The trajectories for waste

The waste trajectories presented here reflect four possible and plausible future perspectives of waste in the UK. These trajectories are based on four scenarios developed in a separate project commissioned by the Department for Environment, Food and Rural Affairs in 2010 exploring the future of UK waste out to 2020 and 2030,[1] but with some adjustments to ensure compatibility with the calculator. The scenarios describe radically different futures, covering developments in fields such as economic growth, commodity markets, consumption patterns, waste treatment technology and waste policy.

The scenarios are not predictions or reflective of Government policy but rather plausible, consistent descriptions of how the future of waste may develop out to 2050. In line with the Waste Hierarchy, the primary aim of waste policy remains the reduction and treatment of waste and not the production of bioenergy.

As a starting point for the trajectories, waste arisings and waste management activities were established for the base year of 2007.[2] The trajectories consider household waste (HH),[3] commercial and industrial (C&I) waste and only wood waste arisings from construction and demolition (C&D) waste. Sewage sludge is also considered.

Waste arising

The 2007 levels of waste arising in the UK are shown in Table F2. All figures in the following tables have been updated from those given in the July 2010 report.

Table F2: Waste arising in selected waste streams in 2007 by waste type

	WASTE ARISING (million tonnes)				
WASTE STREAM	Biogenic, dry	Biogenic, wet	Non biogenic combustible	Non combustible	TOTAL
Household waste[4]	12.95	9.10	6.65	6.30	35
Commercial and industrial[5]	12.24	10.20	2.72	42.84	68

[1] *Scenario Building for Future Waste Policy*, undertaken by Z_punkt: The Foresight Company, supported by Resource Futures and Brook Lyndhurst. To be published shortly.
[2] This baseline was developed by Defra outside of the "Scenario Building for Future Waste Policy" project, which primarily covered the period 2010 to 2030.
[3] For 2007 the figure given is for municipal solid waste arisings, which comprises household waste plus a small quantity of commercial and industrial waste. Actual household waste arisings will be slightly smaller.
[4] Sources: Defra Waste Statistics (Municipal Waste Statistics); Landfill Allowance Scheme Data 2007/08 (WasteDataFlow); Wales WasteDataFlow 2007/08; NIEA, Municipal Waste Management Northern Ireland, for the year ended 31 March 2008.
[5] Sources: EA England, Commercial and Industrial Waste Survey 2002/03, adapted for 2007/08 using ADAS (2009) National Study into Commercial and Industrial Waste Arisings, Final report for EERA;

Construction and demolition[6]	2.30	-	-	-	2.30
TOTAL	27.49	19.3	9.37	49.14	105.3

Waste management

Table F3 below sets out the assumptions in the trajectories of how the waste arising in 2007 was managed.

Table F3: Assumed waste management in 2007 by waste stream

	WASTE MANAGEMENT (% of total waste arising)		
WASTE STREAM	Re-use/recycle	Energy recovery	Landfill
Household waste[7]	37	9	54
Commercial and industrial[8]	37	9	54
Construction and demolition[9]	77	0	23

The capture rate of landfill gas was assumed to be 75% in 2007. Half of this was assumed to be flared, and half used for energy, in order to match the levels of landfill gas recovered for energy as reported by DUKES.[10]

SEPA Scotland Business Waste Survey 2006; WAG - Eurostat submissions; MEL and EnviroCentre (2002) Industrial and Commercial Waste Production in Northern Ireland, Final Report to the Northern Ireland Environment and Heritage Service

[6] C&D biogenic dry from total waste wood from construction and demolition sources, as reported in WRAP (2009) Wood waste market in the UK. Other categories of wood waste discounted to avoid double counting with C&I and MSW, and to account for competing (non-energy) uses of wood.

[7] Defra (Municipal Statistics 2007/08)

[8] EA England, Commercial and Industrial Waste Survey 2002/03, adapted for 2007/08 using ADAS (2009) National Study into Commercial and Industrial Waste Arisings, Final report for EERA; SEPA Scotland Business Waste Survey 2006; WAG - Eurostat submissions; MEL and EnviroCentre (2002) Industrial and Commercial Waste Production in Northern Ireland, Final Report to the Northern Ireland Environment and Heritage Service [taken from background spreadsheets for Eunomia landfill bans analysis (2010)]

[9] Wales Construction & Demolition Survey for EC Waste Stats Submission 2005/06 [taken from background spreadsheets for Eunomia landfill bans analysis (2010)]

[10] DECC (2009) Digest of UK Energy Statistics

Developing the four waste trajectories

The four trajectories A to D are based on the scenarios in the z_punkt report[11] and describe very different futures:

- **Trajectory A** is based on the 'Unlimited Wastefulness' scenario which shows an economic boom-and-bust cycle that leads to a lag of societal and policy responses to waste problems;
- **Trajectory B** is based on the 'Reference Scenario' and shows what happens when current trends continue;
- **Trajectory C** is based on the 'High-Tech/Large Scale Approaches' scenario and describes an industry and technology-led scenario that focuses on smarter ways of handling waste. This envisions significant investment in technology and changes to the planning system; and
- **Trajectory D** is based on the 'Sustainability Turn' scenario and shows what happens when the whole country (society, industry and politics) adopts strong environmental behaviours and legislation, with a strong overall focus on waste prevention.

To form the trajectories, Defra undertook a linear extrapolation of the trends explained in the scenarios from 2030 to 2050.[12] It should be noted that the original scenarios considered all construction and demolition waste arisings but for the purposes of this Calculator has been more narrowly confined to only the wood waste fraction. This had led to some difference in figures presented, such as overall 2030 recycling rates.

Figure F3 shows the emissions over time to 2050 from each of the four trajectories. Figure F4 shows the amount of energy produced from biodegradable waste under the four trajectories. This includes energy from anaerobic digestion, landfill gas and sewage treatment works.

[11] *Scenario Building for Future Waste Policy*, undertaken by Z_punkt: The Foresight Company, supported by Resource Futures and Brook Lyndhurst. To be published shortly.
[12] Except for Trajectory A based on the Reference Scenario. A view to 2050 was already taken as part of the original *Scenario Building for Future Waste Policy* project.

Figure F3: GHG emissions from waste under four waste trajectories

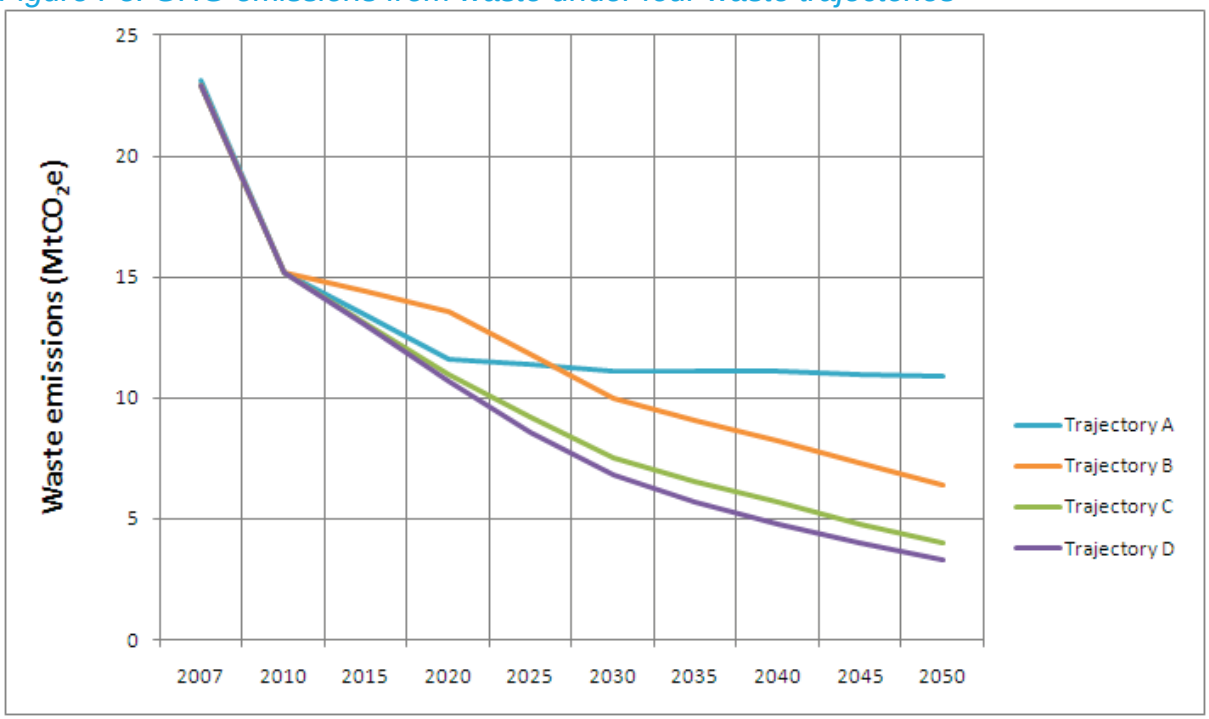
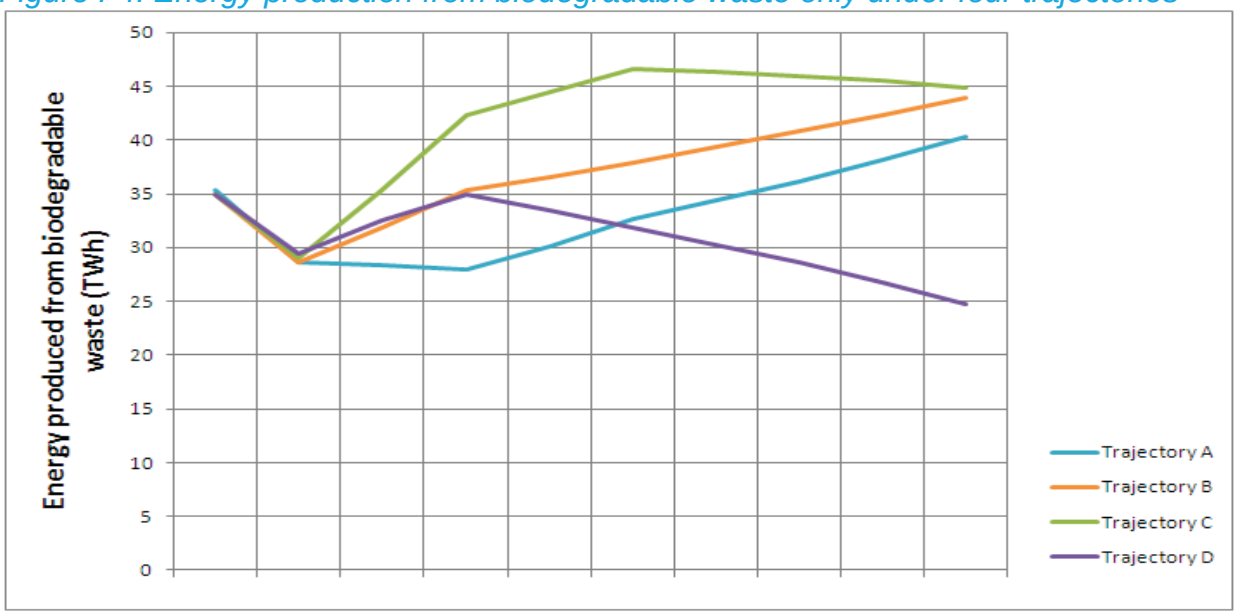


Figure F4: Energy production from biodegradable waste only under four trajectories



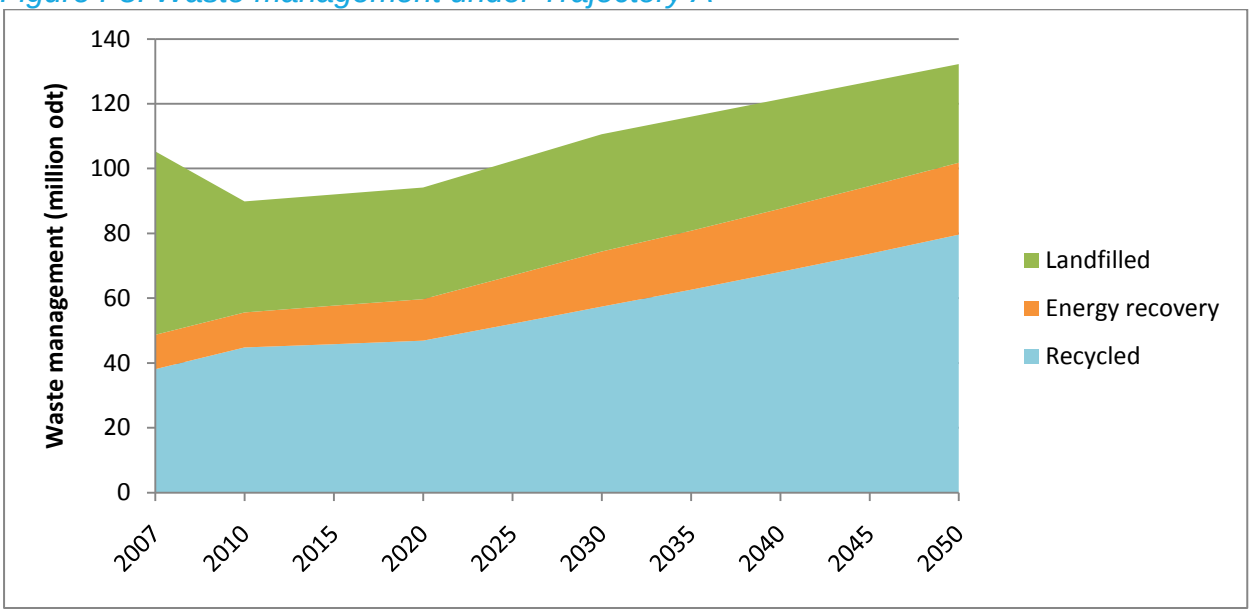
Trajectory A

Trajectory A (figure F5) shows a large increase in overall waste arisings of 26% between 2007 and 2050. While the *proportion* sent to landfill declines, it does so at a slower rate than all other trajectories, falling to 24% in 2050. Recycling rates increase to 61% in 2050. Energy from waste maintains a gradual and continual increase to reach 16% in 2050.

Emissions decline by around 40% below 2007 levels to 2020, after which they reduce steadily. By 2050 they are around 53% below 2007 levels (figure F3). Energy

from biodegradable waste, landfill and sewage gas amounts to just over 40 TWh in 2050 (figure F4).

Figure F8: Waste management under Trajectory A

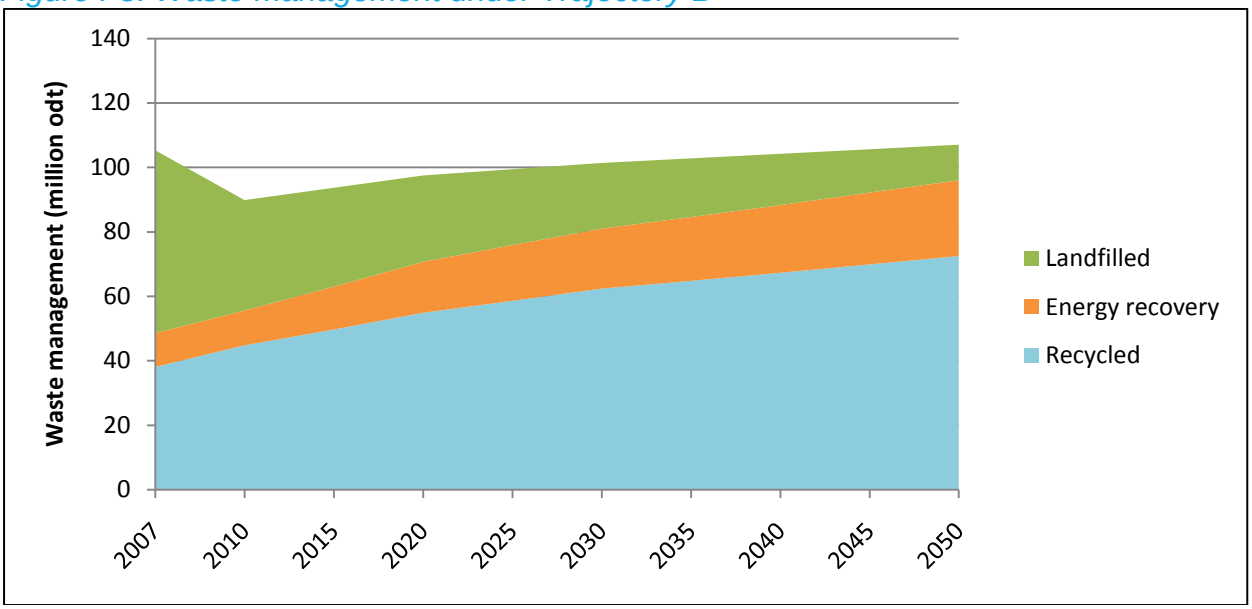


Trajectory B

Trajectory B (figure F6) shows a sustained increase in recycling rates, to 68% in 2050. Energy from waste also increases from 9% in 2007 to 21% in 2050. The amount of waste going to landfill sees a continual decline to 21% in 2030 and 11% in 2050.

Emissions decline by nearly 50% below 2007 levels to 2020, after which they continue reducing but at a slower rate. By 2050 they are over 70% below 2007 levels (figure F3). Energy from biodegradable waste, landfill and sewage gas amounts to around 44 TWh in 2050 (figure F4).

Figure F8: Waste management under Trajectory B

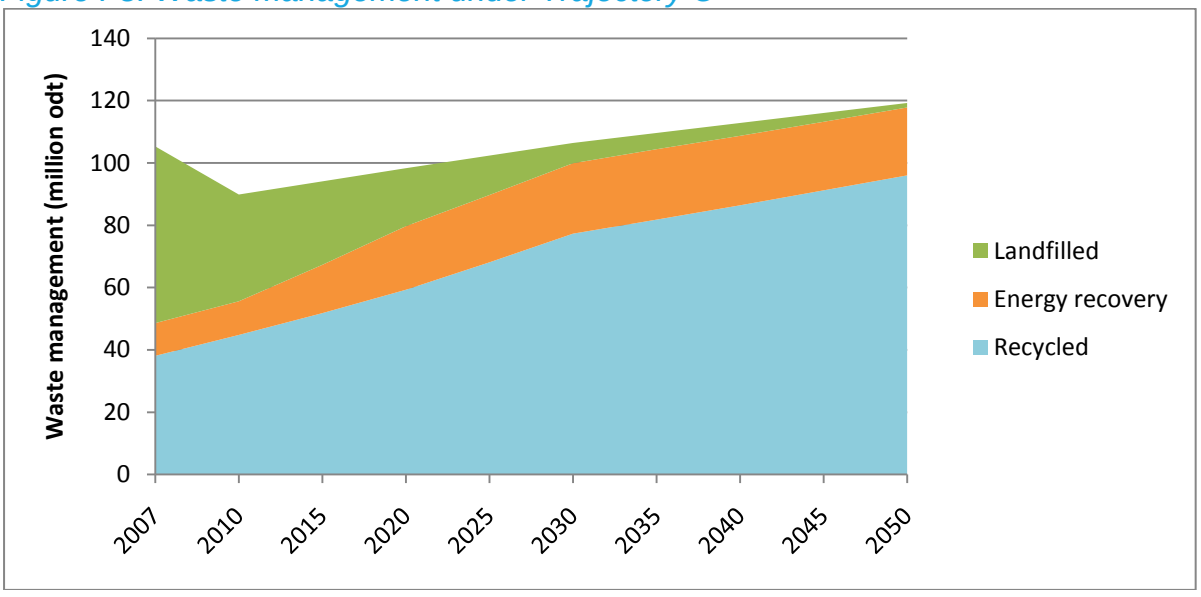


Trajectory C

Trajectory C (figure F7) shows total waste production increasing by 13% in 2050, with changes in waste management. There is a large increase in recycling to 73% in 2030 going up to 81% in 2050. Energy from waste increases in the medium term to 20% in 2020 but is then assumed to reduce to 17% in 2050 as more is recycled. Landfill decreases rapidly to 7% in 2030 before being virtually eliminated by 2050.

Emissions decline by over 50% to 2020, after which they reduce steadily to over 80% below 2007 levels in 2050 (figure F3). Energy from biodegradable waste, landfill and sewage gas amounts to around 45 TWh in 2050 (figure F4).

Figure F8: Waste management under Trajectory C



Trajectory D

Trajectory D (figure F8) shows a fall in overall waste arisings of 33% between 2007 and 2050. Recycling rates increase rapidly to 75% in 2030 and 85% in 2050. Energy from waste increases in the short to medium term, to 15% in 2030 before declining to 12% by 2050. Landfill sees a sharp decline to 10% in 2030 and to 3% in 2050.

Emissions decline by over 50% to 2020, after which they continue reducing. By 2050 they are over 85% below 2007 levels (figure F3). Energy from biodegradable waste, landfill and sewage gas amounts to nearly 25 TWh in 2050 (figure F4).

Figure F8: Waste management under Trajectory D