

Energy Use and GHG Emissions from Coal, Oil and Wastes & Renewables

The fuels covered in this section are solid and liquid fuels: coal, oil and wastes & renewable.

Domestic Coal: Energy use and greenhouse gas emissions from smokeless solid fuels (SSF) - coke and anthracite - burnt exclusively within Smoke Control Areas and used for room heaters, cookers, boilers, open fires and stoves.

Industrial and Commercial Coal: Energy use and greenhouse gas emissions from industrial (e.g., iron and steel production, excluding coal-fired electricity generation at power stations) and commercial/ public (e.g., as feedstock for boilers providing heating and hot water in public buildings such as hospitals and schools) coal consumption.

Domestic Oil: Energy use and greenhouse gas emissions from domestic oil (e.g., heating oil, gas oils, kerosene, etc) used for oil- fired central heating in residential homes.

Industrial and Commercial Oil: Energy use and greenhouse gas emissions from oil (e.g., heavy, medium and light fuel oil) used in general industrial and commercial applications, including boiler firing for hot water and steam raising, furnaces and large air heater and dryers but excluding petrol and gas oil/diesel (DERV) used by road and rail transport as well as oil used for electricity generation at power stations.

Wastes & Renewables: Energy use and greenhouse gas emissions from wastes (excepting greenhouse gases from waste incinerated and/or used to generate energy) and renewables (including, landfill gas, sewage gas, wood, municipal solid waste, scrap tyres, waste oils, clinical waste, waste solvents, etc.). CO₂ emissions from biomass are excluded but non-carbon dioxide greenhouse gases (methane and nitrous oxide) are included.

Summary

Energy consumption from coal, oil and wastes & renewables were estimated from DECC's UK Local and Regional estimates of non-gas, non-electricity and non-transport energy consumption for 2007. The local and regional estimates for coal, oil and wastes & renewables are produced by DECC's contractor AEA and are calculated from a number of different information sources. DECC advises users to recognise that the information contained in the datasets are based on modelled rather than real data, and as such are subject to potential modelling error. These datasets are available at DECC's Energy Statistics website¹.

Greenhouse gas emissions were estimated from DEFRA's National Statistics on CO₂ Emissions at Local Authority and Regional Levels datasets 2007.

¹ <http://www.decc.gov.uk/en/content/cms/statistics/regional/other/other.aspx>

Up-to-date 2008 sewage datasets were obtained from WRc and were used to comprehensively estimate emissions from sewage in the LEGGI 2008.

The main source of information used to calculate coal, oil and wastes & renewables energy use is the National Atmospheric Emissions Inventory (NAEI) database. The breakdowns provided by DECC only provide aggregated consumption figures for the different energy sources at London borough and Greater London levels. This is because in the domestic sector average consumption figures for coal, manufactured solid fuels and oil consumption could be misleading given that few domestic properties use either solid fuel or oil fired central heating systems in their homes. Aggregated consumption from the local and regional dataset differs from the UK energy statistics produced in the DUKES, because the statistics for DUKES are based on information from UK energy suppliers, whilst AEA have used a variety of data sources to produce their estimates. Due to the limitations of the source data (particularly of energy consumption for smaller industrial and commercial sites and the domestic sector), many of the local authority estimates are based on heavily modelled data, which use less well-linked spatial information, incorporating a significant number of assumptions.

Full information on the 2007 datasets and methodology report are accessible from the web links below:

<http://www.berr.gov.uk/whatwedo/energy/statistics/publications/dukes/page45537.html>

UK sub-national estimates of non-gas, non electricity and non road transport energy consumption on 2005, 2006 and 2007 from

<http://www.decc.gov.uk/en/content/cms/statistics/regional/other/other.aspx>

The regional and local oil, coal and wastes & renewable fuel consumption (expressed in thousand tonnes of oil equivalent, ktoe) statistics for 2007 were further disaggregated to 1-km² grid cells to enable sub-borough areas such as electoral wards to be monitored and targeted. The spatial analysis methodology is the same as those used for analysing electricity and gas consumption data. That is, to produce local oil, coal and renewables & wastes fuel consumption statistics for 2007 at the 1-km² spatial resolution, the oil, coal and renewables & wastes fuel consumption statistics for each London borough was first disaggregated (using the area of domestic and non-domestic buildings categories from the DCLG's Generalised Land Use Database Statistics for England 2005 as a weighting factor) to the Census ward areas and then aggregated to the 1-km² grid cells using GIS algorithms by overlaying the Census wards' oil, coal and renewables & wastes fuel consumption data (map) with the 1,604 km² grid cells.

CO₂ emission estimates

CO₂ emissions estimates from oil, coal and wastes & renewable fuel consumption in the LEGGI 2008 were obtained from DEFRA's 'Detailed Sector Split' Local and Regional CO₂ Emissions Estimates for 2007 spreadsheet, which was produced by AEA for DEFRA in November 2009. The spreadsheet was used with reference to the report 'Local and Regional CO₂ Emissions Estimates for 2008'². The nationally consistent carbon dioxide

² <http://www.defra.gov.uk/environment/statistics/globalatmos/galocalghg.htm>

emission estimates for "Domestic" and "Industrial & Commercial" sectors at local authority (London boroughs) and regional level (Greater London) that are contained within the spreadsheet were produced following the publication of local oil, coal and wastes & renewable fuel consumption estimates by DECC. The 'Detailed Sector Split' worksheet shows the elements of data included within the CO₂ estimates are of reasonable certainty, as they are based on local readings and sales data.

The 2008 regional and local CO₂ emissions from oil, coal and wastes & renewable fuel consumption statistics were spatially analysed and apportioned to 1-km² grid cells to enable sub-borough areas such as electoral wards to be monitored and targeted. In order to produce CO₂ emissions at the 1-km² spatial resolution, the CO₂ emissions statistics for each London borough was first disaggregated (using the area of domestic and non-domestic buildings categories obtained from Department for Communities and Local Government (DCLG)'s Generalised Land Use Database Statistics for England 2005 as a weighting factor) to Census ward areas and then aggregated to the 1-km² grid cells using GIS functionality (i.e., spatial analysis by overlaying the Census wards' oil, coal and wastes & renewable fuel consumption data with the 1,604 1-km² grid cells of the LEGGI area).

Methane and N₂O emissions estimates from oil, coal and wastes & renewable fuel consumption in the LEGGI 2008 were calculated by multiplying the energy consumption by the Fuel Conversion Factors (Table 1). These conversion factors were published by Defra under the "2009 Guidelines to Defra/DECC's GHG Conversion Factors for Company Reporting" in September 2009.

Table 1: Fuel Conversion Factors

Fuel Type	CH ₄ (kg CO ₂ eq per kWh)	N ₂ O (kg CO ₂ eq per kWh)
Coal - Domestic	0.03892	0.00447
Coal - Industrial and Commercial	0.00002	0.00494
Oil – Domestic ³	0.00026	0.02412
Oil - Industrial and Commercial ⁴	0.00020	0.00092
Gas – Domestic, Industrial and Commercial ⁵	0.00028	0.00011
Waste - Industrial and Commercial		

Projection Years: 2011 and 2015

Projections of atmospheric emissions from oil, coal and wastes & renewable fuel consumption were based on an analysis of historical trends in energy consumption. Because of the lack of data on Methane and N₂O emissions, electricity consumption trends have been used to estimate the projections on these gases.

Coal

The % per annum growth/decay rates in coal consumption (2005-2007) from the domestic and industrial-commercial sectors in the Greater London area were calculated as follows (see Table 2 and Table 3):

³ In Annex 1 Fuel Conversion Factors (Table 1b) as Gas Oil

⁴ In Annex 1 Fuel Conversion Factors (Table 1b) as Fuel Oil.

⁵ In Annex 1 Fuel Conversion Factors (Table 1b) as Natural Gas.

For Domestic coal projections to 2011 = -0.40%
For Industrial-Commercial coal projections to 2011 = 1.60%

For Domestic coal projections to 2015 = -0.40%
For Industrial-Commercial coal projections to 2015 = 1.65%

Table 2: Trends in Domestic coal consumption (ktoe) in Greater London and projection factors

Years	Coal Consumption (ktoe)		
2005	2.06		
2006	2.90		
2007	3.00		
2011	2.96	% decrease between 2007-2011	-51.20%
2012			
2013			
2014			
2015	2.92	% decrease between 2007-2015	-2.77%

Table 3: Trends in Industrial and Commercial coal consumption (ktoe) in Greater London and projection factors

Years	Coal Consumption (ktoe)		
2005	1.23		
2006	2.00		
2007	1.40		
2011	1.47	% increase between 2007-2011	4.79%
2012			
2013			
2014			
2015	1.56	% increase between 2007-2015	11.54%

As a result of these growth rates the following conversion factors were calculated. These conversion factors were applied to the values for 2007 (base year) to calculate the projections in coal consumption for 2011 and 2015.

Conversion factor for Domestic coal projections to 2011 = 0.9880
Conversion factor for Industrial-Commercial coal projections to 2011 = 1.0479

Conversion factor for Domestic coal projections to 2015 = 0.9723
Conversion factor for Industrial-Commercial coal projections to 2015 = 1.1154

Oil

The % per annum growth/decay rates in oil consumption (2005-2007) from the domestic and industrial-commercial sectors in the Greater London area were calculated as follows (see Table 4 and Table 5):

For Domestic oil projections to 2011	= -0.40%
For Industrial-Commercial oil projections to 2011	= 1.60%
For Domestic oil projections to 2015	= -0.40%
For Industrial-Commercial oil projections to 2015	= 1.65%

Table 4: Trends in Domestic oil consumption (ktoe) in Greater London and projection factors

Years	Oil Consumption (ktoe)		
2005	23.36		
2006	24.69		
2007	25.06		
2011	24.76	% decrease between 2007-2011	-1.20%
2012			
2013			
2014			
2015	34.36	% decrease between 2007-2015	-2.77%

Table 5: Trends in Industrial and Commercial oil consumption (ktoe) in Greater London and projection factors

Years	Oil Consumption (ktoe)		
2005	239.10		
2006	275.90		
2007	279.40		
2011	292.79	% increase between 2007-2011	4.79%
2012			
2013			
2014			
2015	311.63	% increase between 2007-2015	11.54%

As a result of these growth rates the following conversion factors were calculated. These conversion factors were applied to the values for 2007 (base year) to calculate the projections in oil consumption for 2011 and 2015.

Conversion factor for Domestic oil projections to 2011	= 0.9880
Conversion factor for Industrial-Commercial oil projections to 2011	= 1.0479
Conversion factor for Domestic oil projections to 2015	= 0.9723
Conversion factor for Industrial-Commercial oil projections to 2015	= 1.1154

Waste and renewables

The % per annum growth/decay rates in waste and renewables consumption (2005-2008) from the industrial-commercial sector in the Greater London area were calculated as follows (see Table 6):

For Industrial-Commercial waste and renewables projections to 2011 = 1.79%

For Industrial-Commercial waste and renewables projections to 2015 = 1.85%

Table 6: Trends in Industrial and Commercial waste and renewables consumption (ktoe) in Greater London and projection factors

Years	Waste and Renewables (ktoe)		
2005	10.07		
2006	10.13		
2007	10.43		
2011	10.99	% increase between 2007-2011	5.36%
2012			
2013			
2014			
2015	11.78	% increase between 2007-2015	12.96%

As a result of these growth rates the following conversion factors were calculated. These conversion factors were applied to the values for 2007 (base year) to calculate the projections in waste and renewables consumption for 2011 and 2015.

Conversion factor for Industrial-Commercial electricity projections to 2011 = 1.0536

Conversion factor for Industrial-Commercial electricity projections to 2015 = 1.1296