Greenhouse Gas Emissions in Tanzania

Tanzania Numbers at a Glance (2014)

286.49 $MtCO_2e$*
Total GHG emissions (0.59% of world total)
World: 48,892 $MtCO_2e$

52,234,869
Population
World: 7,268,986,176

5.48
tCO_2e per capita
World: 6.73 tCO_2e

US $40,883 Million
GDP**
World: US$73,479 Billion

7,007
tCO_2e/million US$ GDP
World: 665 tCO_2e/million US$ GDP

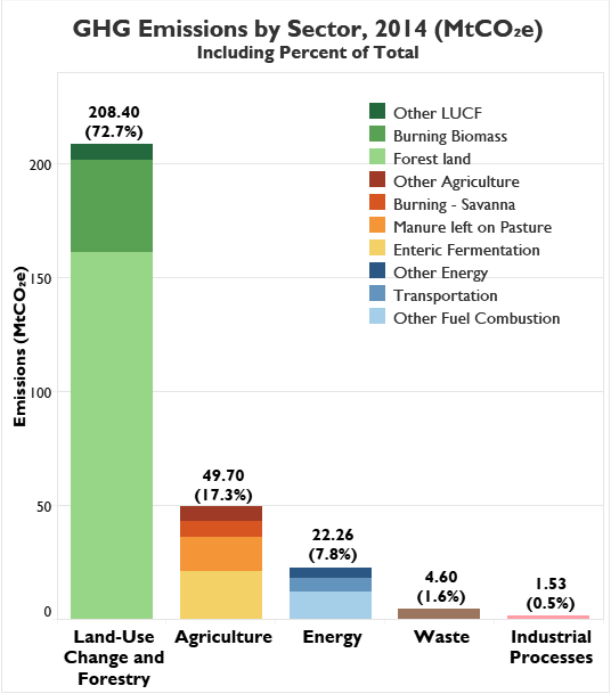
+9.01 $MtCO_2e$ (+3%)
Change in GHG emissions (1990–2014)
World: +15,069 $MtCO_2e$ (+45%)

Sources: WRI CAIT 4.0, 2018. Emissions including Land-Use Change and Forestry. Global Warming Potentials are from the Intergovernmental Panel on Climate Change Second Assessment Report.
*Million metric tons of carbon dioxide equivalent
**Gross Domestic Product (GDP) in constant 2010 US$

Greenhouse Gas (GHG) Emissions by Sector

According to the World Resources Institute Climate Analysis Indicators Tool (WRI CAIT), Tanzania's GHG emissions in 2014 were primarily from the land-use change and forestry (LUCF) sector (72.7%), followed by agriculture (17.3%), energy (7.8%), waste (1.6%), and industrial processes (IP) (0.5%).[1] Within the LUCF sector, 77% of emissions were from forest land.[2]

Tanzania's Second National Communication (SNC), submitted to the UNFCCC in 2015, includes GHG inventory data that indicates that emissions in 2000 from agriculture and forest land were the two largest sources of GHGs.[3]



Source: WRI CAIT 4.0, 2018, FAOSTAT, 2018
Note: Percentages have been rounded.

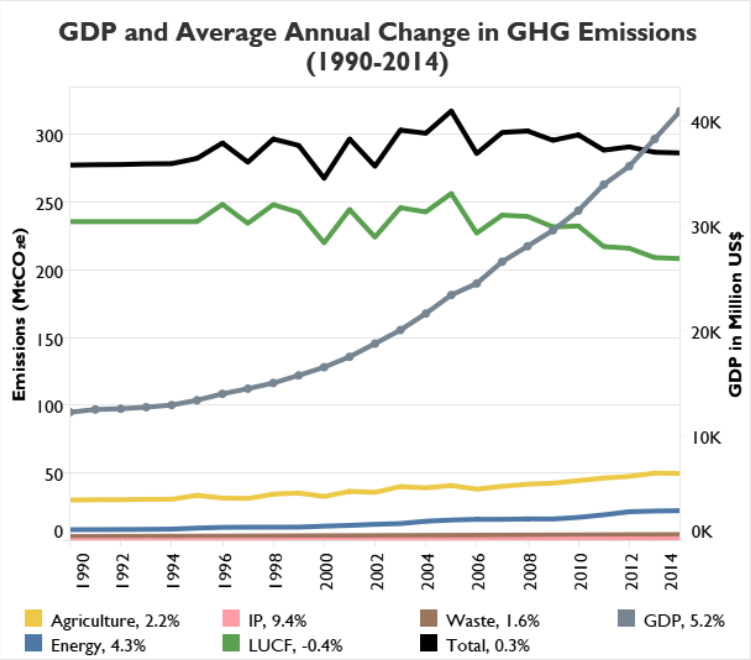
Change in GHG Emissions in Tanzania (1990–2014)

According to WRI CAIT, Tanzania's GHG emissions increased by 9 $MtCO_2e$ (3%) between 1990 and 2014. The average annual change in total emissions was 0.3% (see the line graph below). The change in emissions in selected sectors is discussed below.

LUCF: According to WRI CAIT, LUCF emissions decreased by 12% from 1990 to 2014, due to reductions from the loss and conversion of forest land and decreases in burning biomass.[4] It is difficult to confirm how or why this decrease occurred as most sources note Tanzania's traditionally high levels of deforestation and continued pressure from major direct drivers of deforestation such as forest and bush fires, and high levels of dependence on wood and charcoal for energy, among others.[5] According to the Center for International Forestry Research (CIFOR), the proportion of Tanzania's deforestation that is directly related to woodfuel production is as high as 70%; the associated degradation is also sizeable and compounds the negative environmental impact. The National Forest program in Tanzania (2001-2010) estimated a deforestation rate ranging from 130,000 to 500,000 ha per annum, driven by strong pressure from agricultural expansion, livestock grazing, wild fires, unsustainable exploitation of wood resources, and other human activities.[6] To combat the decline of forest resources, Tanzania's National Adaptation Programme of Action (NAPA) proposes activities such as afforestation using rapidly growing tree species, alternative energy sources including community-based mini-hydroelectric and geothermal to reduce reliance on wood, strengthening community-based forest management, and forest fire prevention. Since 2008, with support from Norway, Tanzania has been implementing REDD+[7] initiatives including establishing a national monitoring, reporting, and verification system.[8] The Global Landscapes Forum recently identified various landscape restoration approaches being implemented in Tanzania – natural forest conservation, participatory forest management, tree planting, changing highly degraded natural forests to forest plantations, and extension services, but also noted constraints to successful restoration (financial, population growth,

non-implementation of land use plans, lack of local community awareness of the importance of forests).[9] The forestry sector contributed 3.1% of Tanzania's GDP in 2014.[10]

Agriculture: Agricultural emissions increased by 65% from 1990 to 2014, with the majority due to enteric fermentation by livestock, followed by manure left on pasture. According to the SNC, Tanzania's livestock subsector was the third largest in Africa and contributed 4.4 percent of GDP in 2013. However, potential livestock productivity has been restricted by poor quality pasture, disease, tsetse flies, poor genetic potential, and a myriad of issues are exacerbated by climate change. Crop production accounts for about 19% of GDP, making up roughly 70 percent of rural incomes. Tanzania's NAPA suggests tsetse fly control measures, sustainable range management, farmer education programs, control of livestock movement, and other potential mitigation actions. Agriculture accounted for 23.5% of Tanzania's 2014 GDP.[11]



Source: WRI CAIT 4.0, 2018

Energy: Tanzania's energy emissions increased 171% from 1990 to 2014, due primarily to other fuel combustion and transportation.[12] The SNC notes that 90% of energy consumption is from biomass, 8% from oil and gas, 1.5% from electricity, and 0.5% from renewable sources. To reduce dependence on biomass, the NAPA proposes development of alternative energy sources, enhanced natural gas utilization, and applying cogeneration in industry. Transportation also drives energy emissions growth. Due to rapid urbanization, limited investment, and lack of modernization planning, much of Tanzania's infrastructure has aged beyond its economic life and the low quantity of city roads in good condition contributes to higher congestion and vehicle emissions.[13] In 2016, Dar es Salaam implemented a bus rapid transit system that has effectively reduced delays and fare prices, and improved rider comfort.[14]

Carbon Intensity: GHG Emissions Relative to Gross Domestic Product (GDP)

According to WRI CAIT, Tanzania's GHG emissions increased 3% between 1990 and 2014, averaging 0.3% annually, while GDP grew 234%, averaging 5.2% annually. Although GDP grew faster than GHG emissions, in 2014, Tanzania's emissions relative to GDP were almost eleven times the world average, indicating significant potential for improvement.

Climate Change Mitigation Targets and Plans

In its INDC, Tanzania states its goal to embark on a climate resilient development pathway that will reduce GHG emissions by 10% to 20% by 2030, relative to the projected 2030 business-as-usual emissions of 138-153 $MtCO_2e$. The INDC also identifies intended actions whose implementation would reduce emissions while developing Tanzania's agriculture, livestock, forestry, energy, transport, waste management, coastal / marine / environment / fisheries sector, water resources, tourism, human settlements, and health sectors.[15]

---

[1] World Resources Institute Climate Analysis Indicators Tool (WRI CAIT 4.0, 2017). GHG emissions are expressed in units of carbon dioxide equivalent. Global Warming Potentials (GWPs) are the 100-year GWPs from the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report (SAR).
[2] Food and Agriculture Organization of the United Nations Statistics Division (FAOSTAT). Tanzania, Emissions – Land use total and Emissions – Agriculture total, viewed on August 19, 2018.
[3] United Republic of Tanzania. Second National Communication to the United Nations Convention on Climate Change (SNC), 2014.
[4] Emissions from forest land and burning biomass are not double counted. For LUCF, CAIT uses FAO data classified as emissions from forest land, burning biomass, cropland, and grassland. FAO defines the annual net change in GHG emissions from carbon dioxide emission/removal from forest land as the net carbon stock gain/loss in the living biomass pool (aboveground and belowground biomass) associated with forest and net forest conversion. FAO defines the GHG emissions from burning of biomass as methane and nitrous oxide gases from biomass combustion of forest land cover classes 'Humid and Tropical Forest' and 'Other Forests', and of methane, nitrous oxide, and carbon dioxide gases from combustion of organic soils.
[5] See Food and Agriculture Organization (FAO). Global Forest Resources Assessment 2010 Country Report – United Republic of Tanzania, 2014; Kweka, Demetrius, R. Carmenta, M. Hyle, I. Mustalahti, T. Dokken, and M. Brockhaus. The context of REDD+ in Tanzania, Drivers, agents and institutions, CIFOR Occasional Paper 133, 2015; and The REDD Desk. REDD in Tanzania, viewed on November 26, 2018. CIFOR cautions that significant data gaps exist and figures for forested area estimates vary substantially, depending on the methods and definitions used and other factors.
[6] Food and Agriculture Organization (FAO). Global Forest Resources Assessment 2010 Country Report – United Republic of Tanzania, 2014.

[7] REDD+ refers to Reducing Emissions from Deforestation and Forest Degradation, and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks.
[8] Gapare, N. William, C. Final Evaluation of the UN-REDD Tanzania National Programme Final Report, 2013.
[9] Chamuya, Nurdin Athuman and Shani Khalid. Reshaping the terrain, Landscape restoration in Tanzania, CIFOR and Global Landscapes Forum, GLF Factsheet, August 2018.
[10] United Republic of Tanzania. National Accounts of Tanzania Mainland, 2015.
[11] Ibid.
[12] WRI CAIT 4.0, 2018. To estimate "other fuel combustion," CAIT sums methane and nitrous oxide emissions from Biomass Combustion and Stationary and Mobile Sources, and carbon dioxide from Other Sectors, into a single yearly estimate. See CAIT Country Greenhouse Gas Emissions: Sources & Methods (June 2015).
[13] African Development Bank Group. Tanzania Transport Sector Review, 2013.
[14] Chengula, D.H., Kombe, K. Assessment of the Effectiveness of Dar Es Salaam Bus Rapid Transit (DBRT) System in Tanzania, 2017.
[15] United Republic of Tanzania. Intended Nationally Determined Contributions, 2018.