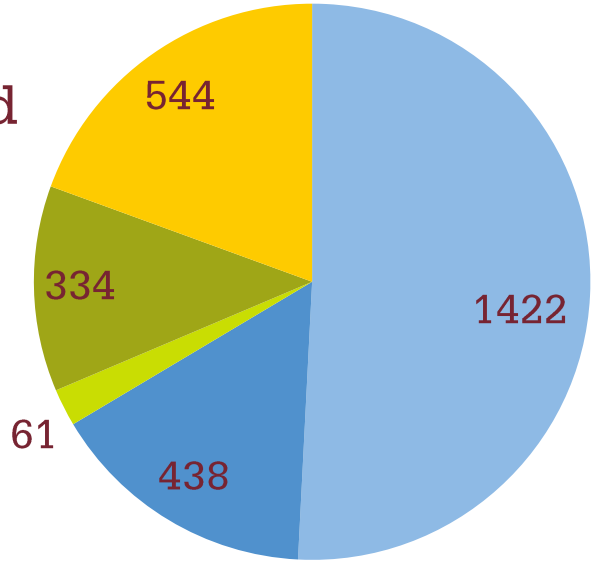
01

CURRENT UK WASTE MANAGEMENT.

01 CURRENT UK WASTE MANAGEMENT

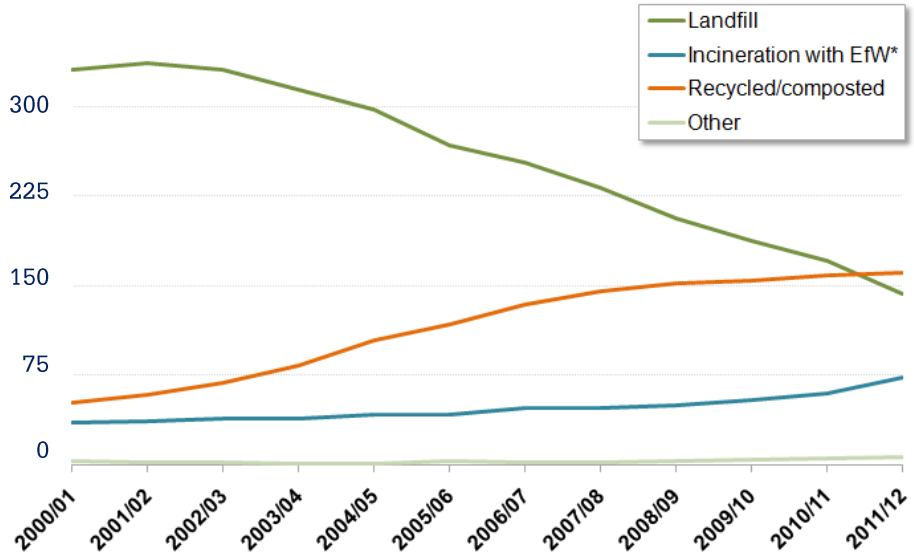
Actual UK waste collected

Expressed as kg/person/year



- Construction and Demolition Waste
- Household Waste
- Other Local Authority Collected Waste
- Municipal & Commercial & Industrial Waste
- Non-Municipal Commercial & Industrial Waste

Trends in household waste over the last ten years



*Energy from Waste

02

COMPARISONS AND CONTRASTS WITH HONG KONG.

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	UK	Hong Kong
Population	64 million	7 million
Median Age	40.2 years	40.7 years
GDP per capita	US$36,901	US$30,088
Domestic Waste arisings	438kg/person/yr	496kg/person/yr

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Domestic Landfill	185kg/person/yr	307kg/person/year

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COMPOSITION AND STORED ENERGY ANALYSIS.

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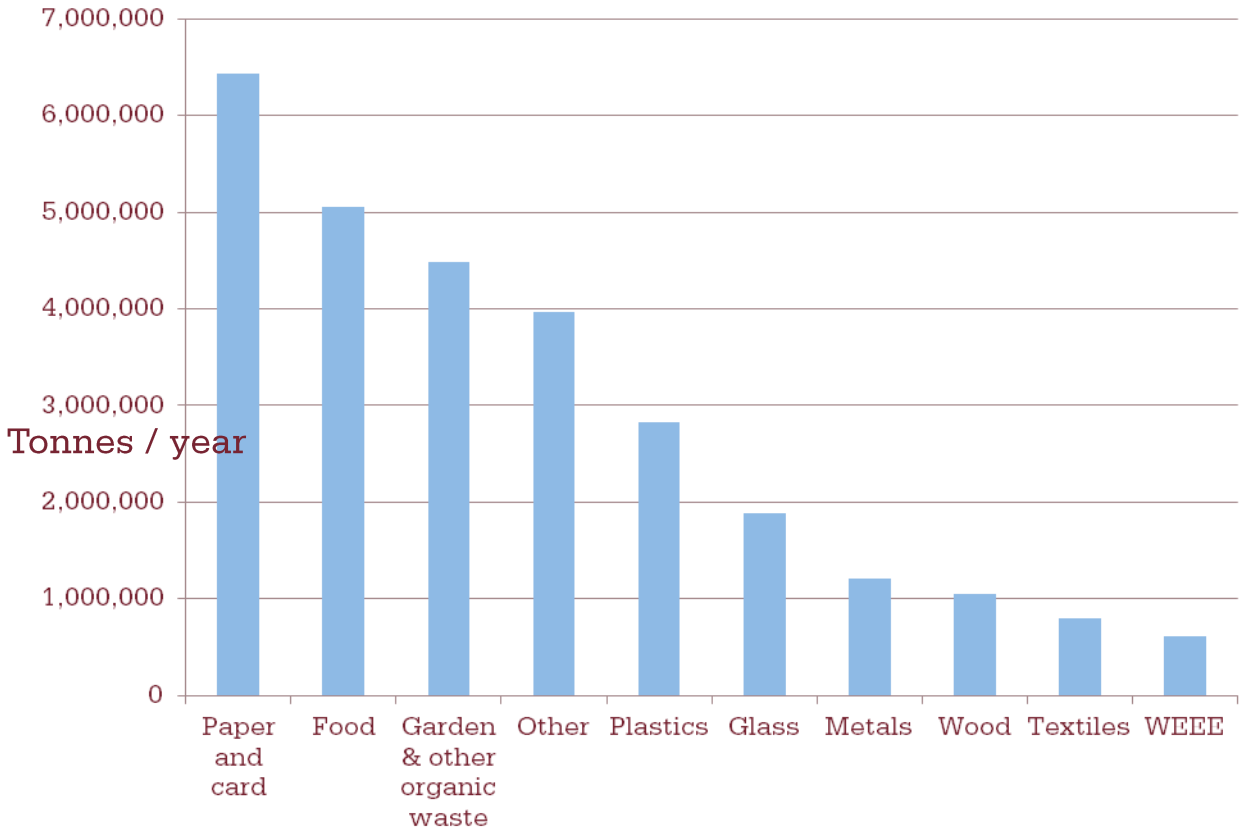
Average Composition of UK Household Waste*

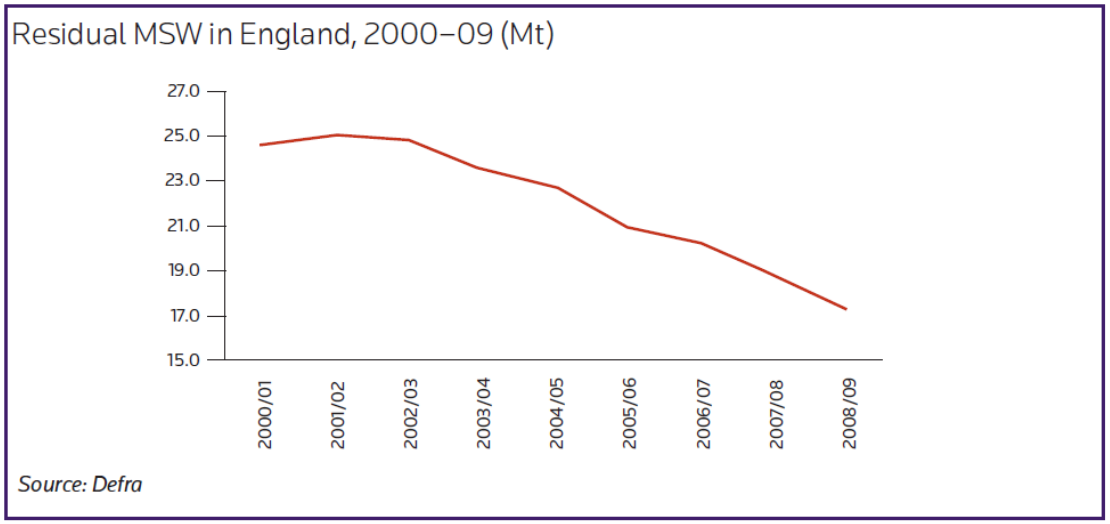


* 2006 DEFRA

03 COMPOSITION AND STORED ENERGY ANALYSIS

Residual Waste is reducing in the UK

The weight of Residual MSW in England is reducing by 1.2Mt each year.



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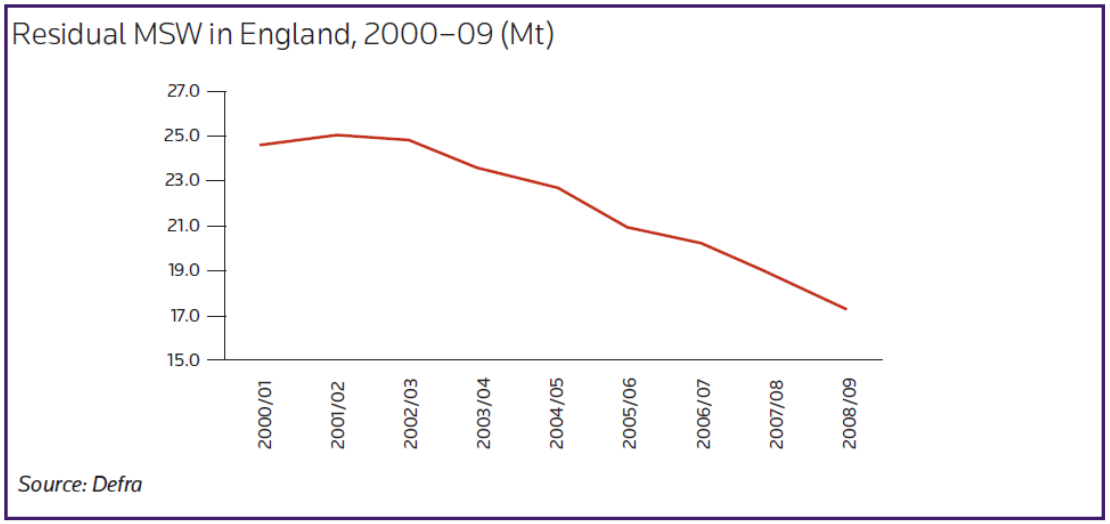
Based on the current calorific value of Residual MSW this is removing £314M a year of equivalent energy value from the residual waste stream.



03 COMPOSITION AND STORED ENERGY ANALYSIS

Options for treating waste

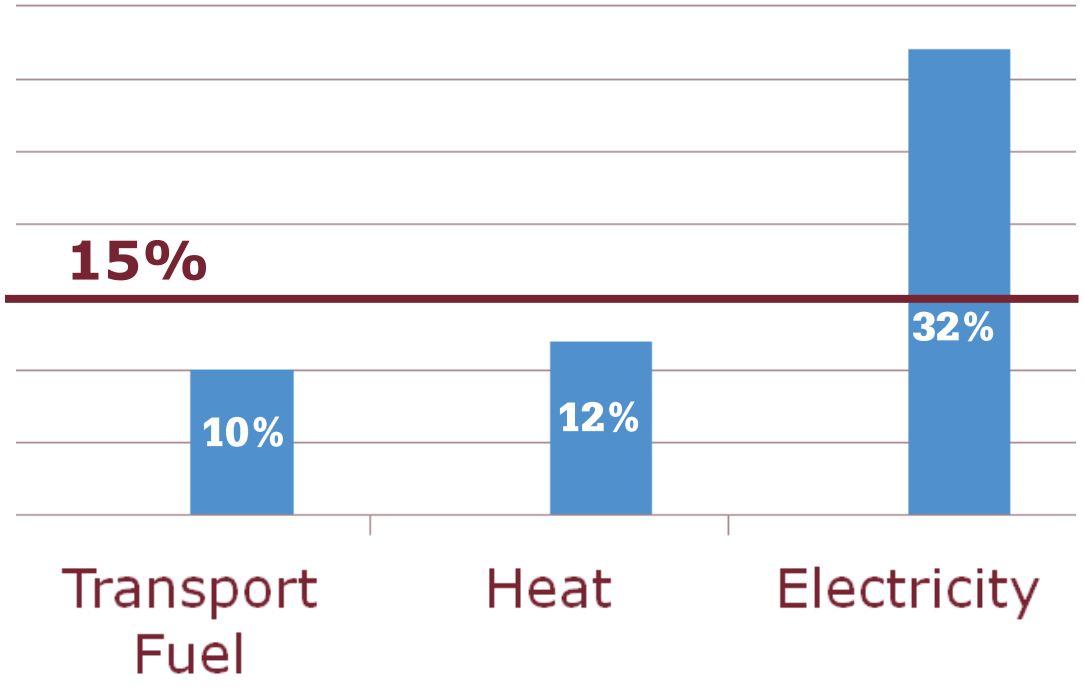
Diminishing returns from too much recycling*

* http://www.imeche.org/docs/default-source/position-statements-energy/WasteasaResourceIMechEPolicy.pdf?sfvrsn=0

03 COMPOSITION AND STORED ENERGY ANALYSIS

EU Renewable Energy Directive

15% of Energy by 2020

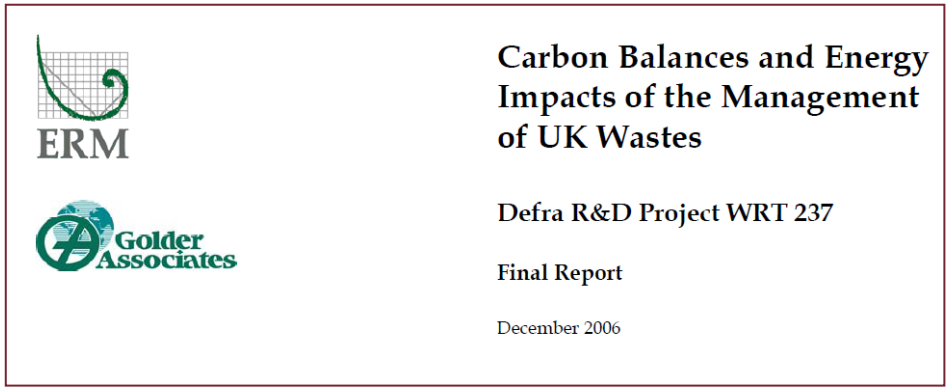


03 COMPOSITION AND STORED ENERGY ANALYSIS

UK Government analysis in 2006

Carbon flows from:-

- Energy used in processing and transport
- Releases from the waste material
- Avoidance of greenhouse gas emission elsewhere
- Sequestration of carbon in soils



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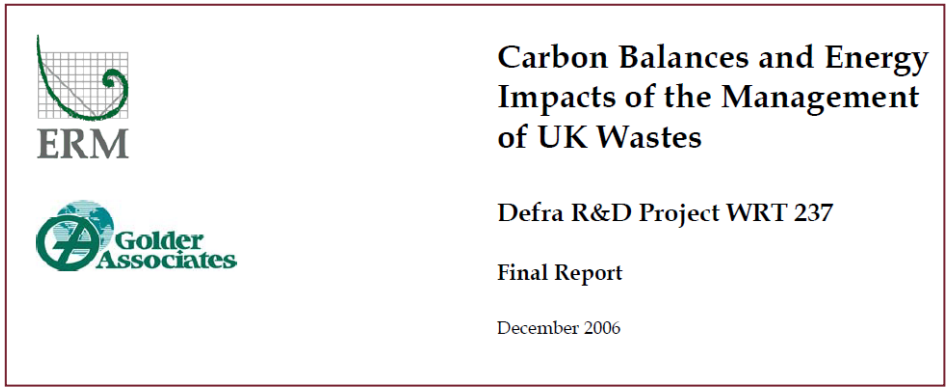

Conclusions to encourage:-

- Anaerobic digestion of agricultural and kitchen wastes
- Combustion of waste wood, crop and other organic wastes
- Balanced recycling with combustion of paper and card

* http://www.fcrn.org.uk/sites/default/files/ERM_Carbon_balances_and_energy_impacts_of_waste.pdf

04

INSTALLED UK WASTE TREATMENT CAPACITY.

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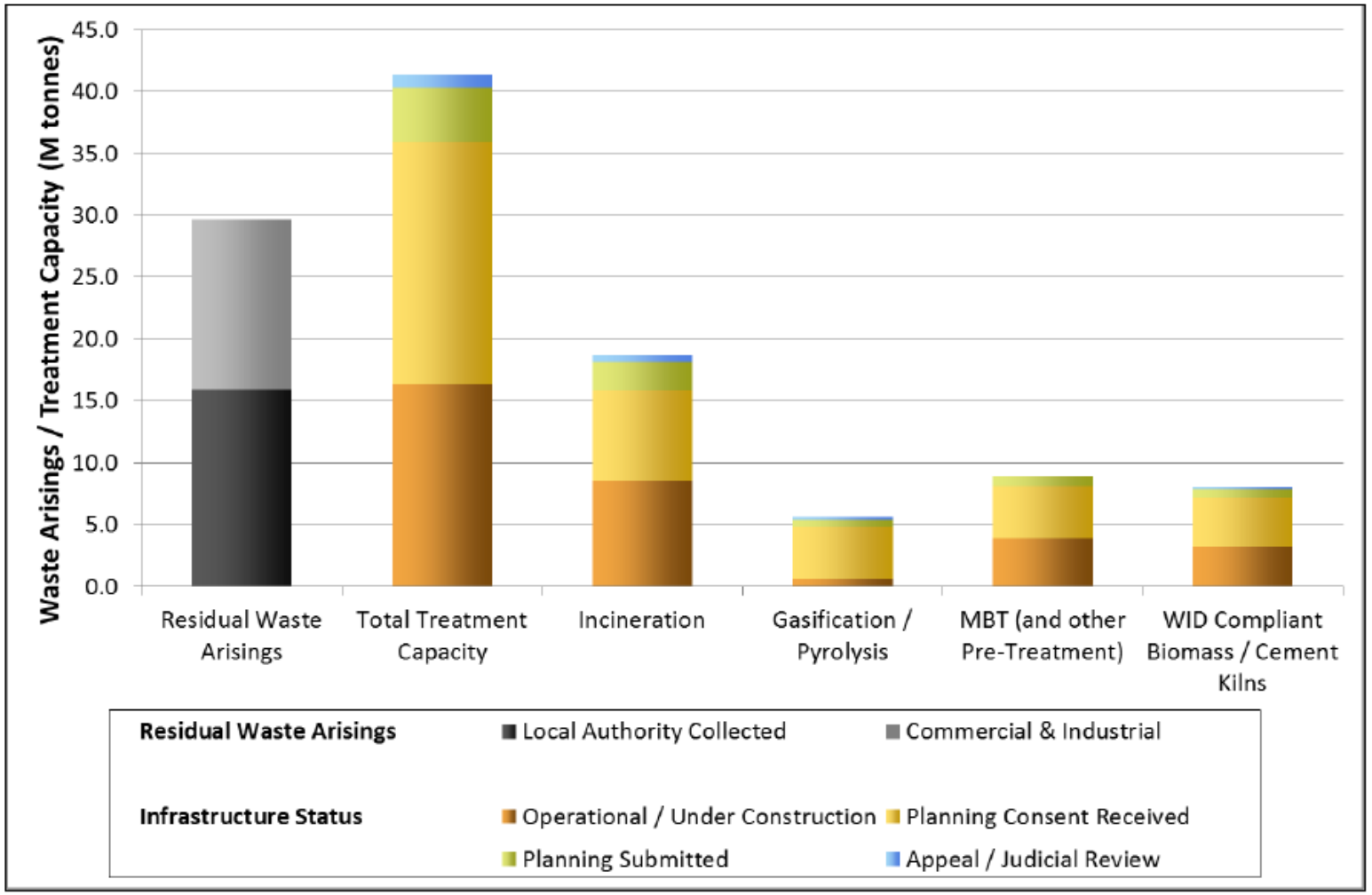
UK residual waste arisings (2011/12)



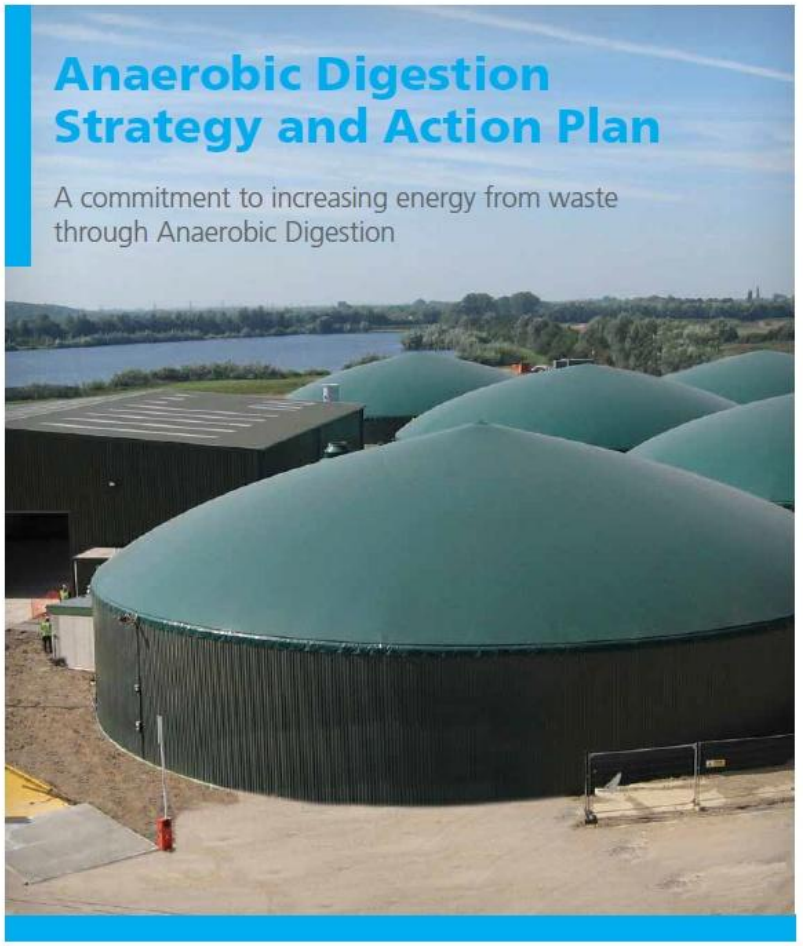
04 INSTALLED UK WASTE TREATMENT CAPACITY

Anaerobic digestion

Currently only 2.2million tonnes of installed capacity

Target for over 7 million tonnes capacity by 2020, producing approximately 3.5TWh of electricity

(Enough to supply 913,000 households and save 1.8Mt of CO_2e from grid-based electricity production)



DEPARTMENT OF ENERGY & CLIMATE CHANGE

defra
Department for Environment Food and Rural Affairs

04 INSTALLED UK WASTE TREATMENT CAPACITY

Incineration (8.3Mt in 2011)

Waste Incineration Directive

Minimum of 850^{0}C for 2s
Emission limits for
- SO_2
- NO_x
- HCl and HF
- VOCs
- CO
- Particulate
- Heavy Metals
- Dioxins and furans
- Bottom ash carbon content

Energy recovery of 3.2TWh

www.defra.gov.uk

Department
for Environment
Food & Rural Affairs

Incineration of Municipal Solid Waste

February 2013

05

UK LEGISLATION PLANS

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Rt Hon Owen Paterson MP
Secretary of State for DEFRA
9 April 2013

Waste prevention programme

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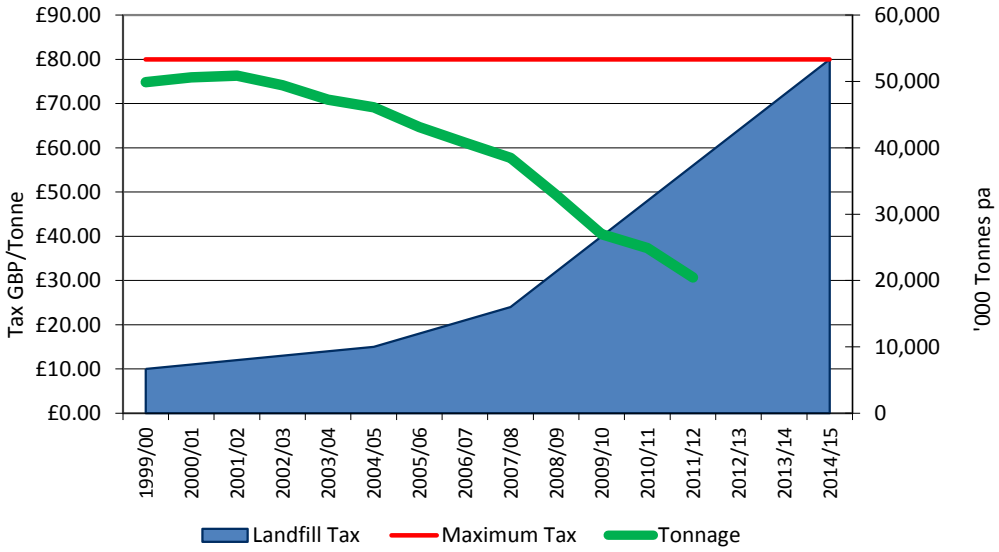
New measures on waste crime

05
UK LEGISLATION PLANS

Landfill Tax

EU Landfill Directive

Target maximum of 35% of 1995 level of biodegradable municipal waste to landfill by 2020
(12.5 million tonnes / year)
(195kg/person/year)



Treatment Type	Technology	Median Gate Fee
Recycling	MRF	£9/tonne
	AD	£41/tonne
Residual Waste	MBT	£79/tonne
	EfW	£82/tonne
Landfill		£101/tonne

05
UK LEGISLATION PLANS

Renewable Energy Directive

Financial Incentive	EfW Combustion	Gasification / Pyrolysis	Anaerobic digestion
Renewables Obligation	Only qualifies for ROCs if it is CHP	Eligible, and currently earns 2ROCs/MWh	Eligible, and currently earns 2ROCs/MWh
Renewable Heat Incentive	Inconsistent Only MSW is eligible. C&I waste does not qualify Receives 2.7p/kWh	Inconsistent Installations are only eligible if below 200kW. Biomethane injection qualifies at any scale. Receives 6.8p/kWh	Inconsistent Installations only eligible if below 200kW. Biomethane injection qualifies at any scale. Receives 6.8p/kWh for biogas combustion or biomethane injection (Landfill gas is excluded)
Renewable Transport Fuel Obligation	Not applicable Biofuels are not produced by EfW combustion plant	Pyrolysis plant could produce renewable diesel and gasification plant biomethane	Biomethane qualifies for the RTFO, but requires suitable vehicles to use it – also, the RTFO provides a far weaker financial incentive than the RHI
Feed In Tariffs	Not applicable	Inconsistent Not eligible	Biogas plant are eligible for FITs

Source: REA – "Energy from Waste" September 2011

06

PROJECTED NEW UK TREATMENT CAPACITY

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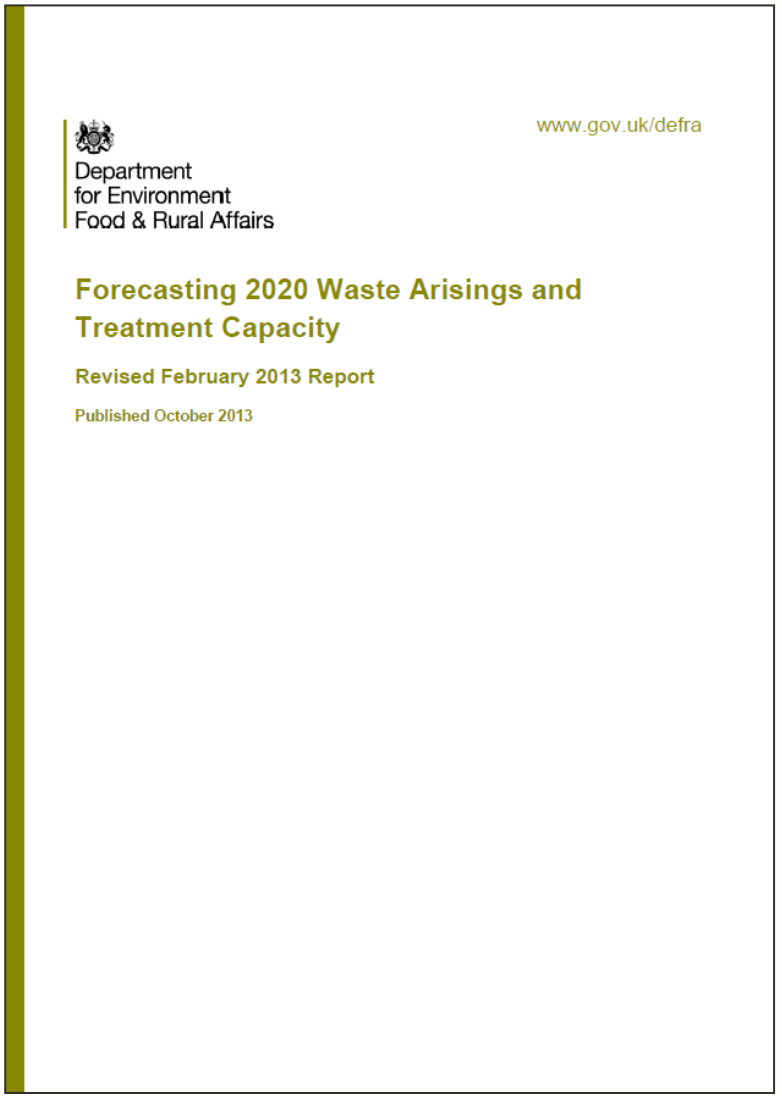
We have enough capacity

"We now expect to have sufficient infrastructure in England to enable the UK to meet the EU target of reducing waste sent to landfill. Consequently the decision has been taken not to fund [further] projects"

DEFRA, February 2013


www.gov.uk/defra

Department
for Environment
Food & Rural Affairs

Forecasting 2020 Waste Arisings and Treatment Capacity

Revised February 2013 Report

Published October 2013

06 PROJECTED NEW UK TREATMENT CAPACITY

Green Investment Bank

Priorities

- Offshore wind
- Waste
- Non-domestic energy efficiency

Capitalised with £3bn

"complement other green policies to help accelerate additional capital in green infrastructure"

07

CONCLUSIONS

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Public Opinion

FOE oppose incineration

- it worsens climate change
- it wastes resources and undermines recycling
- it causes pollution from emissions and ash

September 2007

Briefing

Friends of the Earth

Up in smoke

Why Friends of the Earth opposes incineration

07 CONCLUSIONS

The Waste Incineration Directive

Total dust	10 mg/m^3
Gaseous and vaporous organic substances, expressed as total organic carbon	10 mg/m^3
Hydrogen chloride (HCl)	10 mg/m^3
Hydrogen fluoride (HF)	1 mg/m^3
Sulphur dioxide (SO_2)	50 mg/m^3
Nitrogen monoxide (NO) and nitrogen dioxide (NO_2), expressed as nitrogen dioxide for existing incineration plants with a nominal capacity exceeding 6 tonnes per hour or new incineration plants	200 mg/m^3

"...prevent or limit as far as practicable, negative effects on the environment."

* Daily average values

07 CONCLUSIONS

The economics of waste policy

Collection	€42-€60 / tonne
Compositing	€40-€60 / tonne
Incineration	€47 / tonne
Anaerobic digestion	€80-€96 / tonne

Costs for Municipal Waste Management in the EU

Final Report to

Directorate General Environment,

European Commission

eunomia
research & consulting

http://ec.europa.eu/environment/waste/studies/pdf/eucostwaste.pdf

07 CONCLUSIONS

Targets are more important than technologies

Waste definitions are critical

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

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 2009/10 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 20,000 tonnes a year in 2015 and 30,000 tonnes a year in 2031.

* "London's Wasted Resource" The Mayor's Municipal Waste Management Strategy. November 2011

07
CONCLUSIONS

Three Key Issues for the UK

- Incentives need to stay constant

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Three Key Issues for the UK

- Incentives need to stay constant
- Partial biomass needs to be recognised
- Electricity only from EfW should be allowed

THANK YOU

For more information please contact:

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