

Greenhouse Gases (GHGs)

There are many gases that contribute to global warming. For most industries **carbon dioxide** (CO₂) is the main gas and it is a relatively simple exercise to calculate from energy consumption (fuel and electricity). For agriculture, CO₂ in energy is relatively unimportant compared with **Nitrous Oxide** (N₂O) (from manures and fertiliser) and **Methane** (CH₄) (from livestock digestion and manure).

All outputs are shown in **Carbon Dioxide equivalents** (CO₂e). The object of reporting in terms of CO₂e is to place all greenhouse gases on the same basis. The conversion used is called the **Global Warming Potential** (GWP). Thus N₂O has a GWP 310 times greater than CO₂ while the CH₄ GWP is 21 times higher than CO₂. These conversion factors are stated in the 1995 Second Assessment Report by the Intergovernmental Panel for Climate Change (IPCC) and are used in the calculator to be consistent with the Kyoto agreement and the **United Nations Framework Convention on Climate Change** (UNFCCC). However, IPCC have now updated these factors (e.g. CH₄ = 25 and N₂O = 298).

These factors are the estimated impact over 100 years. In fact the impact of the gases varies significantly over time with for example CH₄ having an estimated life of 12 years. This means that the initial impact is very much higher than the 21 GWP quoted above.

Rather than carbon dioxide equivalents, carbon equivalents are also sometimes quoted. The conversion is simply based on the relative molecular weights of carbon (C) of 12 and CO₂ of 44. To convert from CO₂e to C(e) multiply by 12/44. N.B. The distinction between carbon, carbon dioxide, carbon equivalents and carbon dioxide is often muddled.

For most business the major GHG is derived from energy and consequently easy to calculate. In addition, it is rare for businesses to pass on emissions from their activity to someone else in their sector. This is not true in agriculture where feed is often imported leaving another producer responsible for the emissions involved with its production. Production of biofuels or export of manure to another grower will also change the ownership of the emissions source. The most important emission outside the sector is derived from the production of fertiliser, particularly nitrogen fertilisers. A key element of any detailed assessment is to define the business for which the calculation is to be done. How should let offices or houses be treated? Should the account include tenants? How do we deal with contractors, and so on. We offer some guidance on how to deal with these issues. See **Step 2** for help on this.