Methodology for calculating CO_2 emissions from energy use

The method used to estimate carbon emissions from energy consumption was revised for the 2016 edition of the Statistical Review.

The previous method for calculating CO_2 emissions was constructed by applying a single emission factor to each of oil, gas and coal, as reported in the footnote of the table 'Carbon Dioxide Emissions'. Those emission factors were based on standard global average conversion factors compiled on the basis of average carbon content: oil at 73,300 kg CO_2 per TJ (3.07 tonnes per tonne of oil equivalent); natural gas at 56,100 kg CO_2 per TJ (2.35 tonnes per tonne of oil equivalent); and coal at 94,600 kg CO_2 per TJ (3.96 tonnes per tonne of oil equivalent).

The previous method also took no account of fuel consumption used for non-combustion purposes.

The revised method differs in two main respects.

First, the revised estimates use the Default CO_2 Emission Factors for Combustion for each energy product type from the list of IPCC emission factors[1]. Biofuels are considered as non-emitting CO_2, consistent with the practice of the IEA.

Second, the revised method takes account of fuel consumption used for non-combustion purposes, such as the use of natural gas in the petrochemicals industry or of oil to produce bitumen for road construction. Estimates of the share of non-combusted fossil fuels taken from the IEA's energy balances[2] are subtracted from the total consumption of fossil fuels before applying the relevant emission factors.

Applying the old methodology to the fuel consumption numbers reported in the 2016 edition of the Statistical Review (the year in which the new methodology was adopted) would result in CO_2 emissions about 8% higher than those derived from the new method. The change in the growth rate of CO_2 emissions between the two methods is minimal, ranging from 0.2%to - 0.3% over the last 25 years, with the difference over this period averaging less than 0.1%.

[1] IPCC 2006, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T., and Tanabe K. (eds). Published: IGES, Japan; available at http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_0_Cover.pdf

[2] 'Energy Statistics of OECD Countries', 'Energy Balances of OECD Countries', 'Energy Statistics of Non-OECD Countries, and 'Energy Balances of Non-OECD Countries'