# Appendices

## APPENDIX A: DEFINITION OF NFR CODES AND SECTOR CATEGORIES

Some NFR codes in the table below are not applicable (n/a) to the Devolved Administrations' Air Quality Pollutant Inventory. i.e. the emissions from these NFR codes for all pollutants and all Devolved Administrations are 'zero' across the whole time series, 1990-2010.

The Sector Category "Other" is applied to 1A5b and 7A across all pollutants, as shown in the table below. Additional Sector Categories are included under "Other" for each pollutant. If a Sector Category is insignificant for a pollutant, then it is included within the "Other" category in the tables and graphs of the report. The specific Sector Categories included under "Other" for each pollutant are listed in each chapter of the report.

**Table A1:** Definition of NFR Codes and Sector Categories

| NFR Code | NFR Source Description | Sector Category |
|---|---|---|
| 1A1a | 1 A 1 a Public Electricity and Heat Production | Energy Industries |
| 1A1b | 1 A 1 b Petroleum refining | Energy Industries |
| 1A1c | 1 A 1 c Manufacture of Solid Fuels and Other Energy Industries | Energy Industries |
| 1A2 | 1 A 2 Manufacturing Industries and Construction | Industrial combustion |
| 1A2a | 1 A 2 a Iron and Steel | Industrial combustion |
| 1A2b | 1 A 2 b Non-ferrous Metals | Industrial combustion |
| 1A2c | 1 A 2 c Chemicals | Industrial combustion |
| 1A2d | 1 A 2 d Pulp, Paper and Print | Industrial combustion |
| 1A2e | 1 A 2 e Food Processing, Beverages and Tobacco | Industrial combustion |
| 1A2fi | 1 A 2 f i Stationary combustion in manufacturing and construction: Other | Industrial combustion |
| 1A2fii | 1 A 2 f ii Mobile combustion in manufacturing industries and construction | Industrial combustion |
| 1A3ai(i) | 1 A 3 a ii Civil Aviation (International, Landing & Take-Off) | Transport |
| 1A3aii(i) | 1 A 3 a ii Civil Aviation (Domestic, Landing & Take-Off) | Transport |
| 1A3b | 1 A 3 b Road Transportation | Transport |
| 1A3bi | 1 A 3 b i    Road Transport, Passenger cars | Transport |
| 1A3bii | 1 A 3 b ii    Road Transport, Light duty vehicles | Transport |
| 1A3biii | 1 A 3 b iii   Road Transport, Heavy duty vehicles | Transport |
| 1A3biv | 1 A 3 b iv   Road Transport, Mopeds & Motorcycles | Transport |
| 1A3bv | 1 A 3 b v    Road Transport, Gasoline evaporation | Transport |
| 1A3bvi | 1 A 3 b vi   Road Transport, Automobile tyre and brake wear | Transport |
| 1A3bvii | 1 A 3 b vii   Road Transport, Automobile road abrasion | Transport |
| 1A3c | 1 A 3 c Railways | Transport |
| 1A3dii | 1 A 3 d ii National Navigation | Transport |
| 1A3e | 1 A 3 e Other (to be specified) | n/a |
| 1A3ei | 1 A 3 e i  Pipeline compressors | n/a |
| 1A3eii | 1 A 3 e ii  Other mobile sources and machinery | n/a |
| 1A4a | 1 A 4 a Commercial / Institutional Combustion | Commercial, domestic and agricultural combustion |

| NFR Code | NFR Source Description | Sector Category |
|---|---|---|
| 1A4ai | 1 A 4 a Commercial / Institutional: Stationary | Commercial, domestic and agricultural combustion |
| 1A4b | 1 A 4 b Residential | Commercial, domestic and agricultural combustion |
| 1A4bi | 1 A 4 b i  Residential plants | Commercial, domestic and agricultural combustion |
| 1A4bii | 1 A 4 b ii  Household and gardening (mobile) | Commercial, domestic and agricultural combustion |
| 1A4c | 1 A 4 c  Agriculture / Forestry / Fishing | Commercial, domestic and agricultural combustion |
| 1A4ci | 1 A 4 c i Stationary | Commercial, domestic and agricultural combustion |
| 1A4cii | 1 A 4 c ii Off-road Vehicles and Other Machinery | Commercial, domestic and agricultural combustion |
| 1A4ciii | 1A 4 c iii National Fishing | Commercial, domestic and agricultural combustion |
| 1A5a | 1 A 5 a Other, Stationary (including Military) | n/a |
| 1A5b | 1 A 5 b Other, Mobile (Including military) | Other |
| 1B1 | 1 B 1 Fugitive Emissions from Solid Fuels | Fugitive |
| 1B1a | 1 B 1 a Coal Mining and Handling | Fugitive |
| 1B1b | 1 B 1 b Solid fuel transformation | Fugitive |
| 1B1c | 1 B 1 c Other (to be specified) | Fugitive |
| 1B2 | 1 B 2 Oil and natural gas | Fugitive |
| 1B2a | 1 B 2 a  Oil | Fugitive |
| 1B2ai | 1 B 2 a i  Exploration Production, Transport | Fugitive |
| 1B2aiv | 1 B 2 a iv Refining / Storage | Fugitive |
| 1B2av | 1 B 2 a v Distribution of oil products | Fugitive |
| 1B2avi | 1 B 2 a vi Other | Fugitive |
| 1B2b | 1 B 2 b Natural gas | Fugitive |
| 1B2c | 1 B 2 c Venting and flaring | Fugitive |
| 2A | 2 A MINERAL PRODUCTS (b) | Industrial processes |
| 2A1 | 2 A 1 Cement Production | Industrial processes |
| 2A2 | 2 A 2 Lime Production | Industrial processes |
| 2A3 | 2 A 3 Limestone and Dolomite Use | Industrial processes |
| 2A4 | 2 A 4 Soda Ash Production and use | Industrial processes |
| 2A5 | 2 A 5 Asphalt Roofing | Industrial processes |
| 2A6 | 2 A 6 Road Paving with Asphalt | Industrial processes |
| 2A7 | 2 A 7 Other including Non Fuel Mining & Construction (to be specified) | Industrial processes |
| 2A7a | 2A7a Quarrying and mining of minerals other than coal | Industrial processes |
| 2A7b | 2A7b Construction and demolition | Industrial processes |
| 2A7c | 2A7c Storage, handling and transport of mineral products | Industrial processes |
| 2A7d | 2A7d Other Mineral products | Industrial processes |
| 2B | 2 B CHEMICAL INDUSTRY | Industrial processes |
| 2B1 | 2 B 1 Ammonia Production | Industrial processes |
| 2B2 | 2 B 2 Nitric Acid Production | Industrial processes |
| 2B3 | 2 B 3 Adipic Acid Production | Industrial processes |
| 2B4 | 2 B 4 Carbide Production | Industrial processes |
| 2B5 | 2 B 5 Other (to be specified) | Industrial processes |
| 2B5a | 2 B 5a Other Chemical Industry (to be specified) | Industrial processes |

| NFR Code | NFR Source Description | Sector Category |
|---|---|---|
| 2C | 2 C METAL PRODUCTION | Industrial processes |
| 2C1 | 2 C 1 Iron and steel production | Industrial processes |
| 2C3 | 2 C 3 Aluminium production | Industrial processes |
| 2C5a | 2 C 5 a Copper production | Industrial processes |
| 2C5b | 2 C 5 b Lead production | Industrial processes |
| 2C5d | 2 C 5 d Zinc production | Industrial processes |
| 2C5e | 2 C 5 e Other metal production | Industrial processes |
| 2D | 2 D OTHER  PRODUCTION (b) | Industrial processes |
| 2D1 | 2 D 1 Pulp and Paper | Industrial processes |
| 2D2 | 2 D 2 Food and Drink | Industrial processes |
| 2D3 | 2 D 3 Wood processing | Industrial processes |
| 2E | 2E_Production_of_Halocarbons_and_Sulphur_Hexafluoride | Industrial processes |
| 2E1 | 2 E 1 Halocarbons production (by-product) | Industrial processes |
| 2E2 | 2 E 2 Halocarbons production (fugitive) | Industrial processes |
| 2F | 2 F Halocarbons use | Industrial processes |
| 2G | 2 G OTHER (to be specified) | Industrial processes |
| 3A | 3 A PAINT APPLICATION | Solvent processes |
| 3A1 | 3 A 1 Decorative coating application | Solvent processes |
| 3A2 | 3 A 2 Industrial coating application | Solvent processes |
| 3A3 | 3 A 3 Other coating application (Please specify the sources included/excluded in the notes column to the right) | Solvent processes |
| 3B | 3 B DEGREASING AND DRY CLEANING | Solvent processes |
| 3B1 | 3 B 1 Degreasing | Solvent processes |
| 3B2 | 3 B 2 Dry cleaning | Solvent processes |
| 3C | 3 C CHEMICAL PRODUCTS, MANUFACTURE AND PROCESSING | Solvent processes |
| 3D | 3 D OTHER incl. products containing HMs and POPs (to be specified) | Solvent processes |
| 3D1 | 3 D 1 Printing | Solvent processes |
| 3D2 | 3 D 2 Domestic solvent use including fungicides | Solvent processes |
| 3D3 | 3 D 3 Other product use | Solvent processes |
| 4A1 | 4 A 1 Enteric_Fermentation_Cows | Agriculture |
| 4A10 | 4 A 10 Enteric_Fermentation_Deer | Agriculture |
| 4A3 | 4 A 3 Enteric_Fermentation_Sheep | Agriculture |
| 4A4 | 4 A 4 Enteric_Fermentation_Goats | Agriculture |
| 4A6 | 4 A 6 Enteric_Fermentation_Horses | Agriculture |
| 4A8 | 4 A 8 Enteric_Fermentation_Swine | Agriculture |
| 4B | 4 B MANURE MANAGEMENT (c) | Agriculture |
| 4B1 | 4 B 1 Cattle | Agriculture |
| 4B1a | 4 B 1 a Dairy | Agriculture |
| 4B1b | 4 B 1 b Non-Dairy | Agriculture |
| 4B11 | 4 B 11 Liquid_Systems | Agriculture |
| 4B12 | 4 B 12 Solid_Storage_and_Drylot | Agriculture |
| 4B13 | 4 B 13 Other | Agriculture |
| 4B1a | 4 B 1 a Dairy | Agriculture |
| 4B1b | 4 B 1 b Non-Dairy | Agriculture |
| 4B2 | 4 B 2 Buffalo | Agriculture |
| 4B3 | 4 B 3 Sheep | Agriculture |
| 4B4 | 4 B 4 Goats | Agriculture |
| 4B5 | 4 B 5 Camels and Llamas | Agriculture |
| 4B6 | 4 B 6 Horses | Agriculture |

| NFR Code | NFR Source Description | Sector Category |
|---|---|---|
| 4B7 | 4 B 7 Mules and Asses | Agriculture |
| 4B8 | 4 B 8 Swine | Agriculture |
| 4B9a | 4 B 9 a Laying hens | Agriculture |
| 4B9b | 4 B 9 b Broilers | Agriculture |
| 4B9d | 4 B 9 d Other poultry | Agriculture |
| 4C | 4 C RICE CULTIVATION | Agriculture |
| 4D | 4 D AGRICULTURAL SOILS | Agriculture |
| 4D1 | 4 D 1 Direct Soil Emission | Agriculture |
| 4F | 4 F FIELD BURNING OF AGRICULTURAL WASTES | Agriculture |
| 4G | 4 G OTHER (d) | Agriculture |
| 5B | 5 B FOREST AND GRASSLAND CONVERSION | n/a |
| 5D | 5D_CO2_Emissions_From_Soils | n/a |
| 5E | 5 E Other | n/a |
| 6A | 6 A SOLID WASTE DISPOSAL ON LAND | Waste |
| 6B | 6 B WASTE-WATER HANDLING | Waste |
| 6C | 6 C WASTE INCINERATION (e) | Waste |
| 6Ca | 6 C a Clinical waste incineration (d) | Waste |
| 6Cb | 6 C b Industrial waste incineration (d) | Waste |
| 6Cc | 6 C c Municipal waste incineration (d) | Waste |
| 6Cd | 6 C d Cremation | Waste |
| 6Ce | 6 C e Small scale waste burning | Waste |
| 6D | 6 D OTHER WASTE: Composting and accidental fires | Waste |
| 7A | 7 A OTHER | Other |
| **Memo Items** | | |
| 1A3ai(ii) | International Aviation (Cruise) | n/a |
| 1A3aii(ii) | Domestic Aviation (Cruise) | n/a |
| 1A3di(i) | International maritime Navigation | n/a |
| 1A3di(ii) | International inland waterways (included in NEC totals only) | n/a |
| X | X (11 08 Volcanoes) | n/a |

# APPENDIX B: METHODS FOR CALCULATING EMISSION DISTRIBUTIONS

For a more detailed description of the integration of point source data analysis and the development of UK emission maps, see Chapter 3 of "*UK Emission Mapping Methodology 2009*" (Tsagatakis *et al*., 2011). This report outlines in detail the analysis conducted to analyse known point source emissions data, and derive the 'area' emission sources that make up the remaining component of UK emission totals. These area sources are then disaggregated geographically across the UK using a range of methods according to available data for the source in question. The geographical distribution of emissions across the UK is then built up from distributions of emissions in each source sector.

For large industrial point sources, emissions are compiled from a variety of official UK sources (Environment Agency, Scottish Environment Protection Agency, Northern Ireland Environment Agency, DECC Offshore Inspectorate, Local Authorities). The area source distribution maps are generated using appropriate surrogate statistics for that sector, commonly using local activity statistics such as raw material use, energy use, industrial production and employment data, housing and population data, road vehicle and fuel sales data, periodic census or socio-economic survey data.

Total emissions from road transport in each DA region are calculated from the following information:

- Emission factors (g/m) for different types of vehicles, which depend on the fuel type (petrol or diesel) and are influenced by the drive cycle or average speeds on the different types of roads;
- Traffic activity for each DA region, including distance and average speed travelled by each type of vehicle on each type of road;
- DA-specific fleet data on petrol/diesel car mix, car engine size and fleet composition (i.e. age distribution) for cars, LGVs and rigid HGVs based on DVLA data; the age of the fleet determines the proportion of vehicles manufactured in conformity with different exhaust emission regulations;

There are a number of improvements made to the 2010 UK road transport inventory and thus affecting the DA inventories:

- The application of Automatic Number Plate Recognition (ANPR) data to define vehicle fleet composition by different road types;
- Revised 2009 vehicle km activity data for Northern Ireland as provided by the Department for Regional Development;
- Removed previous assumptions made on the early uptake of Euro 4 petrol cars as these appear to have been overly optimistic. Their date of introduction is now based on the mandatory date set in the European emissions directive;
- Assumptions on the split in vehicle km for HGVs by vehicle weight class have been updated using information provided by DfT's Road Freight Statistics. This is to improve how the emission factors for different HGV vehicle weight classes are utilised;
- Revised emission factors for NOx for all vehicle types (except motorcycles) and emission degradation methodology for light duty vehicles based on latest version of COPERT 4 (v8.1).

Table B1 provides a simple overview of the different data used to map the SNAP sectors, whilst Table B2 below provides a more detailed insight into the disaggregation methodologies used to compile the DA air quality pollutant inventories. Table B2 is presented using the NFR reporting structure, which is the format currently required for the LRTAP submission.

**Table B1:** Methods used to Map Emissions in each of the 11 UNECE Source Sectors

| 1 Combustion in energy production and transfer | 6 Solvent use |
|---|---|
| points | population |
| offshore | points |
| IDBR employment | IDBR employment |
| **2 Combustion in commercial, institutions, residential and agricultural sectors** | Land use |
| points | **7 Road transport** |
| domestic fuel use | road transport |
| IDBR employment | **8 Other transport and machinery** |
| IDBR agriculture | agriculture |
| IDBR commercial and public fuel use | airports |
| **3 Combustion in industry** | other |
| points | rail |
| IDBR employment | shipping |
| IDBR industry fuel use | IDBR employment |
| **4 Production processes** | population |
| points | **9 Waste Treatment and disposal** |
| IDBR employment | landfill |
| shipping | Land use |
| road transport | Offshore |
| population | points |
| other | IDBR employment |
| **5 Extraction / Distribution of fossil fuels** | **10 Agricultural, forests and land use change** |
| points | agriculture |
| offshore | Land use |
| other | **11 Other sources and sinks** |
| domestic fuel use | Land use |
| population | population |

**Table B2:** Disaggregation Methodologies for compiling the DA Air Quality Pollutant Inventories

| NFR Sector | Source | Disaggregation Method |
|---|---|---|
| 1A1a | Power stations (all fuels) | All emissions are derived from the AEA point source database, which is based on annual emissions estimates reported to UK environmental regulators by IPC/IPPC-regulated industry and (since 2005) fuel use data available from the EUETS.<br><br>Environment Agency (2011a,b), SEPA (2011a,b), NIEA (2011a,b) |
| 1A1b | Refineries (all fuels) | Point source data provided by plant operators to IPC/IPPC pollution inventories (see 1A1a). Further detail on combustion and process emissions provided by UKPIA (2011). |
| 1A1c | Coke & SSF production (all fuels) | Point source data provided by plant operators (see 1A1a).<br><br>Regional iron & steel production and fuel use data (ISSB, 2011).<br><br>UK fuel use data from DECC (2011a). |
| | Nuclear fuel production (all fuels) | All emissions are in England |
| | Colliery combustion (all fuels) | Deep mined coal production, data from the Coal Authority (2011). |
| | Gas production & gas separation plant (all fuels) | Arrivals of natural gas, DECC (2011a,d), DECC Oil & Gas EEMS inventory (2011) |
| | Offshore oil & gas (Natural gas use) | DECC Offshore Inspectorate (2011) EEMS inventory. Point source data for $NO_X$, $SO_2$, VOC. (CO and $PM_{10}$ assumed same as $SO_2$.) |
| 1A2a | Blast furnaces & sinter plant | Point source data provided by plant operators (see 1A1a), supplemented by site-specific breakdown of emissions from Tata Steel (2011). |
| | Iron & steel combustion plant (all fuels) | Regional iron & steel production and fuel use data (ISSB, 2011) used to inform estimates to 2004. 2005 onwards derived from activity data from EUETS. |
| 1A2b | Non Ferrous Metals | Emissions analysis for 2010: Pollution Inventory (EA, SEPA, NIEA 2011a), EUETS (EA, SEPA, NIEA 2011b) IDBR and employment data (ONS, 2011). Overall analysis of the 1A2b,c,d,e and f sectors used to constrain the DA totals to previous 1A2 DA estimates, using 1A2f Other Industry as |
| 1A2c | Chemical Industry Combustion | |

| NFR Sector | Source | Disaggregation Method |
|---|---|---|
| 1A2d | Paper and Pulp | residual. Detailed analysis conducted for 2008-2010; 1A2b,c,d,e 1990-2008 DA trends matched with UK trends due to data limitations for the detailed industry sub-sector activities at DA level. |
| 1A2e | Food, drink and tobacco | (see above – method for 1A2b,c,d,e and f integrated.) |
| 1A2f | Refractory & ceramic production | Regional GDP data (ONS, 2011). |
| | Autogenerators (coal) | All emissions in England. |
| | Lime, cement, brick and ammonia production (all fuels) | Point source data from plant operators (see 1A1a).<br><br>All lime production and ammonia production in England. |
| | Other industrial combustion (oils) | Sub-national energy statistics, DECC (2011b), and analysis of AEA point source data derived from EU ETS and IPPC data. Environment Agency (2011a,b), SEPA (2011a,b), NIEA (2011a,b). Overall analysis of the 1A2b,c,d,e and f sectors used to constrain the DA totals to previous 1A2 DA estimates, using 1A2f Other Industry as residual. |
| | Other industrial combustion (SSF, coke) | |
| | Other industrial combustion (coal) | |
| | Other industrial combustion & auto-generators (gas) | Natural gas consumption data from gas network operators: Transco (2011), Northern Gas Networks (2011), Scotia Gas Networks (2011), Wales & West Utilities (2011), Phoenix Natural Gas (2011), Firmus Energy (2011), Vayu (2011). Regional energy statistics, DECC (2011b), and analysis of AEA point source data derived from EU ETS and IPPC data. Environment Agency (2011a,b), SEPA (2011a,b), NIEA (2011a,b). |
| | Industrial off-road machinery (all fuels) | Sub-national energy statistics (DECC, 2011b) and DA GDP data (ONS, 2011). |
| 1A3ai (i) | Aircraft – international take-off and landing (all fuels) | CAA (2011), UK airport statistics. All take-off and landing cycle emissions for each flight assigned to DA of origin airport. |
| 1A3aii (i) | Aircraft – domestic take-off and landing (all fuels) | |
| 1A3bi to 1a3bvii | Road Transport | Vehicle km, DfT, NI DRD<br>Emission factors: Boulter et al. (2009) COPERT 4 (EEA, 2010)<br>Fuel efficiency: Road Freight Statistics, DfT (2009, -2011a-e)<br>Composition of fleet: Vehicle Licensing Statistics Report, DfT (GB)<br>Dept of Regional Development (NI). |

| NFR Sector | Source | Disaggregation Method |
|---|---|---|
| | | Traffic data: National Traffic Census, DfT<br>(England, Scotland, Wales: 1990-2011)<br>Dept of Regional Development (NI: 1990-1999), Traffic Census Report (NI: 2000), Vehicle Kilometres of Travel Survey of Northern Ireland Annual Report (NI: 2001), Traffic and Travel Information, DRDNI  (NI: 2002- 2011)<br>Fuel consumption: Digest of UK Energy Statistics (1990-2011),<br>Welsh Office fuels data (WO, 1998) |
| 1A3c | Railways: intercity, regional and freight | Gas oil consumption back calculated from fuel data from ATOC/ORR using train km data from DfT. Gas oil consumption from Translink (2011)<br><br>Fuel consumption: Digest of UK Energy Statistics (1990-2011) |
| 1A3dii | Coastal shipping (gas oil, fuel oil) | Port movement data, DfT (2011b) Maritime Statistics. |
| 1A3eii | Aircraft support vehicles (gas oil) | Regional aircraft movements, DfT (2011d) |
| 1A4a | Railways – stationary combustion | Sub-national energy statistics, DECC (2011b) |
| | Industrial & commercial combustion | Sub-national energy statistics, DECC (2011b), and analysis of AEA point source data and public and commercial mapping grids from regional employment data by sector. Gas use data supplemented by data from gas network operators (same references as 1A2f). PSEC data (DFPNI 2010) used to inform the N Ireland estimates. |
| | Public sector combustion | |
| 1A4bi | Domestic combustion | For coal, anthracite, petroleum fuels, analysis is from Sub-national energy statistics, DECC (2011b) and Housing Condition Survey data. Domestic peat combustion data from CEH (Tomlinson, 2010). Gas use data provided by gas network operators (same references as 1A2f). Domestic mapping grid for GB was updated in 2011, and this has been used. |
| 1A4bii | House & garden machinery (all fuels) | Regional dwellings data, ONS (2011). |
| 1A4ci | Agriculture – Stationary combustion | Agricultural employment data, Defra (2011) used for allocation of solid and gaseous fuels. Regional energy statistics, DECC (2011b) used for petroleum-based fuels. N Ireland gas use data for agriculture sector based on 2005 estimate for the sector provided by Phoenix Natural Gas (2007) |

| NFR Sector | Source | Disaggregation Method |
|---|---|---|
| 1A4cii | Agriculture – mobile machinery | Agricultural off-road mapping grid, with overall petroleum fuel allocations constrained to the DECC sub-national energy data (DECC, 2011b) |
| 1A4ciii | Fishing vessels | Port movement data, DfT (2011b) Maritime Statistics. |
| 1A5b | Military aircraft and naval shipping | Regional GDP data (ONS, 2011). |
| 1B1a | Deep-mined coal | Regional deep mine production, Coal Authority (2011). Emissions from closed coal mines derived from WSP report (Fernando, 2011) |
| 1B1b | Coke & SSF production | Coal feed to coke ovens, ISSB, WS, DECC and (1999-2004) PI. 2005 onwards: EUETS (EA, SEPA, NIEA 2011b) |
| | Iron & steel flaring | Coal feed to coke ovens, ISSB, WS, DECC and (1999-2004) PI. 2005 onwards: EUETS (EA, SEPA, NIEA 2011b) |
| 1B2ai | Offshore oil & gas: offshore oil loading, well testing. | All emissions unallocated. |
| | Offshore oil & gas: process emissions, onshore oil loading, oil terminal storage | Emissions derived from the DECC Offshore Inspectorate (2011) EEMS point source dataset, with extrapolations back to cover 1990, 1995 where data gaps are evident. |
| 1B2aiv | Refinery process emissions (drainage, tankage, general) | Point source data provided by plant operators (see 1A1a), UKPIA (2011) and analysed using the AEA point source database. |
| 1B2av | Petrol terminal storage and loading, Refinery road and rail haulage emissions | Point source data provided by plant operators (see 1A1a). |
| | Petrol station emissions from delivery, vehicle refuelling, storage tanks and spillages | Regional road transport distribution based on analysis of vehicle km data for different vehicle types and the resultant fuel use distributions. Hence, references as 1A3b. |
| 1B2b | Onshore gas production (gasification process emissions) | Point source data provided by plant operators (see 1A1a). |

| NFR Sector | Source | Disaggregation Method |
|---|---|---|
| | Gas leakage from supply infrastructure | Leakage data provided by gas network operators: Transco (2011), Northern Gas Networks (2011), Scotia Gas Networks (2011), Wales & West Utilities (2011), Phoenix Natural Gas (2011). |
| 1B2c | Offshore oil & gas: flaring & venting | Emissions derived from the DECC Offshore Inspectorate (2011) EEMS point source dataset, with extrapolations back to cover 1990, 1995 where data gaps are evident. |
| | Refinery flaring | Point source data provided by plant operators (see 1A1a). |
| 2A1 | Cement decarbonising | Point source data provided by plant operators (see 1A1a). |
| | Concrete batching | Regional GDP data (ONS, 2011). |
| | Slag cement production | Slag cement production mapping grid |
| 2A2 | Lime production decarbonising | Point source data provided by plant operators (see 1A1a). |
| 2A3 | Limestone & dolomite use in: inter plant, glass production, basic oxygen furnaces. FGD emissions from power stations. | Point source data provided by plant operators (see 1A1a). |
| 2A4 | Soda ash use in glass and chemical industries | Point source data provided by plant operators (see 1A1a). |
| 2A7 | Construction, asphalt manufacture | Regional GDP data (ONS, 2011). |
| | Quarrying (aggregates) | Quarries mapping grid. |
| | Glass industry process emissions | Point source data provided by plant operators and from EUETS (see 1A1a). |
| 2B1 | Ammonia production | All ammonia production now in England. Point source emissions data and plant capacity data used for earlier years. |
| 2B2 | Nitric acid production | Point source data provided by plant operators (see 1A1a). Now all England. |
| 2B3 | Adipic acid production | Point source data provided by plant operators (see 1A1a). All England. |

| NFR Sector | Source | Disaggregation Method |
|---|---|---|
| 2B5 | Ship purging | All emissions unallocated. |
| | Chemical industry process emissions | Point source data provided by plant operators (see 1A1a). |
| 2C | Industrial process emissions from SMEs, hot & cold steel rolling emissions | Regional GDP data (ONS, 2011). |
| | Process emissions from: blast furnaces, EAFs, BOFs, primary aluminium production & anode baking, alumina production, non-ferrous metal processes | Point source data provided by plant operators (see 1A1a), plus supplementary data provided by Tata Steel (2011) and the ISSB (2011) |
| | Flaring & stockpile emissions at iron & steelworks | Regional iron & steel production and fuel use data (ISSB, 2011). |
| | Foundries | Foundries mapping grid |
| 2D1 | Paper production process emissions | Regional GDP data (ONS, 2011). |
| | Wood product process emissions | Wood coating mapping grid. |
| 2D2 | Cider & wine manufacture | All emissions are in England. |
| | Spirit manufacture | Spirits mapping grid |
| | Brewery emissions | Brewing mapping grid |
| | Food & drink process industries: meat & fish, margarine, cakes & biscuits, animal feed, coffee roasting | Population used to disaggregate emissions. |
| | Other food & drink processes: bread baking, sugar beet, malting. | Point source data provided by plant operators (see 1A1a). |
| 3 | Solvent use | Population data, ONS (2011). |

| NFR Sector | Source | Disaggregation Method |
|---|---|---|
| 3A | Trade & retail decorative paints, | Population data, ONS (2011). |
| | Industrial coatings: commercial vehicles, aircraft, agricultural and construction vehicles. | Regional GDP data (ONS, 2011). |
| | Industrial coatings: wood, metal, plastic, marine, vehicle refinishing. | Various coatings mapping distribution grids are used, based on surveys of locations of such processes. |
| | Industrial coatings: coil, metal packaging, automotive, drum. | Point source data provided by plant operators (see 1A1a). |
| 3B | Domestic surface cleaning. | Population data, ONS (2011). |
| | Dry cleaning (solvent use) | Dry cleaning mapping grid |
| | Industrial surface cleaning | Industrial employment mapping distribution grid. |
| 3C | Rubber & plastic products | Population data, ONS (2011). |
| | Leather coating and degreasing | Regional GDP data (ONS, 2011). |
| | Tyre manufacture and industrial coatings: textiles, film. | Point source data provided by plant operators (see 1A1a). |
| | Industrial coating manufacture: adhesives, inks, solvents and pigments | Various industry-specific coatings mapping distribution grids |
| 3D | Industrial adhesives and solvent use, printing, aerosol and non-aerosol products (cosmetics & toiletries, household products, paint thinners), | Population data, ONS (2011). |
| | Printing – public gravure | Other printing mapping grid |
| | Road dressings | Road dressing mapping grid. |

| NFR Sector | Source | Disaggregation Method |
|---|---|---|
| | Agrochemical use, wood impregnation | Various agricultural mapping distribution grids |
| | Seed oil extraction, paper coatings, some adhesive and printing processes. | Point source data provided by plant operators (see 1A1a). |
| 4B1 | Cattle waste: manure & excreta | Livestock data, via Rothamsted Research (2011)<br><br>For $NH_3$, specific DA splits for manure management, based on regional emissions data for 1990, 1995, 2000-2010 provided by Rothamsted Research |
| 4B3 | Sheep & goat waste: manure & excreta | Livestock data, via Rothamsted Research (2011)<br><br>For $NH_3$, specific DA splits for manure management, based on regional emissions data for 1990, 1995, 2000-2010 provided by Rothamsted Research |
| 4B6 | Horse waste: manure & excreta | Livestock data, via Rothamsted Research (2011) |
| 4B8 | Pig waste: manure & excreta | Livestock data, via Rothamsted Research (2011)<br><br>For $NH_3$, specific DA splits for manure management, based on regional emissions data for 1990, 1995, 2000-2010 provided by Rothamsted Research |
| 4B9 | Poultry wastes: manure & excreta | Livestock data, via Rothamsted Research (2011)<br><br>For $NH_3$, specific DA splits for manure management, based on regional emissions data for 1990, 1995, 2000-2010 provided by Rothamsted Research |
| 4B13 | Domestic pets: manure & excreta | 2010 Mapping data from CEH (2011) and population data, ONS (2011). |
| 4D1 | Use of domestic fertiliser & composting | Population data, ONS (2011).<br><br>For NH3, specific DA splits for fertiliser use, based on regional emissions data for 1990, 1995, 2000-2010 provided by Rothamsted Research |

| NFR Sector | Source | Disaggregation Method |
|---|---|---|
| | Agricultural soil emissions | Rothamsted Research (2011), livestock data and fertiliser application data. For $NH_3$, specific DA splits for agricultural soils, based on regional emissions data for 1990, 1995, 2000-2010 provided by Rothamsted Research |
| 4F | Field burning | Field burning estimates, via Rothamsted Research (2011) |
| 5B | Deforestation | CEH (2011) regional distribution data. |
| 6A | Landfills, benzoles & tars | Regional landfill MSW disposal data (www.wastedataflow.org), combined with DA-specific landfill model developed by the Defra Waste team (Defra, 2012). |
| 6B | Sewage sludge decomposition | Population data, ONS (2011). |
| 6C | Clinical waste incineration, small-scale waste burning | Population data, ONS (2011). |
| | Incineration: MSW, crematoria, sewage sludge, chemical waste | Point source data provided by plant operators (see 1A1a). |
| | Foot & mouth pyres | Data on livestock disposal, NAO report. |
| 6D | Nappies, accidental fires, composting | Population data, ONS (2011). |
| 7 | Cigarettes, fireworks & bonfires | Population data, ONS (2011). |