



DOCUMENTATION OF CALIFORNIA'S GREENHOUSE GAS INVENTORY

Last reviewed on May 21, 2009 at 15:20

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? Category: Waste

IPCC: 4D1 - Wastewater Treatment and Discharge - Domestic Wastewater Treatment and Discharge

Sector: Industrial : Wastewater Treatment : Domestic Wastewater : Effluent Emissions

? Greenhouse gas: Nitrous oxide (N2O)

? 2006 N2O from California population - —

(Version 2 - Last updated on 03/13/2009)

? GREENHOUSE GAS EMISSION ESTIMATE —

Amount: 3,197 tonnes of N2O Emitted (991,007 tonnes CO2 Eq.)

Basis: Calculation

Calculation: (([California Population]*[Protein Consumption Rate]*[Fraction of nitrogen in protein]*[Non-consumption protein factor] * [Industrial and commercial codischarge factor]) - [Sewage sludge N not entering aquatic environment]) * [Effluent water emission factor] * [Molecular weight ratio of N2O to N2]

Reference: USEPA (2008). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006. United States Environmental Protection Agency. EPA 430-R-08-005. Chapter 8: Waste. April 15, 2008. Washington DC. http://www.epa.gov/climatechange/emissions/usgginv_archive.html

? ACTIVITY LEVEL USED IN CALCULATIONS —

Activity: California population = 37,332,976 person

Basis: Data

Reference: CDOF (2008). California Department of Finance, California Demographic Research Unit: Population Estimates and Projections. Accessed online at: <http://www.dof.ca.gov/HTML/DEMOGRAP/ReportsPapers/ReportsPapers.php>

? PARAMETERS AND CONSTANTS USED IN CALCULATIONS —

Parameter: CA population served by biological denitrification = 272,148 Person

Reference: USEPA (2008). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006. United States Environmental Protection Agency. EPA 430-R-08-005. Chapter 8: Waste. April 15, 2008. Washington DC. ARB staff scaled USEPA's national data down to California pro-rata to yearly population estimates. http://www.epa.gov/climatechange/emissions/usgginv_archive.html

Parameter: Effluent water emission factor = 5.000E-03 g / g

Reference: USEPA (2008). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006. United States Environmental Protection Agency. EPA 430-R-08-005. Chapter 8: Waste. April 15, 2008. Washington DC. http://www.epa.gov/climatechange/emissions/usgginv_archive.html

Parameter: Emission factor w/o nitrification denitrification = 3.2 g / person

Reference: USEPA (2008). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006. United States Environmental Protection Agency. EPA 430-R-08-005. Chapter 8: Waste. April 15, 2008. Washington DC. http://www.epa.gov/climatechange/emissions/usgginv_archive.html

Parameter: Emission factor with nitrification denitrification = 7 g / person

Reference: USEPA (2008). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006. United States Environmental Protection Agency. EPA 430-R-08-005. Chapter 8: Waste. April 15, 2008. Washington DC. http://www.epa.gov/climatechange/emissions/usgginv_archive.html

Parameter: Fraction of nitrogen in protein = 0.16

Reference: USEPA (2008). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006. United States Environmental Protection Agency. EPA 430-R-08-005. Chapter 8: Waste. April 15, 2008. Washington DC. http://www.epa.gov/climatechange/emissions/usgginv_archive.html

Parameter: Fraction using wastewater treatment plants = 0.9

Reference: CWTRC, 2003. Status Report: Onsite Wastewater Treatment Systems in California. Jointly presented by: California Wastewater Training & Research Center, California State University Chico and USEPA Region 9 Ground Water Office. August 2003. <http://www.csuchico.edu/cwtrc/Pages/InfoandReoprtspage.htm>

Parameter: Industrial and commercial codischarge factor = 1.25

Reference: USEPA (2008). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006. United States Environmental Protection Agency. EPA 430-R-08-005. Chapter 8: Waste. April 15, 2008. Washington DC. http://www.epa.gov/climatechange/emissions/usgginv_archive.html

Parameter: Non-consumption protein factor = 1.4

Reference: USEPA (2008). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006. United States Environmental Protection Agency. EPA 430-R-08-005. Chapter 8: Waste. April 15, 2008. Washington DC. http://www.epa.gov/climatechange/emissions/usgginv_archive.html

Parameter: Protein consumption rate = 41,885 g / person / year

Reference: USEPA (2008). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006. United States Environmental Protection Agency. EPA 430-R-08-005. Chapter 8: Waste. April 15, 2008. Washington DC. http://www.epa.gov/climatechange/emissions/usgginv_archive.html

Parameter: Sewage sludge N not entering aquatic environment = 30,892,798,089 g (i.e. 30.89 thousand tonnes)

Reference: USEPA (2008). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006. United States Environmental Protection Agency. EPA 430-R-08-005. Chapter 8: Waste. April 15, 2008. Washington DC. ARB staff scaled USEPA's national data down to California pro-rata to yearly population estimates. http://www.epa.gov/climatechange/emissions/usgginv_archive.html

Constant: Molecular weight ratio of N₂O to N₂ = 1.571133815

Reference: IUPAC (2006). ATOMIC WEIGHTS OF THE ELEMENTS 2005 (IUPAC TECHNICAL REPORT). Pure Appl. Chem., Vol. 78, No. 11, pp. 2051–2066, 2006.

Constant: Global warming potential of N₂O = 310

Reference: IPCC (1996). Second Assessment Report. Climate Change 1995: WG I - The Science of Climate Change. Intergovernmental Panel on Climate Change; J.T. Houghton, L.G. Meira Filho, B.A. Callander, N. Harris, A. Kattenberg, and K. Maskell (eds.); Cambridge University Press. Cambridge, U.K.

? GREENHOUSE GAS EMITTED PER UNIT ACTIVITY —

Amount: 85.6 g of N₂O per person
26,545 g (i.e. 26.55 kg) of CO₂eq. per person

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