FOOD EMISSIONS

DIRECT AGRICULTURAL EMISSIONS

ABOUT BIG FACTS

Big Facts is a resource of the most up-to-date and robust facts relevant to the nexus of climate change, agriculture and food security. It is intended to provide a credible and reliable platform for fact checking amid the range of claims that appear in reports, advocacy materials and other sources. Full sources are supplied for all facts and figures and all content has gone through a process of peer review.

Big Facts is also an open-access resource. We encourage everyone to download, use and share the facts and graphic images. We believe that by sharing knowledge we can aid the type of interdisciplinary understanding and collaboration necessary for meeting the challenges posed to agriculture and food security in the face of climate change.

The Big Facts project is led by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). CCAFS is a strategic partnership of CGIAR and Future Earth, led by the International Center for Tropical Agriculture (CIAT). CCAFS brings together the world's best researchers in agricultural science, development research, climate science and Earth System science, to identify and address the most important interactions, synergies and tradeoffs between climate change, agriculture and food security.

We are well aware that this field is progressing rapidly, and that science is always open for re-evaluation. We welcome your suggestions for improvements, updates and corrections at ccafs@cgiar.org.

Acknowledgments

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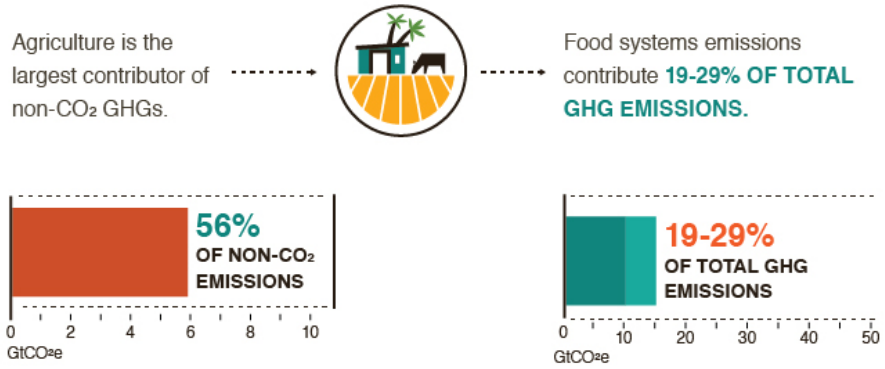
Emissions from Agricultural Soils (N2O)

Between 1990 and 2012, nitrous oxide (N2O) emissions from agricultural soils increased by 30.9%, from 1,614 million tonnes of carbon dioxide (CO2) equivalent to 2,114 million tonnes, which corresponds to 39.3% of total agricultural emissions (FAO 2015)

Underlying this trend are increases in crop production and fertilizer use and other nitrogen sources such as crop residues (US-EPA 2012)

From 2012 to 2030, N2O emissions from agricultural soils are projected to increase by 3.8%, from 2,114 million tonnes of CO2 equivalent to 2,195 million tonnes, which corresponds to 38.1% of total agricultural emissions (FAO 2015)



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Emissions from Livestock and Animal Products

The livestock sector contributes an estimated 7,100 million tonnes of CO2 equivalent per year, representing 14.5% of human-induced greenhouse gas emissions (Gerber et al. 2013).

Production of beef and cattle milk accounts for the majority of emissions, contributing 41% and 20%, respectively, of the sector's emissions. Production of pig meat and poultry meat and eggs contribute 9% and 8%, respectively, of the sector's emissions (Gerber et al. 2013).

Feed production and processing, and enteric fermentation from ruminants are the two main sources of emissions, accounting for 45% and 39%, respectively, of sector emissions. Manure storage and processing account for 10 % of emissions (Gerber et al. 2013).

The consumption of fossil fuel along livestock-sector supply chains accounts for about 20% of sector emissions (Gerber et al. 2013).

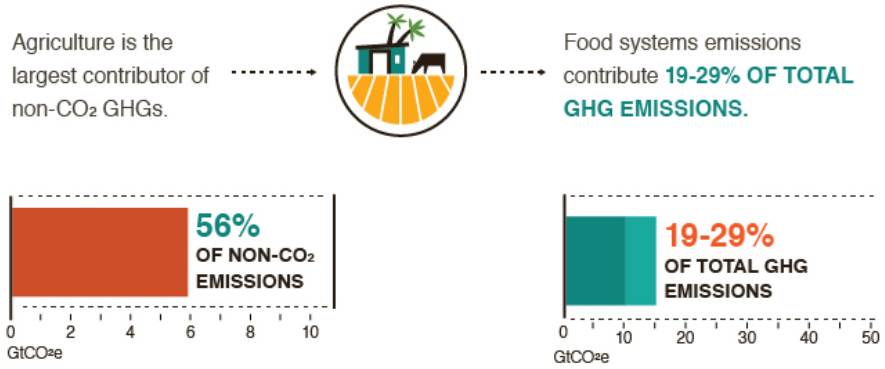
About 44% of the sector's emissions are in the form of methane (CH4). The rest is almost equally shared between N2O (29%) and CO2 (27%) (Gerber et al. 2013).

Global CH4 emissions from enteric fermentation increased by 11.2% from 1990 to 2012, from 1,869 million tonnes of CO2 equivalent to 2,080 million tonnes, a share that represents 38.7% of total agricultural emissions in 2012 (FAO 2015)

From 2012 to 2030, CH4 emissions from enteric fermentation are projected to increase by 13.7%, from 2,080 million tonnes of CO2 equivalent to 2,365 million tonnes (FAO 2015).

From 1990 to 2012, CH4 and N2O emissions from manure management increased by 8.7%, from 335 million tonnes of CO2 equivalent to 364 million tonnes, corresponding to 6.8% of total agricultural emissions in 2010 (FAO 2015)

From 2012 to 2030, global CH4 and N2O emissions from manure management are projected to increase by 13.4%, from 364 million tonnes of CO2 equivalent to 413 million tonnes (FAO 2015).



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Emissions from Rice Cultivation (CH4)

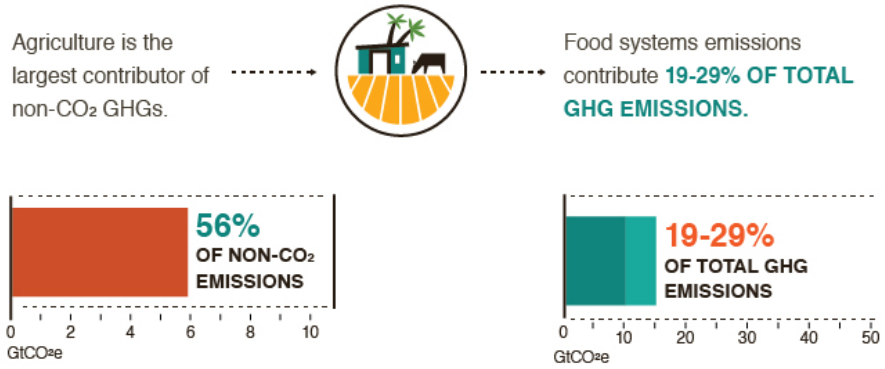
CH4 emissions from rice production have increased 12% from 1990 to 2012, from 466 million tonnes of CO2 equivalent to 522 million tonnes, corresponding to approximately 9.7% of total agricultural emissions in 2012. Underlying this trend has been a similar increase in the land area of harvested rice (FAO 2015)

From 2012 to 2030, CH4 emissions from this source are projected to decrease 3.8% from 522 million tonnes of CO2 equivalent to 502 million tonnes (FAO 2015)

Other Agriculture Sources of non-CO2 Emissions (CH4, N2O):

From 1990 to 2012, total emissions from other agricultural sources (such as burning of crop residues) increased from 277 million tonnes of CO2 equivalent to 301 million tonnes, corresponding to approximately 5.6% of total agricultural emissions in 2010 (FAO 2015).

Type of emission	Total emissions 1990 (MtCO2e)	Total emissions 2012 (MtCO2e)	Total emissions 2030* (MtCO2e)
Agricultural soils (N2O)	1,614 (35.4%)	2,114 (39.3%)	2,195 (38.1%)
Enteric fermentation (CH4)	1,869 (41%)	2,080 (38.7%)	2,365 (41.1%)
Rice cultivation (CH4)	466 (10.2%)	522 (9.7%)	502 (8.7%)
Manure management (CH4, N2O)	335 (7.3%)	364 (6.8%)	413 (7.2%)
Other emissions (CH4, N2O)	277 (6.1%)	301 (5.6%)	281 (4.9%)
Total non-CO2 emissions	4,561 (100%)	5,381 (100%)	5,756 (100%)



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SOURCES & FURTHER READINGS

FAO. 2015. Food and Agriculture Organization of the United Nations, FAOSTAT database. Available at: http://faostat3.fao.org/faostat-gateway/go/to/home/

Gerber PJ, Steinfeld H, Henderson B, Mottet A, Opio C, Dijkman J, Falcucci A, Tempio G. 2013. Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities. Rome: Food and Agriculture Organization of the United Nations. (Available from http://www.fao.org/docrep/018/i3437e/i3437e.pdf) (Accessed on 6 November 2013)

[US-EPA] United States Environmental Protection Agency. 2012. Global anthropogenic non-CO2 greenhouse gas emissions: 1990 – 2030. EPA 430-R-12-006. Washington, DC: US-EPA. (Available from http://www.epa.gov/climatechange/EPAactivities/economics/nonco2projections.html) (Accessed on 6 November 2013)

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