

Waste

GHG Inventory summary Factsheet

Territorial coverage: UK including Crown Dependencies and Overseas Territories

Total emissions: Quoted with respect to emissions including net LULUCF

Sector Definition: National Communication

Sector summary – historic emissions

- Overall contribution of emissions to UK GHG emissions in 2010 was 3%.
- Emissions from the waste sector have decreased by 64% since 1990. This is mostly due to the implementation of CH₄ recovery systems at UK landfill sites.
- CH₄ is the dominant GHG emitted.
- Emissions from landfill dominate waste sector emissions in the UK.

Sources of emissions and data sets

- Emissions of GHGs from this sector occur from the disposal and treatment of waste.
- Managed waste disposal on land covers emissions of CH₄ arising from waste disposed of to landfill. CH₄ is produced as organic wastes decay in the oxygen deficient lower layers of the landfills.
- Wastewater handling leads to emissions of CH₄ and N₂O.
- Waste incineration includes combustion of chemical and clinical waste, Municipal Solid Waste (MSW) and sewage sludge.
- Emissions from energy recovered from waste incineration are reported under the energy supply sector.
- Key data sources include the Environment Agency's Pollution Inventory, Expenditure and Food Survey (Defra), UK population statistics (Office National Statistics) and raw data from water companies. Waste arisings data are taken from WasteDataFlow.

Methodology

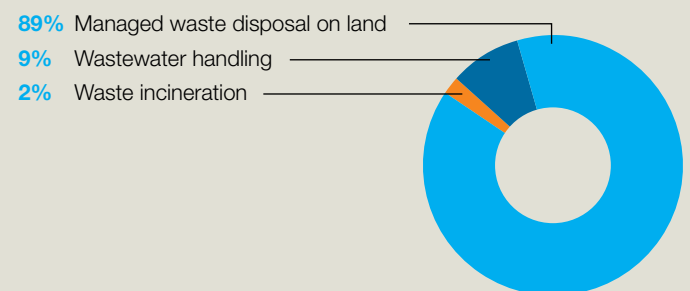
- Landfill emissions in the UK are estimated using a first order decay (Tier 2) methodology based on estimates and historical data on waste quantities, composition and disposal practices over several decades.

Waste Emissions 1990-2010



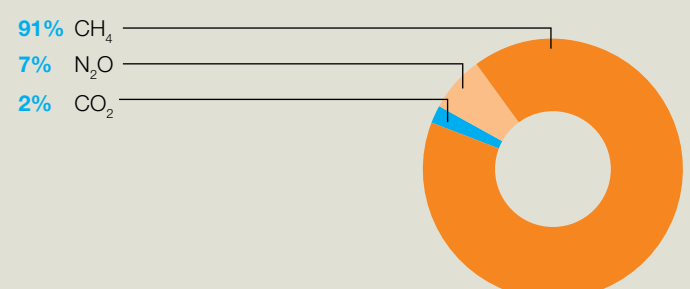
Source: UK GHG Inventory (UNFCCC coverage) (AEA, 2012)

Waste Emissions by Source (2010)



Source: UK GHG Inventory (UNFCCC coverage) (AEA, 2012)

Waste Emissions by Gas (2010)



Source: UK GHG Inventory (UNFCCC coverage) (AEA, 2012)

- First-order decay is simply the assumption that biodegradable carbon in the waste decays to CH₄ with a reaction rate that is proportional to the amount of carbon remaining in the waste.
- Estimates of CH₄ emitted from wastewater handling are based on activity and emissions data from the water industry annual reporting system. From these, implied emission factors for specific emission sub-sources can be derived.
- Estimates of N₂O from wastewater handling are based on protein consumption data and emission factors from the IPCC Guidelines.
- Emissions from waste incineration are estimated from a combination of data reported to the Environment Agency's Pollution Inventory, supplemented with the use of literature-based emission factors.

Uncertainties

- The GHG Inventory quantifies uncertainties on emission factors and activity data, which in turn allow for the production of uncertainty estimates on the: emissions; overall uncertainty by gas; and indicative-only estimates of sector level uncertainties.
- There are many uncertainties associated with estimating CH₄ emissions from the waste sector. For example, the landfill model is particularly sensitive to certain input values such as the amount of degradable organic carbon (DOC) present in

the waste and the amount of this that is converted to CH₄ and CO₂, as well as the oxidation factor.

- The estimated uncertainty for landfill is +/-54% as a 95% confidence interval. Emissions from wastewater treatment are more uncertain, with the value of the emission falling between 0.4 and 4.2Mt CO₂ equivalent. The uncertainty for waste incineration is estimated to be +/-48%, as a 95% confidence interval.
- The estimated uncertainty for the whole waste sector is estimated to be +/-52% as a 95% confidence interval.

Improvements

- Defra, DECC and the Environment Agency are considering research to test landfill CH₄ measurement, which may in time provide information to improve estimates of UK landfill waste emissions.
- Model input data for the landfill model was updated for the 2011 inventory. This was done as part of a research project commissioned by Defra. A peer review on the revised model has since resulted in the revision of some values assigned to DDOC in the model.
- Emissions of N₂O from wastewater handling have been revised downwards to remove a double-count with the agricultural soils source. Emissions are now included in the agriculture sector for sewage sludge applied to agricultural land.

Projections

- Projected emissions from landfill are expected to continue the current, declining trend.
- The overall decrease in waste emissions between 1990 and 2025 is estimated to be 75%.
- The projections presented here exclude the impact of emissions trading.
- The projections are taken from DECC's Updated Energy and Emissions Projections: October 2011 although historic emissions presented here are from the 2012 inventory.

Historic and Projected Emissions from Waste Management



Source: Updated Energy and Emissions Projections: October 2011 (DECC).

Links

- UK GHG Inventory: <http://ghgi.decc.gov.uk/>
- UK GHG National Statistics: <http://www.statistics.gov.uk/hub/agriculture-environment/environment/climate-change/index.html>
- UK Updated Energy Projections: http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/en_emis_projs/en_emis_projs.aspx
- Defra: <http://www.defra.gov.uk/environment/economy/waste/>
- The Environment Agency: <http://www.environment-agency.gov.uk/>