



# Greenhouse Gas Emissions in Nepal

## Nepal Numbers at a Glance (2014)

**44.06 MtCO<sub>2</sub>e\***

Total GHG emissions  
(0.09% of world total)  
World: 48,892.37 MtCO<sub>2</sub>e

**28,323,241**

Population  
World: 7,268,986,176

**1.56**

tCO<sub>2</sub>e per capita  
World: 6.73 tCO<sub>2</sub>e

**US\$ 19,139 Million**  
GDP\*\*

World: US\$73,479 Billion

**2,302**

tCO<sub>2</sub>e/million US\$ GDP  
World: 665 tCO<sub>2</sub>e/million US\$ GDP

**-12.30 MtCO<sub>2</sub>e (-22%)**  
Change in GHG emissions  
(1990-2014)

World: +15,069 MtCO<sub>2</sub>e  
(+45%)

Sources: WRI CAIT 4.0, 2017.

Emissions including Land-Use Change and Forestry

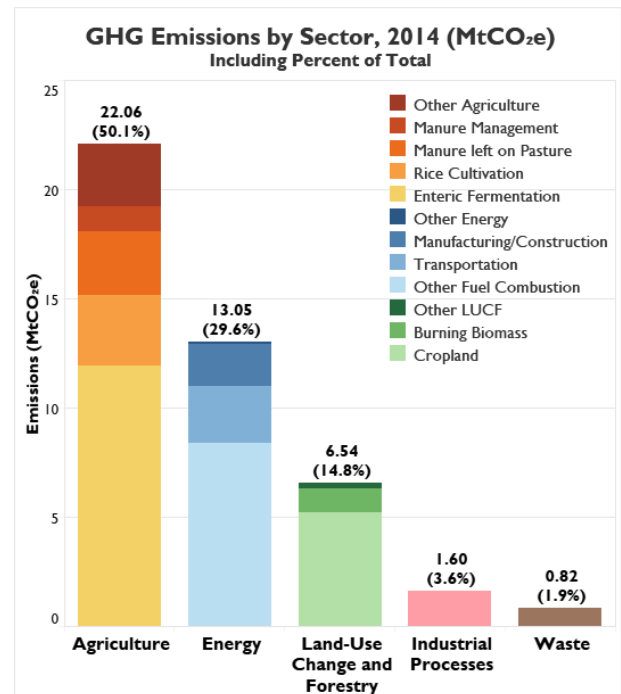
\*Million metric tons of carbon dioxide equivalent.

Global Warming Potentials are from the Intergovernmental Panel on Climate Change Second Assessment Report.

\*\*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), half (50.1%) of Nepal's 2014 GHG emissions were from the agriculture sector.<sup>1</sup> Within the agriculture sector, 54% of emissions were from enteric fermentation from livestock.<sup>2</sup> Energy was the second largest source of emissions (29.6%), with "other fuel combustion" contributing 64% of energy emissions.<sup>3</sup> Land-use change and forestry (LUCF), industrial processes (IP), and waste contributed 14.8%, 3.6%, and 1.9% of total emissions, respectively. Nepal's [Second National Communication](#) (SNC) to the UNFCCC, submitted in 2014, includes a GHG inventory for the period 1990 to 2000 and also shows agriculture to have been the greatest source of emissions in 2000 (68.9%), followed by energy (27.8%). However, the SNC shows Land Use, Land Use Change and Forestry (LULUCF) to have been a net carbon sink in 2000, absorbing 12.4 MtCO<sub>2</sub>e more than was emitted.<sup>4</sup> In contrast, CAIT shows LUCF to have been the largest source of emissions in 2000, accounting for 56.8% of emissions that year. The discrepancy may be due to different sources for activity data and methodological differences.



Sources: WRI CAIT 4.0, 2017, FAOSTAT, 2018  
Note: Emission totals have been rounded

## Change in GHG Emissions in Nepal (1990–2014)

According to WRI CAIT data, Nepal's GHG emissions fluctuated but decreased overall, by 22% (12.30 MtCO<sub>2</sub>e) from 1990 to 2014 driven by a sharp drop in emissions in the LUCF sector due to the lack of reported change in forest area from 2005 onward. According to multiple sources there is significant uncertainty in LUCF change over time.<sup>5</sup> The average annual change in total emissions during this period was -0.4%, with sector-specific average annual changes as follows: agriculture (1.4%), energy (5.6%), LUCF (-3.4%), waste (2.1%) and IP (22.1%). The change in emissions from Nepal's three most significant sources is discussed below.

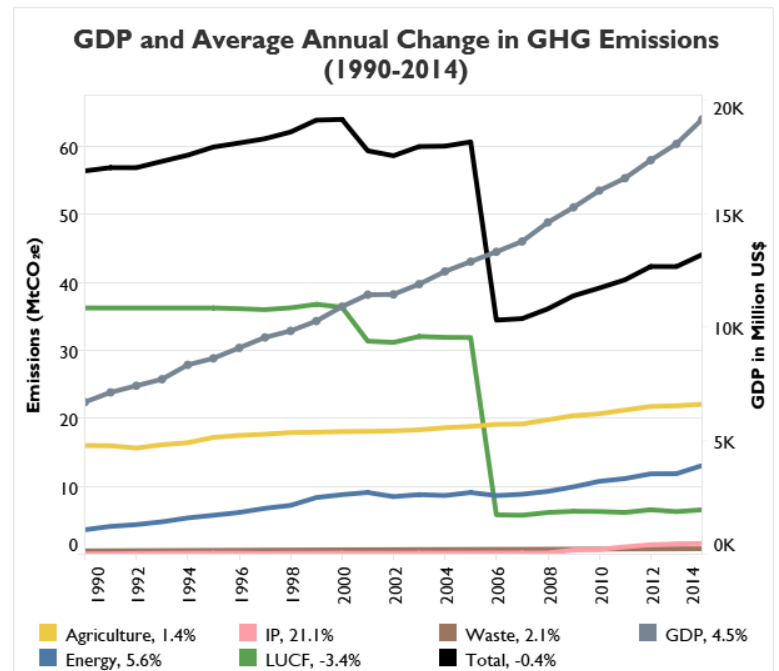
**Agriculture:** Representing almost 35% of Gross Domestic Product (GDP) and employing about 70% of the workforce, agriculture is a key sector for economic growth, food security, poverty reduction, and rural development.<sup>6</sup> According to WRI CAIT, agriculture emissions increased 38% from 1990 to 2014, driven by increased emissions from enteric fermentation. During the same period, FAO data show an increase in the number of cattle of around 16%. FAOSTAT data show the greatest magnitude of change to be from enteric fermentation, followed by manure left on pasture, then manure management. Rice cultivation was the second largest source of agriculture emissions, although its emissions grew very little. From 1990 to 2014, emissions from synthetic fertilizers nearly doubled, but represent a small share (3%) of 2014 agriculture emissions.

The SNC states that agricultural productivity has not kept pace with population growth, due to low competitiveness and limited adoption of improved technology, which has resulted in a growing food trade deficit and malnutrition. Nepal ranks 16<sup>th</sup> out of 31 highly food-deficient countries that require emergency assistance, with the situation compounded by natural disasters, such as earthquakes and floods, and political instability that continues to disrupt the development process. In 2014, the [Agriculture Development Strategy](#) was published, which

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includes a 10-year action plan and roadmap that aims to lower carbon emissions, among other goals. Furthermore, several of [Nepal's Sustainable Development Goals](#) include actions in the agriculture sector.

**Energy:** WRI CAIT data show emissions from the energy sector to have increased 262% from 1990 to 2014, with significant growth across all energy subsectors. The greatest magnitude of change was from manufacturing and construction (870%), followed by transportation (668%). According to the SNC, energy consumption is increasing every year because of population growth and increased economic activities. Nepal relies heavily on traditional sources of biomass energy such as firewood, agricultural residues, and cow dung for about 87% of its energy needs, whereas the amount of electricity and renewables (such as hydro, solar, and other biomass for which Nepal has potential) is not significant. According to the World Bank, household electrification has increased rapidly over the past two decades, with a 90.7% electrification level in 2016.<sup>7</sup>



Source: WRI CAIT 4.0, 2017.

**LUCF:** According to WRI CAIT, LUCF emissions decreased 82% from 1990 to 2014, following forest land emission trends. LUCF emissions were driven by forest cover loss, with 2.1% of forest cover lost annually from 1990 to 2000, 1.4% lost annually from 2000 to 2005, and no net forest cover loss after 2005.<sup>8</sup> Total forest area remained steady at 25% from 2005 until 2016.<sup>9</sup> After 2006, the average annual increase in LUCF emissions of 1% has been driven instead by an increase in burning biomass.<sup>10</sup> The historical drivers of deforestation and land degradation in Nepal have principally been unsustainable harvesting practices, lack of cheap energy sources, forest fire, encroachment, overgrazing, infrastructure development, resettlement and expansion of invasive species.<sup>11</sup>

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

Nepal is the 17<sup>th</sup> poorest country in the world, with agriculture, services and industry being the leading contributors to the economy.<sup>12</sup> According to WRI CAIT, Nepal's GDP increased 186% from 1990 to 2014, averaging 4.5% annually, while GHG emissions decreased 22%, averaging 0.4% annually during the same period.<sup>13</sup> Although GDP grew while GHG emissions decreased, as of 2014, Nepal emitted more GHGs relative to GDP than the world average, indicating potential for improvement.

### Climate Change Mitigation Targets and Plans

In its [Nationally Determined Contribution \(NDC\)](#), Nepal describes its plans to reduce GHG emissions and build climate change adaptation and resilience. The NDC does not commit to an economy-wide GHG mitigation target but includes a list of 14 goals, including participation in UN-REDD+ activities that could reduce about 14 Mt CO<sub>2e</sub> by 2020. It also describes other targets, including:<sup>14</sup> achieve 20% and 80% renewable sources in the energy mix by 2020 and 2050 respectively, reduce fossil fuel dependency by 50% by 2050, increase the share of electric vehicles to 20% by 2020, keep 40% of the country's total area under forest cover, and deploy renewable energy systems through the National Rural Renewable Energy Program (NRREP). However, according to the Climate Action Tracker, despite showing intent to reduce emissions, many details such as target years and characteristics are not provided. Therefore, it is not possible to determine the aggregate effect of Nepal's NDC goals.<sup>15</sup>

<sup>1</sup> 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 \(SAR\)](#).

<sup>2</sup> Food and Agriculture Organization of the United Nations Statistics Division (FAOSTAT). Nepal, [Emissions – Land use total](#) and [Emissions – Agriculture total](#), viewed on August 19, 2018.

<sup>3</sup> WRI CAIT 4.0, 2017. "Other fuel combustion" includes emissions from stationary and mobile sources as well as biomass combustion.

<sup>4</sup> Nepal. 2014. Nepal's Second National Communication (SNC) to the UNFCCC. The SNC uses GWPs consistent with the [Revised 1996 IPCC Guidelines](#) for the calculation of GHGs in CO<sub>2e</sub>. The SNC inventory shows total GHG and sector emissions in GgCO<sub>2e</sub> for 1990-2000.

<sup>5</sup> These sources include: FAO; B. Paudel et al. 2016. Review of studies on land use and land cover change in Nepal. *Journal of Mountain Science*, October 2016; B. Das and S. Thakuri. 2017. Mitigation potentials of GHGs emissions from Biomass Burning in Nepal. *Climate Change and Green Growth*, Vol. 13.

<sup>6</sup> Food and Agriculture Organization of the United Nations (FAO). 2013. Nepal, Country Programming Framework 2013-2017.

<sup>7</sup> World Bank, Sustainable Energy for All (SE4ALL) database from the SE4ALL Global Tracking Framework led jointly by the World Bank, International Energy Agency, and the Energy Sector Management Assistance Program. Accessed [here](#) on March 21, 2019.

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<sup>8</sup> FAO. 2011. The State of the World's Forests, cited by UN-REDD Programme. [Nepal](#), viewed on September 12, 2018. According to FAO, positive impacts have been seen due to Community Forestry (CF) intervention and increasing of protected area systems. However, they do note that questions have been raised about the reliability of this data since a National Forest Inventory (NFI) has not been carried out since 1994.

<sup>9</sup> FAOSTAT. [Statistical Yearbook – Nepal](#), viewed March 20, 2019.

<sup>10</sup> WRI CAIT 4.0, 2017

<sup>11</sup> Ministry of Forests and Soil Conservation. 2010. Nepal's REDD Readiness Proposal 2010-2013. Government of Nepal.

<sup>12</sup> United States Agency for International Development (USAID). Nepal, Economic Growth and Trade, viewed on August 19, 2018.

<sup>13</sup> WRI CAIT 4.0, 2017

<sup>14</sup> Nepal. 2016. Nepal's Nationally Determined Contributions (NDC).

<sup>15</sup> Climate Analytics, Ecofys, and NewClimate Institute, 2018. Climate Action Tracker, [Nepal Pledges and Targets](#).