Dataset Information:

Title	**Synthetic Fertilizers**
Abstract	Greenhouse gas (GHG) emissions from synthetic fertilizers consist of nitrous oxide gas from synthetic nitrogen additions to managed soils. Computed at Tier 1 following the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 2006); available by country, with global coverage and relative to the period 1961-present, with annual updates, and projections for 2030 and 2050.
Supplemental	This domain contains data on GHG emissions, associated emission factors and underlying activity data. The FAOSTAT Emissions data are estimates by FAO and do not coincide with GHG data reported by member countries to UNFCCC. The database is intended primarily as a service to help member countries assess and report their emissions, as well as a useful international benchmark. The FAOSTAT Emissions data are disseminated publicly to facilitate continuous feedback from member countries.
Creation Date	2012
Last Update	2013
Data Type	Climate Change - Greenhouse Gases
Category	Environment
Time Period	1961-present; projections for 2030 and 2050
Periodicity	Annual
Geographical Coverage	World
Spatial Unit	Country
Language	Multilingual (EN, FR, ES)

Methodology and Quality Information:

Methods and processing	GHG emissions from synthetic fertilizers consist of direct and indirect nitrous oxide (N_2O) emissions from nitrogen (N) added to agricultural soils by farmers. Specifically, N_2O is produced by microbial processes of nitrification and de-nitrification taking place on the addition site (direct emissions), and after volatilization/re-deposition and leaching processes (indirect emissions). The FAOSTAT data are estimated at Tier 1 following IPCC, 2006, Vol. 4, Ch. 11. Direct emissions are estimated at country level, using the formula: *Emission = A * EF* where: *Emission* = GHG emissions in kg N_2O-N yr^{-1}; *A* = Activity data, representing amount of annual synthetic N applications in kg N yr^{-1} (1); *EF* = Tier 1, default IPCC emission factors, expressed in kg N_2O-N / kg N (2). (1) N consumption data are taken from the FAOSTAT Fertilizers Archive Dataset (1961-2001) (domain: Resources/Resources/Fertilizers) and the Fertilizers Dataset (2002 to present) (domain: Resources/Resources/Fertilizers Archive). These are derived as an annual balance of N production and net trade. Projections of activity data for 2030 and 2050 are computed with respect to a baseline, defined as the 2005-2007 average of the corresponding FAOSTAT activity data, and by applying percentage growth rates from FAO perspective studies (Alexandratos and Bruinsma, 2012). The FAO projections used cover some 140 countries. Projections of activity data for countries not included assume the same growth rate of neighbouring countries. The following assumption is made: N application data = FAOSTAT N consumption data. (2) Global default EF values are taken from IPCC, 2006: Vol. 4, Ch.11, Tab. 11.1.

	Indirect emissions are estimated at country level, using the formula: *Emission = A * EF* where: *Emission* = GHG emissions in kg N_2O-N yr^{-1}; *A* = Activity data, representing the amount of synthetic N applications that volatizes as NH_3 and NO_x and is lost through runoff and leaching in kg N yr^{-1} (3); *EF* = Tier 1, default IPCC emission factors, expressed in kg N_2O-N / kg N yr^{-1} (4). (3) Obtained through the volatilization and leaching factors in IPCC, 2006: Vol.4, Ch. 11, Tab. 11.3. (4) Global default EF values from IPCC, 2006: Vol.4, Ch.11,Tab.11.3. Dimensionless conversion factors used are: 44/28, to convert the emissions from kg N_2O-N to kg N_2O gas; 10^{-6}, to convert the emissions from kg N_2O to Gg N_2O; and GWP-N_2O = 310 (100-year time horizon), to convert Gg N_2O to Gg CO_2eq (IPCC, 1996: Technical Summary, Tab. 4 pg. 22). The synthetic fertilizer sub-domain contains the following data categories available for download: country-level GHG emissions, provided as total, direct and indirect amounts in both Gg N_2O and Gg CO_2eq; implied emission factors; and activity data. Data are available for all countries and territories, as well as for standard FAOSTAT regional aggregations, plus Annex I and non-Annex I groups. The data period is 1961-present with projections for 2030 and 2050. Uncertainties in estimates of GHG emissions are due to uncertainties in emission factors and activity data. They may be related to, inter alia, natural variability, partitioning fractions, lack of spatial or temporal coverage, spatial aggregation. In the case of synthetic fertilizers more detailed information is available in the guidelines (IPCC, 2006: Vol.4, Ch. 11, Section 11.2.1.4 for direct emissions, and Section 11.2.2.4 for indirect emissions). *References* Alexandratos, N. and J. Bruinsma. 2012. World agriculture towards 2030/2050: the 2012 revision. ESA Working paper No. 12-03. Rome, FAO. IPCC. 1996. Climate Change 1995 - The Science of Climate Change: Contribution of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge. 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), IGES, Hayama, Japan.
Data Collection Method	Computed
Completeness	100%
Links	www.fao.org/climatechange/micca/ghg/ www.ipcc-nggip.iges.or.jp/public/

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