

Methodology to derive Carbon Plan headline emissions figures from the UK Greenhouse Gas Inventory

This note sets out how the emissions estimates included in the 2011 Carbon Plan have been derived from the UK greenhouse gas inventory, and to demonstrate how the two sets of figures are consistent. Note that this only covers the historical emissions estimates, for all years from 1990 to 2009, and not the projections.

The chapters of the Carbon Plan have different sectoral definitions from the inventory breakdown of greenhouse gas (GHG) emissions, which is published each year as a National Statistics¹ publication. The chapters of the Carbon Plan are: power stations, industry, buildings, transport, agriculture and land use, waste and exports. The inventory breakdown is presented in what are called National Communication (NC) sectors, which are: energy supply, business, transport, public, residential, agriculture, industrial processes, waste management, land use land use change and forestry and exports. Each of these high level sectors are made up of a number of different sub-sectors.

This note incorporates three tables which clarify the approach used to map inventory sectors to the Carbon Plan chapters.

Table 1 and **Table 2** show how 2009 emissions as reported in the greenhouse gas inventory have been allocated to the different chapters of the Carbon Plan, on both a source and an end-user basis. When emissions are reported by source, emissions are attributed to the sector that emits them directly. When emissions are reported by end-user, this reallocates the emissions by source in accordance with where the end-use activity occurred. For example, all the carbon dioxide emissions produced by a power station are allocated to the power station when reporting on a source basis. However, on an end-user basis, these emissions are reallocated to the users of the electricity produced at that power station, such as domestic homes or businesses.

Finally, **Table 3** shows how the different National Communication sectors have been mapped to the different chapters of the Carbon Plan. It should be noted that the National Communication sectors are high level sectors made up of a number of more detailed sectors which follow the definitions set out by the International Panel on Climate Change (IPCC). These more detailed sectors are shown in the second column, "IPCC category". The mapping to the Carbon Plan chapters and sub-sectors has been based on the type of activity. For example, some of the emissions from the NC business sector have been allocated to the buildings chapter, whilst

¹ http://www.decc.gov.uk/en/content/cms/statistics/climate_stats/gg_emissions/uk_emissions/uk_emissions.aspx

other emissions have been allocated to the industry chapter, depending on what is covered by each particular category.

Table 1. Emissions by source 2009 – Carbon Plan chapters and sectors

	Chapter	Sub-sector	2009
Emissions by source	Power stations		150.9
	Industry	Industrial combustion	75.0
		Industrial processes	9.6
		Energy supply	44.6
		Total	129.1
	Buildings	Domestic buildings	75.5
		Non-domestic buildings	21.6
		Total	97.0
	Transport	Cars	71.0
		Vans	15.2
		HGVs	20.9
		Buses	5.3
		Rail	2.2
		Domestic aviation & shipping	6.3
		Other transport	0.8
		Total	121.6
	Agriculture and land use	Livestock	19.9
		Fertiliser use	24.9
		Land use change	-4.1
		Other agriculture	4.6
		Total	45.3
	Waste	Landfill methane	15.9
		Wastewater handling	1.7
Incineration		0.3	
Other waste		0.0	
Total		17.9	
Exports		0.0	
Total		561.8	

Table 2. Emissions by end-user 2009 – Carbon Plan chapters and sectors

	Chapter	Sub-sector	2009
Emissions by end-user	Power stations		0.0
	Industry	Industrial combustion	121.8
		Industrial processes	9.9
		Total	131.6
	Buildings	Domestic buildings	143.2
		Non-domestic buildings	69.8
		Total	213.0
	Transport	Cars	79.3
		Vans	17.0
		HGVs	23.2
		Buses	5.9
		Rail	3.9
		Domestic aviation & shipping	7.0
		Other transport	0.8
		Total	137.0
	Agriculture and land use	Livestock	19.9
		Fertiliser use	24.9
		Land use change	-4.1
		Other agriculture	6.9
		Total	47.6
	Waste	Landfill methane	15.9
		Wastewater handling	1.7
		Incineration	0.3
		Other waste	0.0
		Total	17.9
	Exports		14.6
	Total		561.8

Table 3. Mapping from the National Communication sectors to the Carbon Plan chapters

NC category	IPCC category	Source Name	Chapter	Sub-sector
Agriculture	1A4ci_Agriculture/Forestry/Fishing:Stationary	Agriculture - stationary combustion Miscellaneous industrial/commercial combustion	Agriculture and land use Agriculture and land use	Other agriculture Other agriculture
	1A4cii_Agriculture/Forestry/Fishing:Off-road	Agricultural engines Agriculture - mobile machinery	Agriculture and land use Agriculture and land use	Other agriculture Other agriculture
	2B5_Chemical_Industry_Other	Agriculture - agrochemicals use	Agriculture and land use	Other agriculture
	4A10_Enteric_Fermentation_Deer	Agriculture livestock - deer enteric	Agriculture and land use	Livestock
	4A1a_Enteric_Fermentation_Dairy	Agriculture livestock - dairy cattle enteric	Agriculture and land use	Livestock
	4A1b_Enteric_Fermentation_Non-Dairy	Agriculture livestock - other cattle enteric	Agriculture and land use	Livestock
	4A3_Enteric_Fermentation_Sheep	Agriculture livestock - sheep enteric	Agriculture and land use	Livestock
	4A4_Enteric_Fermentation_Goats	Agriculture livestock - goats enteric	Agriculture and land use	Livestock
	4A6_Enteric_Fermentation_Horses	Agriculture livestock - horses enteric	Agriculture and land use	Livestock
	4A8_Enteric_Fermentation_Swine	Agriculture livestock - pigs enteric	Agriculture and land use	Livestock
	4B10_Manure_Management_Deer	Agriculture livestock - deer wastes	Agriculture and land use	Livestock
	4B12_Liquid_Systems	Agriculture livestock - manure liquid systems	Agriculture and land use	Livestock
	4B13_Solid_Storage_and_Drylot	Agriculture livestock - manure solid storage and dry lot	Agriculture and land use	Livestock
	4B14_Other	Agriculture livestock - manure other	Agriculture and land use	Livestock
	4B1a_Manure_Management_Dairy	Agriculture livestock - dairy cattle wastes	Agriculture and land use	Livestock
	4B1b_Manure_Management_Non-Dairy	Agriculture livestock - other cattle wastes	Agriculture and land use	Livestock
	4B3_Manure_Management_Sheep	Agriculture livestock - sheep goats and deer wastes	Agriculture and land use	Livestock
	4B4_Manure_Management_Goats	Agriculture livestock - goats wastes	Agriculture and land use	Livestock
	4B6_Manure_Management_Horses	Agriculture livestock - horses wastes	Agriculture and land use	Livestock
	4B8_Manure_Management_Swine	Agriculture livestock - pigs wastes	Agriculture and land use	Livestock
	4B9_Manure_Management_Poultry	Agriculture livestock - broilers wastes Agriculture livestock - laying hens wastes Agriculture livestock - other poultry wastes	Agriculture and land use Agriculture and land use Agriculture and land use	Livestock Livestock Livestock
	4D_Agricultural_Soils	Agricultural soils	Agriculture and land use	Fertiliser use
	4F1_Field_Burning_of_Agricultural_Residues	Field burning	Agriculture and land use	Other agriculture
4F5_Field_Burning_of_Agricultural_Residues	Field burning	Agriculture and land use	Other agriculture	

NC category	IPCC category	Source Name	Chapter	Sub-sector
Business	1A2a_Manufacturing_Industry&Construction:I&S	Blast furnaces	Industry	Industrial combustion
		Iron and steel - combustion plant	Industry	Industrial combustion
	1A2f_Manufacturing_Industry&Construction:Other	Ammonia production - combustion	Industry	Industrial combustion
		Autogenerators	Industry	Industrial combustion
		Cement production - combustion	Industry	Industrial combustion
		Lime production - non decarbonising	Industry	Industrial combustion
		Other industrial combustion	Industry	Industrial combustion
	1A2fii_Manufacturing_Industry&Construction:Off-road	Industrial engines	Industry	Industrial combustion
		Industrial off-road mobile machinery	Industry	Industrial combustion
	1A4a_Commercial/Institutional	Miscellaneous industrial/commercial combustion	Buildings	Non-domestic buildings
	2B5_Carbon from NEU of products	Other industrial combustion	Industry	Industrial combustion
	2F1_Refrigeration_and_Air_Conditioning_Equipment	Commercial Refrigeration	Buildings	Non-domestic buildings
		Domestic Refrigeration	Buildings	Non-domestic buildings
		Industrial Refrigeration	Industry	Industrial combustion
Mobile Air Conditioning		Industry	Industrial combustion	
Refrigerated Transport		Industry	Industrial combustion	
Stationary Air Conditioning		Buildings	Non-domestic buildings	
2F2_Foam_Blowing	Foams	Industry	Industrial combustion	
2F3_Fire_Extinguishers	Firefighting	Industry	Industrial combustion	
2F5_Solvents	Other PFC use	Industry	Industrial combustion	
	Precision cleaning - HFC	Industry	Industrial combustion	
2F9_Other_(one_component_foams)	One Component Foams	Industry	Industrial combustion	
2F9_Other_(semiconductors_electrical_sporting_goods)	Electrical insulation	Industry	Industrial combustion	
	Electronics - PFC	Industry	Industrial combustion	
	Electronics - SF6	Industry	Industrial combustion	
	Sporting goods	Industry	Industrial combustion	
	Semiconductors, electrical, sporting goods	Industry	Industrial combustion	

NC category	IPCC category	Source Name	Chapter	Sub-sector
Energy Supply	1A1a_Public_Electricity&Heat_Production	Power stations	Power stations	Power stations
	1A1b_Petroleum_Refining	Refineries - combustion	Industry	Energy supply
	1A1ci_Manufacture_of_Solid_Fuels-coke	Coke production	Industry	Energy supply
		Solid smokeless fuel production	Industry	Energy supply
	1A1cii_Other_Energy_Industries	Collieries - combustion	Industry	Energy supply
		Gas production	Industry	Energy supply
		Gas Production - combustion at gas separation plant	Industry	Energy supply
		Gas Production - gas combustion	Industry	Energy supply
		Nuclear fuel production	Industry	Energy supply
		Oil Production - gas combustion	Industry	Energy supply
		Town gas manufacture	Industry	Energy supply
	1B1ai_Post-Mining_Activities	Coal storage and transport	Industry	Energy supply
	1B1ai_Underground_Mines	Closed Coal Mines	Industry	Energy supply
		Deep-mined coal	Industry	Energy supply
	1B1aii_Surface_Mines	Open-cast coal	Industry	Energy supply
	1B1b_Solid_Fuel_Transformation	Coke production	Industry	Energy supply
		Iron and steel - flaring	Industry	Energy supply
		Solid smokeless fuel production	Industry	Energy supply
	1B2ai_Oil_Exploration	Oil Production - Offshore Well Testing	Industry	Energy supply
	1B2aii_Oil_Production	Oil Production - process emissions	Industry	Energy supply
	1B2aiii_Oil_Transport	Oil Production - Offshore Oil Loading	Industry	Energy supply
Oil Production - Onshore Oil Loading		Industry	Energy supply	
1B2aiv_Refining/Storage	Oil Production - Oil terminal storage	Industry	Energy supply	
	Petroleum processes	Industry	Energy supply	
1B2bi_Gas_Production	Gas Production - Gas terminal storage	Industry	Energy supply	
	Gas Production - Offshore Well Testing	Industry	Energy supply	
	Gas Production - process emissions	Industry	Energy supply	
1B2bii_Transmission/Distribution	Gas leakage	Industry	Energy supply	
1B2ci_Flaring_Oil	Oil Production - gas flaring	Industry	Energy supply	
1B2ci_Venting_Oil	Oil Production - gas venting	Industry	Energy supply	
1B2cii_Flaring_Gas	Gas Production - gas flaring	Industry	Energy supply	
1B2cii_Venting_Gas	Gas Production - gas venting	Industry	Energy supply	
2A3_Limestone_&_Dolomite_Use	Power stations - FGD	Industry	Energy supply	

NC category	IPCC category	Source Name	Chapter	Sub-sector	
Industrial Process	1A2a_Manufacturing_Industry&Construction:I&S	Sinter production	Industry	Industrial processes	
	2A1_Cement_Production	Cement - decarbonising	Industry	Industrial processes	
	2A2_Lime_Production	Lime production - decarbonising	Industry	Industrial processes	
	2A3_Limestone_&_Dolomite_Use		Basic oxygen furnaces	Industry	Industrial processes
			Glass - general	Industry	Industrial processes
			Sinter production	Industry	Industrial processes
	2A4_Soda_Ash_Production_&_Use	Glass - general	Industry	Industrial processes	
	2A7_(Fletton_Bricks)	Brick manufacture - Fletton	Industry	Industrial processes	
	2B1_Ammonia_Production	Ammonia production - feedstock use of gas	Industry	Industrial processes	
	2B2_Nitric_Acid_Production	Nitric acid production	Industry	Industrial processes	
	2B3_Adipic_Acid_Production	Adipic acid production	Industry	Industrial processes	
	2B5_Chemical_Industry_Other		Chemical industry - ethylene	Industry	Industrial processes
			Chemical industry - general	Industry	Industrial processes
			Chemical industry - methanol	Industry	Industrial processes
	2C1_Iron&Steel		Electric arc furnaces	Industry	Industrial processes
			Iron and steel - flaring	Industry	Industrial processes
Ladle arc furnaces			Industry	Industrial processes	
2C3_Aluminium_Production		Primary aluminium production - general	Industry	Industrial processes	
		Primary aluminium production - PFC emissions	Industry	Industrial processes	
2C4_Cover_gas_used_in_Al_and_Mg_foundries	Magnesium cover gas	Industry	Industrial processes		
2E1_Production_of_Halocarbons_and_Sulphur_Hexafluoride	Halocarbons production - by-product	Industry	Industrial processes		
2E2_Production_of_Halocarbons_and_Sulphur_Hexafluoride	Halocarbons production - fugitive	Industry	Industrial processes		
3_Solvent_and_Other_Product_Use	Solvent use	Industry	Industrial processes		

NC category	IPCC category	Source Name	Chapter	Sub-sector
Land Use Change	5A_Forest Land (Biomass Burning - wildfires)	Forest Land - Biomass burning	Agriculture and land use	Land use change
	5A_Forest Land (Drainage of soils)	Forest Land - Drainage of Organic Soils	Agriculture and land use	Land use change
	5A1_Forest Land Remaining Forest Land	Forest Land remaining Forest Land	Agriculture and land use	Land use change
	5A2_Forest Land (N fertilisation)	Direct N2O emission from N fertilisation of forest land	Agriculture and land use	Land use change
	5A2_Land Converted to Forest Land	Land converted to Forest Land	Agriculture and land use	Land use change
	5B_Cropland (Biomass Burning - controlled)	Cropland - Biomass Burning	Agriculture and land use	Land use change
	5B_Liming	Cropland - Liming	Agriculture and land use	Land use change
	5B1_Cropland Remaining Cropland	Cropland remaining Cropland	Agriculture and land use	Land use change
	5B2_Land Converted to Cropland	Land converted to Cropland	Agriculture and land use	Land use change
	5B2_N2O emissions from disturbance associated with land-use conversion to cropland	N2O emissions from disturbance associated with land-use conversion to cropland	Agriculture and land use	Land use change
	5C_Grassland (Biomass burning - controlled)	Grassland - Biomass Burning	Agriculture and land use	Land use change
	5C_Liming	Grassland - Liming	Agriculture and land use	Land use change
	5C1_Grassland Remaining Grassland	Grassland remaining Grassland	Agriculture and land use	Land use change
	5C2_Land converted to grassland	Land converted to Grassland	Agriculture and land use	Land use change
	5D_Wetlands (Biomass burning - controlled)	Wetlands - Biomass Burning	Agriculture and land use	Land use change
	5D1_Wetlands remaining wetlands	Wetlands remaining Wetland	Agriculture and land use	Land use change
	5D2_Land converted to wetlands	Land converted to Wetland	Agriculture and land use	Land use change
	5D2_Non-CO2 emissions from drainage of soils and wetlands	Non-CO2 emissions from drainage of soils and wetlands	Agriculture and land use	Land use change
	5E_Settlements (Biomass burning - controlled)	Settlements - Biomass Burning	Agriculture and land use	Land use change
	5E1_Settlements remaining settlements	Settlements remaining Settlements	Agriculture and land use	Land use change
	5E2_Land converted to settlements	Land converted to Settlements	Agriculture and land use	Land use change
	5F_Other land (Biomass burning - controlled)	Other Land - Biomass Burning	Agriculture and land use	Land use change
	5F1_Other land remaining other land	Other Land remaining Other Land	Agriculture and land use	Land use change
5F2_Land converted to other land	Land converted to Other Land	Agriculture and land use	Land use change	
5G_Other (Harvested wood)	Harvested Wood Products	Agriculture and land use	Land use change	

NC category	IPCC category	Source Name	Chapter	Sub-sector
Transport	1A3aii_Civil_Aviation_Domestic	Aircraft - domestic cruise	Transport	Domestic aviation & shipping
		Aircraft - domestic take off and landing	Transport	Domestic aviation & shipping
		Aircraft between UK and CDs - Cruise	Transport	Domestic aviation & shipping
		Aircraft between UK and CDs - TOL	Transport	Domestic aviation & shipping
	1A3b_Road_Transportation	Road transport - all vehicles LPG use	Transport	Cars
		Road transport - buses and coaches - motorway driving	Transport	Buses
		Road transport - buses and coaches - rural driving	Transport	Buses
		Road transport - buses and coaches - urban driving	Transport	Buses
		Road transport - cars - cold start	Transport	Cars
		Road transport - cars - motorway driving	Transport	Cars
		Road transport - cars - rural driving	Transport	Cars
		Road transport - cars - urban driving	Transport	Cars
		Road transport - cars non catalyst - cold start	Transport	Cars
		Road transport - cars non catalyst - motorway driving	Transport	Cars
		Road transport - cars non catalyst - rural driving	Transport	Cars
		Road transport - cars non catalyst - urban driving	Transport	Cars
		Road transport - cars with catalysts - cold start	Transport	Cars
		Road transport - cars with catalysts - motorway driving	Transport	Cars
		Road transport - cars with catalysts - rural driving	Transport	Cars
		Road transport - cars with catalysts - urban driving	Transport	Cars
		Road transport - HGV articulated - motorway driving	Transport	HGVs
		Road transport - HGV articulated - rural driving	Transport	HGVs
		Road transport - HGV articulated - urban driving	Transport	HGVs
		Road transport - HGV rigid - motorway driving	Transport	HGVs
		Road transport - HGV rigid - rural driving	Transport	HGVs
		Road transport - HGV rigid - urban driving	Transport	HGVs
		Road transport - LGVs - cold start	Transport	Vans
Road transport - LGVs - motorway driving	Transport	Vans		

NC category	IPCC category	Source Name	Chapter	Sub-sector
Transport	1A3b_Road_Transportation	Road transport - LGVs - rural driving	Transport	Vans
		Road transport - LGVs - urban driving	Transport	Vans
		Road transport - LGVs non catalyst - cold start	Transport	Vans
		Road transport - LGVs non catalyst - motorway driving	Transport	Vans
		Road transport - LGVs non catalyst - rural driving	Transport	Vans
		Road transport - LGVs non catalyst - urban driving	Transport	Vans
		Road transport - LGVs with catalysts - cold start	Transport	Vans
		Road transport - LGVs with catalysts - motorway driving	Transport	Vans
		Road transport - LGVs with catalysts - rural driving	Transport	Vans
		Road transport - LGVs with catalysts - urban driving	Transport	Vans
		Road transport - mopeds (<50cc 2st) - urban driving	Transport	Other transport
		Road transport - motorcycle (>50cc 2st) - rural driving	Transport	Other transport
		Road transport - motorcycle (>50cc 2st) - urban driving	Transport	Other transport
		Road transport - motorcycle (>50cc 4st) - motorway driving	Transport	Other transport
		Road transport - motorcycle (>50cc 4st) - rural driving	Transport	Other transport
		Road transport - motorcycle (>50cc 4st) - urban driving	Transport	Other transport
		Road vehicle engines	Transport	Other transport
		1A3c_Railways	Rail - coal	Transport
	Railways - freight		Transport	Rail
	Railways - intercity		Transport	Rail
	Railways - regional		Transport	Rail
	1A3dii_National_Navigation	Marine engines	Transport	Domestic aviation & shipping
		Shipping - coastal	Transport	Domestic aviation & shipping
	1A3e_Other_Transportation	Aircraft - support vehicles	Transport	Domestic aviation & shipping
	1A4a_Commercial/Institutional	Railways - stationary combustion	Transport	Rail
	1A4ciii_Fishing	Fishing vessels	Transport	Domestic aviation & shipping
	1A5b_Other:Mobile	Aircraft - military	Transport	Domestic aviation & shipping
Shipping - naval		Transport	Domestic aviation & shipping	

NC category	IPCC category	Source Name	Chapter	Sub-sector
Residential	1A4b_Residential	Domestic combustion	Buildings	Domestic buildings
	1A4bii_Residential:Off-road	House and garden machinery	Buildings	Domestic buildings
	2B5_Chemical_Industry_Other	Non-aerosol products - household products	Buildings	Domestic buildings
	2F4_Aerosols	Aerosols - halocarbons Metered dose inhalers	Industry	Industrial combustion
			Industry	Industrial combustion
6C_Waste_Incineration	Accidental fires - vehicles	Waste	Other waste	
Public	1A4a_Commercial/Institutional	Public sector combustion	Buildings	Non-domestic buildings
Waste Management	6A1_Managed_Waste_Disposal_on_Land	Landfill	Waste	Landfill methane
	6B2_Wastewater_Handling	Sewage sludge decomposition	Waste	Wastewater handling
	6C_Waste_Incineration	Incineration Incineration - chemical waste Incineration - clinical waste Incineration - sewage sludge	Waste	Incineration
			Waste	Incineration
Waste			Incineration	
Waste			Incineration	
Exports		Shipping - international IPCC definition	Exports	Exports
		Aircraft - international cruise	Exports	Exports
		Aircraft - international take off and landing	Exports	Exports
		Aircraft between UK and CDs - TOL	Exports	Exports
		Aircraft between UK and Gibraltar - TOL	Exports	Exports
		Aircraft between UK and other OTs (excl Gib.) - TOL	Exports	Exports
		Aircraft between UK and CDs - Cruise	Exports	Exports
		Aircraft between UK and Gibraltar - Cruise	Exports	Exports
		Aircraft between UK and other Ots (excl Gib.) - Cruise	Exports	Exports
		Exports	Exports	Exports