Greenhouse Gas Emissions in Timor-Leste

Timor-Leste Numbers at a Glance (2010)

1.48 $MtCO_2e$*
Total GHG emissions (<0.0% of world total)
World: 45,761 $MtCO_2e$

1.40
tCO_2e per capita
World: 6.60 tCO_2e

338
tCO_2e/million US$ GDP
*World: 511 tCO_2e/million US$ GDP***

+0.24 $MtCO_2e$ (+19%)
Change in GHG emissions (2005-2010)
World: +3,256 $MtCO_2e$ (+8%)

Sources: Timor-Leste National Communication, 2014.

WRI CAIT, 4.0, 2018. Emissions including Land-Use Change and Forestry

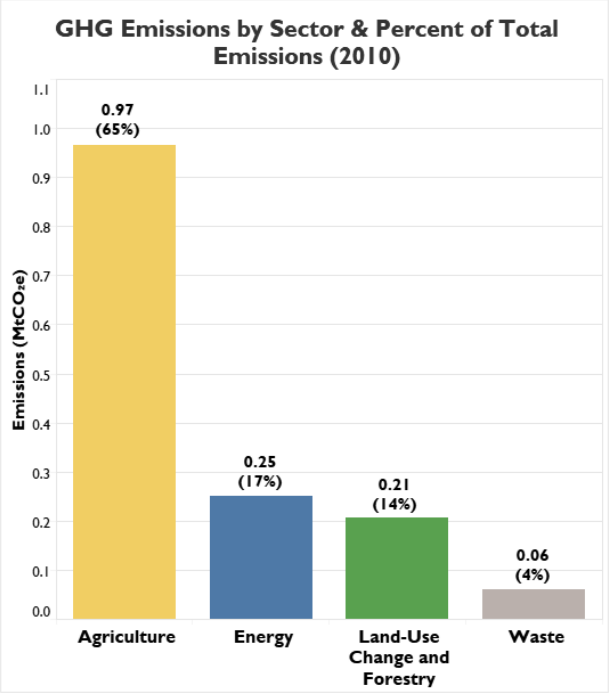
Government of Timor-Leste. Population and Housing Census 2010, 2012.

*Million metric tons of carbon dioxide equivalent. The INC used GWP of 21 for methane and 310 for nitrous oxide in the calculation of GHGs in CO_2e.

**Gross Domestic Product (GDP) in constant 2010 US$

Greenhouse Gas (GHG) Emissions by Sector

Timor-Leste became a sovereign nation in 2002 and ratified the United Nations Framework Convention on Climate Change (UNFCCC) in October 2006. Its Initial National Communication (INC) to the UNFCCC, submitted in 2014, includes a GHG inventory for 2010 that provides GHG emissions for three GHGs by source: carbon dioxide, methane, and nitrous oxide. The inventory shows agriculture to be the leading source of emissions (65%), followed by energy (17%), land use change and forestry (LUCF) (14%), and waste (4%).[1] Emissions from industrial processes and product use – one of the six emission categories defined by the Intergovernmental Panel on Climate Change – was not estimated because Timor-Leste has negligible emissions from this source. Timor-Leste has begun compiling a GHG inventory for the years 2012 to 2017 as part of its upcoming Second National Communication.[2]



Source: Timor-Leste INC, 2014

Change in GHG Emissions in Timor-Leste (2005-2010)

According to the INC, Timor-Leste's GHG emissions increased by 0.24 $MtCO_2e$ between 2005 and 2010. The average annual change in total emissions was 8 percent, largely influenced by a significant spike in deforestation in the mid-2000s.

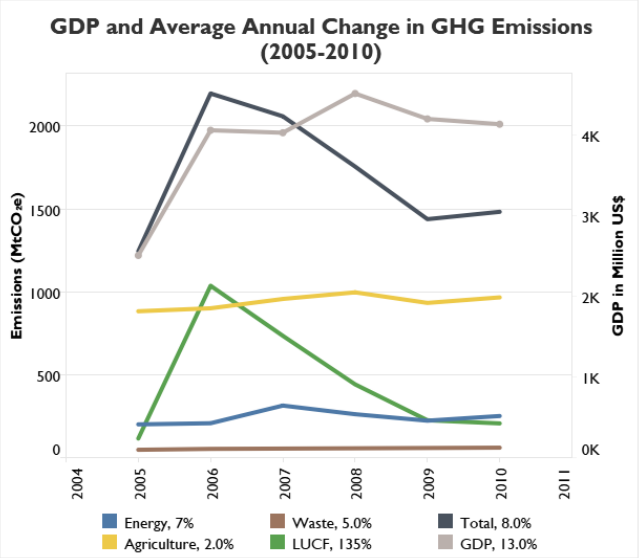
Agriculture: The key sources of agricultural emissions are enteric fermentation from livestock, agricultural soils, rice production, and manure management. For each, the Government of Timor-Leste (GoTL) has identified potential mitigation measures in the INC.

A predominately agrarian nation, 64 percent of the population of Timor-Leste practices subsistence farming.[3] Of the total land area, about 225,000 hectares (ha), or 15 percent, is cultivated.[4] According to the Food and Agriculture Organization (FAO), maize and rice are the most important subsistence crops and coffee is the predominant cash crop. Timor-Leste must import food to meet around 30 to 40 percent of its food needs.

Livestock is among the most important sources of farm income, but contributes significantly to emissions. From 2005 to 2010, cattle were the leading source of methane from enteric fermentation (48%), followed by buffalo, horses and goats. In 2010, methane from manure management was mostly from swine (74%), followed by buffalo, then horses.[5]

Timor-Leste's National Adaptation Programme of Action notes that generations of unsustainable land use, including from uncontrolled burning, "swidden" agriculture practices that involve rotating cultivated land using fire to have it regenerate within a few years, and timber cutting for fuelwood have transformed the country's landscape into predominately rural agricultural regions with pockets of preserved natural areas. The INC identifies the potential to utilize biogas and compost in order to mitigate GHG emissions, as well as the potential to reduce slash and burn farming in favor of permanent agriculture with improved management practices.

Energy: As of 2010, transportation and electricity generation were responsible for 61% and 38% of GHG emissions, respectively.[6] The Intended Nationally Determined Contribution (INDC) discusses options to generate electric power from renewable energy, listing potentials of 352 MW from hydropower, 72 MW from wind, 22 MW from solar photovoltaic, and 6 MW from biomass/waste. The GoTL is promoting solar power for rural communities, and as of 2016, 11% of homes (over 200,000) had installed solar home systems. In 2014, Timor-Leste was approved for a Global Environment Facility mitigation project implemented by the United Nations Development Programme in conjunction with domestic agencies to remove barriers to sustainable production and utilization of biomass for energy.[7] The INC also proposes mitigation actions such as replacing old cars used as taxis with new cars via incentive programs, stimulating public transportation, providing pedestrian and bicycle lanes, and developing infrastructure to support less GHG-intensive gas fuels (LPG, CNG, or LGV) instead of oil fuels.



Source: Timor-Leste INC, 2014

LUCF: The INC inventory shows emissions from LUCF increased 79% from 2005 to 2010. Within this time frame, emissions peaked in 2006, driving up national total GHG emissions that year. Deforestation was also recorded to be at its highest level in 2006. The INC does not provide the 2006 deforestation rate but notes that an assessment of forest cover change based on data from 2004 to 2010 showed the annual loss of forests to be around 2.23% per year. In 2010, removals from forest and other woody biomass stocks partially offset emissions from forest and grassland conversion, but LUCF remained a source of emissions throughout the 2005 to 2010 time frame.[8]

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

Timor-Leste's GDP increased 65% from 2005 to 2010, while its GHG emissions increased 0.24 $MtCO_2e$ (19%). Timor-Leste's GHG emissions relative to GDP were below the world average in 2010, and its per capita emissions were well below the world average.

Climate Change Mitigation Targets and Plans

Per its INDC, Timor-Leste chose not to set a GHG reduction target, and instead committed to activities that would reduce emissions in sectors including transport, agriculture, forestry, energy, and waste.[9] In the forestry sector, the GoTL is interested in exploring opportunities to execute REDD+[10] activities to better conserve forests, enhance and expand carbon sinks, and use energy-efficient cookstoves to substitute use of fuel wood for household cooking and lighting. In agriculture, it proposes increased use of biogas and composting, and practicing more permanent and sustainably managed agriculture in place of slash and burn practices. In energy, the GoTL is currently drafting a Renewable Energy Decree Law to establish a national renewable energy system and plan.

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[1] For comparison, note that ClimateWatch provides Timor-Leste GHG emissions data from the UNFCCC and the Potsdam Institute for Climate Research (PIK). The UNFCCC data are similar to Timor-Leste's INC inventory data, showing total emissions of 1.3 $MtCO_2e$, whereas PIK data show LUCF to be the leading source of emissions in 2010, followed by agriculture, energy, waste, solvent, and other, for total emissions of 8.6 $MtCO_2e$.

[2] Timor-Leste's State Secretariat for Environment. Timor-Leste National Communication, 2014. The INC inventory shows total GHG and sector emissions in Gigagrams of carbon dioxide-equivalent ($GgCO_2e$. For ease of reference, this factsheet presents the data as $MtCO_2e$. The INC used GWP of 21 for methane and 310 for nitrous oxide in the calculation of GHGs in CO_2e.

[3] According to the latest 2015 census figures, around 64% of the population engages in subsistence farming. See figures for "self-employed farmers" from TL-2015 Census Data - Table 14 Employed population aged ten years and over by employment sector and by sex and urban/rural location, available at http://www.statistics.gov.tl/category/publications/publication/?lang=en

[4] Food and Agriculture Organization (FAO). AQUASTAT Survey: Timor-Leste, 2011.

[5] Timor-Leste's State Secretariat for Environment, 2014.

[6] Timor-Leste's State Secretariat for Environment, 2014. The INC also notes that combustion of natural gas to supply energy in an oil and gas facility would be the largest contributor of energy sector GHG emissions (around 70%), however the facility is a joint operation of Timor-Leste and Australia with no agreement on how emissions should be apportioned to each country. The emissions are therefore excluded from Timor-Leste's national totals.

[7] Democratic Republic of Timor-Leste. INDC, 2016.

[8] Global Forest Watch (GFW) data corroborate LUCF remaining a source of emissions. They show that from 2001 to 2017, Timor-Leste lost about 24,500 ha of tree cover (defined as areas with over 30% tree canopy), amounting to a 3.4% decrease since 2000, equivalent to an estimated 2.8 $MtCO_2$. These data to no take tree cover gain into account, but GFW also notes that from 2001 to 2012, Timor-Leste gained 6,120 ha of tree cover (defined as areas with over 50% tree canopy).

[9] Democratic Republic of Timor-Leste. Intended Nationally Determined Contribution (INDC), November 2016.

[10] Reducing Emissions from Deforestation and Forest Degradation, and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries.