

## Overview to Atmospheric Pollutants

The UK is required to report emissions under different international agreements for key air pollutants covered by the National Atmospheric Emissions Inventory (NAEI) and greenhouse gases (GHG) covered by the UK GHG inventory. The National Environmental Technology Centre (Netcen) maintains the National Atmospheric Emissions Inventory.

There is a wide range of pollutants that contribute emissions to the atmosphere. They include greenhouse gases and substances that are directly toxic such as heavy metals. These pollutants can be grouped according to their contribution to environmental themes such as climate change and acid rain.

Each year the Environmental Accounts present estimates of pollutants directly emitted to the atmosphere by each industrial sector. The figures are on a National Accounts basis - they include emissions generated by UK households and companies in the UK and emissions from UK residents' transport and travel activities abroad. They exclude emissions generated by non-residents transport and travel in the UK. The data are therefore on a different basis from estimates previously published by the Department for Environment, Food and Rural Affairs (Defra) under the UK's Kyoto Protocol obligations. The Kyoto basis covers emissions from UK territory only and excludes emissions from international aviation and shipping. For a reconciliation of the different measures see table 2.4 of Environmental Accounts.

Changes in atmospheric emissions are compared to 1990 as this is the base year used in the Kyoto Protocol.

### The Greenhouse effect (Climate change)

Greenhouse gases are transparent to natural light from the sun and relatively opaque to infra-red radiation from the Earth. Therefore, they trap some of the Earth's infra-red radiation and radiate it back to Earth. As a result, the Earth's temperature is kept at about 15°C by the atmospheric blanket. Without this naturally occurring greenhouse effect the Earth's temperature would be about minus 18°C - too cold for human life.

Although most greenhouse gas occur naturally, some are man-made. Since the industrial revolution, human activity has led to an increase in both the natural and man-made gases, especially carbon dioxide. There is growing consensus that the rise in greenhouse gas emissions has led to changes in the global atmosphere, so called global warming. The greenhouse gases included in the atmospheric emissions accounts are those covered by the Kyoto Protocol:

Carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.

To aggregate the greenhouse gases covered in the accounts, a weighting based on the relative global warming potential (GWP) of each of the gases is applied, using the effect of carbon dioxide over a 100 year period as a reference. This gives methane a weight of 21 relative to carbon dioxide and nitrous oxide a weight of 310 relative to carbon dioxide. Sulphur hexafluoride has a GWP of 23,900 relative to carbon dioxide. The GWP of the other fluorinated compounds varies according to the individual gas.

Greenhouse gas emissions are sometimes shown in terms of carbon equivalent rather than carbon dioxide equivalent. To convert from carbon dioxide equivalent to carbon equivalent it is necessary to multiply by 12/44.

## Acid Rain Precursors

The term 'acid rain' describes the various chemical reactions acidic gases and particles undergo in the atmosphere and may be transported long distances before being deposited as wet or dry deposition. When deposited the hydrogen ions may be released causing acidification. These dilute acids damage ecosystems and buildings. The gases covered are sulphur dioxide, nitrogen oxides and ammonia.

## Attributing emissions to industrial sectors

The emissions are weighted together using their relative acidifying effects. The weights, given relative to sulphur dioxide, are 0.7 for nitrogen oxides and 1.9 for ammonia. This is a simplification of the chemistry involved and there are a number of factors which can affect the eventual deposition and effect of acid rain. There may be an upward bias on the weights of the nitrogen-based compounds in terms of damage to ecosystems.

National Atmospheric Emissions Inventory (NAEI) projections of future emissions are an increasingly important requirement for UK government policy-making. National estimates of emissions are calculated across all economic sectors, e.g. industry, domestic use. The disaggregation of national estimates of emissions to industrial sectors is based upon an initial disaggregation provided by the National Environmental Technology Centre (Netcen).

Emissions were estimated by multiplying fuel consumption by emissions factors and adding releases unrelated to fuel use such as methane arising from landfill and collieries.

The NAEI data is used to identify the main processes and industries responsible for the emissions. These are then allocated to individual sectors on the basis of information from a variety of sources. For example, emissions from diesel use by HGVs is allocated to sectors using vehicle mileage data from the Department for Environment, Food and Rural Affairs (Defra). Expenditure information is also used, for example emissions arising from the use of various industrial coatings (e.g. general industrial, heavy duty and vehicle refinishing) are allocated to relevant sectors in proportion to each sector's expenditure on paints, varnishes and similar coatings, printing ink and mastics, using National Accounts Input-Output supply and use tables as the main source.

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