

Energy Consumption and GHG Emissions from Electricity Consumption

This section deals with electricity use and greenhouse gas emissions calculated from actual and estimated meter reading at domestic, industrial and commercial premises, including electricity consumption by over ground electric trains/locomotives and the London Underground trains.

Summary

Electricity consumption and CO₂ emissions for 2008 were estimated from Department for Energy and Climate Change (DECC) 2008 Middle Layer Super Output Area (MLSOA) level Electricity and Gas Consumption datasets and Department for Environment, Food and Rural Affairs (DEFRA) 2008 National Statistics¹ on CO₂ Emissions at Local Authority and Regional Levels datasets².

Department for Energy and Climate Change (DECC) electricity consumption data were collected by obtaining the full co-operation of the electricity industry: annualised consumption data were generated by the data aggregators, agents of the electricity suppliers, who collate and aggregate electricity consumption levels for each customer meter or MPAN (meter point administration number). In addition to this, information is obtained from the Genserv meter postcode address file, which provides the geographical location of each MPAN, including the full address and postcode. For the 2008 dataset, Genserv data were from a quarterly produced extract file produced by the electricity distribution companies' meter point administration system (MPAS)³. The geographical and electricity consumption data are then merged together to enable consumption data to be mapped to postcodes and aggregated to MLSOA (as well as local authority areas and government office regions) levels. The electricity consumption data are generated for both non-half hourly (NHH) meters (domestic and small/medium commercial-industrial customers) and for half hourly (HH) meters (larger commercial-industrial customers).

For the NHH data, annualised estimates are based on either an annualised advance (AA) or estimated annual consumption (EAC). The AA is an estimate of annualised consumption based on consumption recorded between two meter readings. In comparison an EAC is used where two meter readings are not available and an estimate of annualised consumption is produced by the energy company using historical information and the profile information relating to the meter. These data provide a good approximation of annualised consumption, but do not cover exactly the calendar year. For the half hourly meter consumption estimates,

¹ In March 2008 gas consumption dataset gained National Statistics status. This status applies to all data from 2005 onwards. Please note that the 2004 data are still classed as experimental.

² The main data sources are the UK National Atmospheric Emissions Inventory, maintained by AEA on behalf of DEFRA and the Devolved Administrations, and DECC's National Statistics of energy consumption for local authority areas. The work to produce the estimates was carried out by AEA.

³ In 2006 the MPAS data moved onto an on-line system named the Electricity Central Online Enquiry Service (ECOES), which provides similar, but more up-to-date information to the Genserv file.

data aggregators are asked to produce a simple report for each MPAN for the relevant calendar year.

DECC uses the aforementioned data to produce a domestic/non-domestic split, with aggregate and average consumption figures provided for all local authorities and regions. The domestic consumption is based on NHH meters with profiles 1 and 2 (these are the standard Domestic and Economy 7 type tariffs respectively). Non-domestic (i.e. industrial and commercial) consumption is based on NHH meters with profiles 3 to 8 and all HH meters. In addition some of the larger domestic consumers of electricity are reallocated to the industrial-commercial sector if annual consumption is greater than 100,000 kWh.

The 2007 electricity consumption and numbers of customers by region and local authority workbooks were obtained from the DECC's website⁴. DECC collects and compiles estimates of electricity consumption at regional (NUTS1) and local authority levels (NUTS4). Within each workbook, several worksheets provided details of electricity and gas consumption down to MLSOA level for each LA in the UK. The 2007 datasheets showed electricity consumption data (given in kWh for the entire year) for the Greater London area regarding total consumption, number of meters and average consumption levels for domestic and non-domestic users. Details about how the information on electricity and gas consumption has been collected and collated can be found in "DECC, Guidance Note for Regional Energy Data PUBLICATION URN 08/487c" at <http://www.berr.gov.uk/files/file42994.pdf>.

The project team obtained workbooks of electricity consumption from the DECC's website. Within each workbook are worksheets giving details of electricity and gas consumption down to MLSOA level for each LA in that region. The 2008 datasheets showed electricity and gas consumption data (given in kWh for the entire year) for England regarding total consumption, number of meters and average consumption levels for domestic and non-domestic users. Also included are figures for industrial half hourly meter electricity consumption (relating to larger business consumers) within the LA; this data cannot be disaggregated to MLSOA as doing so would break the National Statistics Code of Practice guidelines on data disclosure. Due to data disclosure issues, consumption relating to larger commercial/industrial consumers could not be disaggregated below local authority level, and in some cases data relating to a particular area have been merged with data for nearby areas.

The 2007 regional and local electricity consumption statistics obtained from DECC's Energy Statistics were spatially analysed and apportioned to 1-km² grid cells by the project team to enable sub-borough areas to be monitored and targeted. In order to produce local electricity consumption statistics for 2008 at the 1-km² spatial resolution, the electricity consumption statistics for each MLSOA was first analysed, reformed and then aggregated to the 1-km² grid cells using GIS algorithms (i.e., spatial analysis by overlaying the MLSOAs' electricity consumption data with the 1,604 1-km² grid cells). Where a MLSOA covered more than one 1-km² grid cell area, the electricity consumption was divided between the relevant grid cells based on the proportion of the area covered by the MLSOA. There were also some circumstances where for confidentiality or other reasons, BERR combined MLSOA data, and each MLSOA was given an equal share of the electricity data when deriving statistics. Furthermore, due to data disclosure issues, electricity consumption relating to larger commercial/industrial consumers could not be disaggregated below local authority level, and in some cases data relating to a particular area have been merged with data for nearby areas.

⁴ <http://www.berr.gov.uk/energy/statistics/regional/regional-local-gas/page36200.html>

CO₂ emission estimates

CO₂ emissions estimates from electricity 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 December 2008. The spreadsheet was used with reference to the report 'Local and Regional CO₂ Emissions Estimates for 2008'⁵. The nationally consistent carbon dioxide 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 gas, electricity and road transport fuel consumption estimates by DECC. The 'Detailed Sector Split' worksheet shows the elements of data (such as the domestic gas and electricity estimates and the estimates for road transport) included within the CO₂ estimates are of reasonable certainty, as they are based on local readings and sales data.

The 2007 regional and local CO₂ emissions from electricity 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 2005⁶ 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' electricity consumption data with the 1,604 1-km² grid cells of the LEGGI area).

Emission estimates of methane and nitrous oxide in the LEGGI 2008 were calculated from the energy data, using emissions factors derived from the "2009 Guidance to DEFRA/DECC's GHG Conversion Factors for Company Reporting"⁷ provided by AEA for DECC and DEFRA.

Projection Years: 2011 and 2015

Projections of GHG emissions for electricity were based on an analysis of historical trends in energy consumption. Electricity consumption trends have been used to estimate the projections of Methane and N₂O.

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⁵ <http://www.defra.gov.uk/environment/statistics/globalatmos/galocalghg.htm>

⁶ The Generalised Land Use Database Statistics for England 2005 categorises land parcels into nine key themes: domestic buildings, gardens, non-domestic buildings, road, rail, path, greenspace, water and others and provides statistics for each local authority and also for each Census ward (as defined for 2005). The statistics are produced for DCLG (formerly, ODPM) on behalf of the Office for National Statistics' Neighbourhood Statistics service.
<http://www.communities.gov.uk/publications/planningandbuilding/generalisedlanduse>

⁷ (<http://www.defra.gov.uk/environment/business/reporting/conversion-factors.htm>).

The % per annum growth/decay rates in electricity consumption (2005-2008) from the domestic and industrial-commercial sectors in the Greater London area were calculated as follows (see **Error! Reference source not found.** and **Error! Reference source not found.**):

For Domestic electricity projections to 2011 = -1.14%
 For Industrial-Commercial electricity projections to 2011 = 1.03%

For Domestic electricity projections to 2015 = -1.11%
 For Industrial-Commercial electricity projections to 2015 = 1.05%

Table 1: Trends in Domestic electricity consumption (GWh) in Greater London and projection factors

Years	Electricity Sales (GWh)		
2005	13,885		
2006	13,701		
2007	13,774		
2008	13,410		
2011	12,951	% decrease between 2007-2011	-5.97%
2012			
2013			
2014			
2015	12,364	% decrease between 2007-2015	-10.24%

Table 2: Trends in Industrial and Commercial electricity consumption (GWh) in Greater London and projection factors

Years	Electricity Sales (GWh)		
2005	27,550		
2006	29,143		
2007	28,423		
2008	28,404		
2011	29,284	% increase between 2007-2011	3.03%
2012			
2013			
2014			
2015	30,501	% increase between 2007-2015	7.31%

As a result of these growth rates the following conversion factors were calculated. These conversion factors were applied to the values for 2008 (base year) to calculate the projections in energy consumption for 2011 and 2015.

Conversion factor for Domestic electricity projections to 2011 = 0.9403

Conversion factor for Industrial-Commercial electricity projections to 2011 = 1.0303

Conversion factor for Domestic electricity projections to 2015 = 0.8976

Conversion factor for Industrial-Commercial electricity projections to 2015 = 1.0731

