



# Greenhouse Gas Emissions in Indonesia

## Indonesia Numbers at a Glance (2013)

**2161 MtCO<sub>2e</sub>\***

Total GHG emissions  
(4.47% of world total)  
World: 48,257 MtCO<sub>2e</sub>

**251,268,276**

Population  
World: 7,176,092,192

**8.6**

tCO<sub>2e</sub> per capita  
World: 6.72 tCO<sub>2e</sub>

**US\$ 897,262 Million**  
GDP\*\*

World: US\$71,059 Billion

**2,408**

tCO<sub>2e</sub>/million US\$ GDP  
World: 679 tCO<sub>2e</sub>/million US\$ GDP

**+824 MtCO<sub>2e</sub> (+62%)**  
Change in GHG emissions  
(1990–2013)

World: + 14,434 MtCO<sub>2e</sub>  
(+43%)

Sources: WRI CAIT 2.0, 2017.

Emissions including Land-Use Change and Forestry

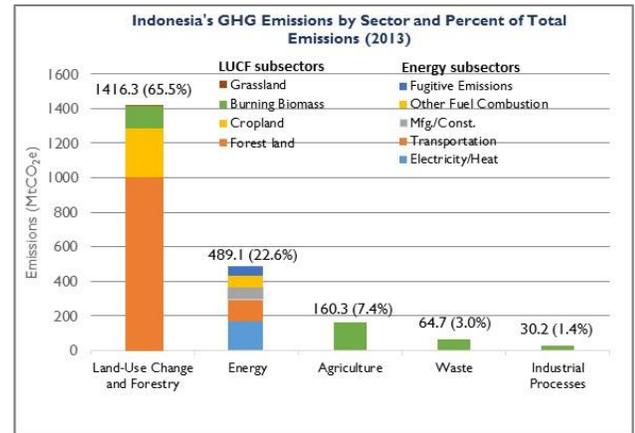
\*Million metric tons of carbon dioxide equivalent. Global Warming Potentials are from the Intergovernmental Panel on Climate Change Second Assessment Report

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

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## Greenhouse Gas (GHG) Emissions by Sector

According to the World Resources Institute Climate Analysis Indicators Tool (WRI CAIT), much of Indonesia's 2013 GHG emissions (65.5%) were from land-use change and forestry (LUCF), followed by emissions from energy (22.6%), agriculture (7.4%), waste (3%) and industrial processes (IP) 1.4%.<sup>1</sup> Indonesia's [Biennial Update Report \(BUR\)](#) to the UNFCCC includes a GHG inventory for the period 2000-2012 which confirms LUCF to be the largest emitting sector in 2012.<sup>2</sup> LUCF emissions are dominated by emissions from forest land.<sup>3</sup>



Sources: WRI CAIT 2.0, 2017, FAOSTAT, 2017  
Note: Percentages do not add up to 100% due to rounding.

## Change in GHG Emissions in Indonesia (1990-2013)

According to WRI CAIT, Indonesia's GHG emissions fluctuated, along with LUCF emissions, but increased by 824 MtCO<sub>2e</sub> from 1990 to 2013. The average annual change in total emissions during this period was 3.9%, with sector-specific average annual changes as follows: LUCF (5.5%), energy (4.0%), agriculture (1.1%), waste (1.5%), and IP (6.3%). The change in emissions in selected sectors is discussed below.

**LUCF:** According to WRI CAIT, LUCF emissions grew by 48% between 1990 and 2013, driven by changes in forest lands.<sup>4</sup> The BUR attributes increasing LUCF emissions from 2000-2012 to forest and grassland conversions and peat fires. High extraction from logging coupled with capital investment for agro-industrial production has caused high rates of deforestation and forest degradation.<sup>5</sup> As of 2013, Indonesia's total forest area was approximately 124 million hectares (ha).<sup>6</sup> The highest rate of deforestation, i.e., more than 2.2 million ha/year, took place between 1996-2000. This figure dropped to a low of 444 thousand ha/year during 2000-2003. In 2011 and 2012, it increased again to about 786 thousand ha/year.<sup>7</sup> Indonesia's BUR attributes fluctuations of GHG emissions between 2000 and 2012 to high variations in emissions from forest and grassland conversion, changes in forest and other woody biomass stocks and peat fires, with high emissions from peat fires during El Niño years (2002, 2006 and 2009). 1997 was also an El Niño year; peaks in LUCF emissions are visible in the graph below. Fire has long been used a tool for agricultural expansion in Indonesia, driven largely by palm oil production.<sup>8</sup> Between June and October 2015, 2.6 million ha of land were burned, with 33% being peatland.<sup>9</sup> The [Global Fire Emissions Database](#) estimated that Indonesian fires contributed 1,748 MtCO<sub>2e</sub>

<sup>1</sup> World Resources Institute Climate Analysis Indicators Tool (WRI CAIT 2.0, 2017). Global Warming Potentials (GWPs) are from the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report (SAR).

<sup>2</sup> Republic of Indonesia. Indonesia's First [Biennial Update Report \(BUR\)](#) to the UNFCCC, 2015. Indonesia's BUR uses GWP values from the [IPCC Fourth Assessment Report](#).

<sup>3</sup> Food and Agriculture Organization of the United Nations Statistics Division (FAOSTAT), [Emissions – Land use total](#), viewed on February 24, 2017..

<sup>4</sup> FAOSTAT, 2017.

<sup>5</sup> Republic of Indonesia. Indonesia's First BUR to the UNFCCC, 2015.

<sup>6</sup> Republic of Indonesia. Investor Guideline, Forest Status Alteration (Forest Area to Area for Other Uses), 2013.

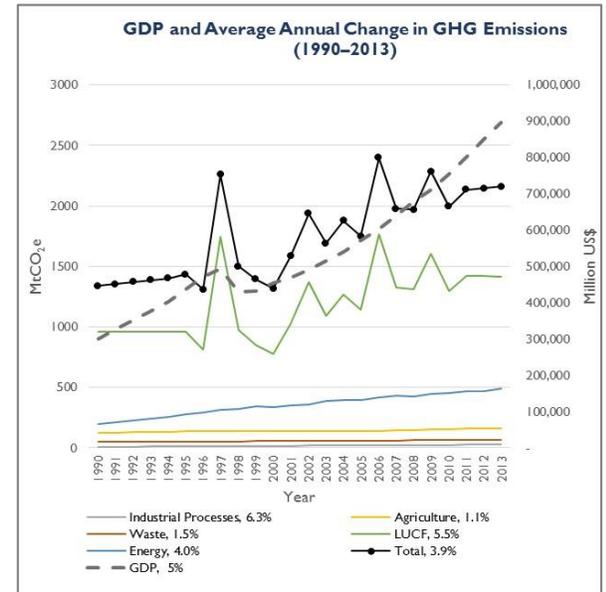
<sup>7</sup> Republic of Indonesia. [National Forest Reference Emissions Level for Deforestation and Forest Degradation](#), 2015.

<sup>8</sup> The World Bank. The Cost of Fire: An Economic Analysis of Indonesia's 2015 Fire Crisis, 2016.

<sup>9</sup> Ibid.

to global emissions in 2015. According to the Indonesian Ministry of Forestry, forests support the livelihoods of 48.8 million people, including through shifting cultivation, hunting, gathering, logging, and selling forest products. About 3.4 million people work in the private forestry sector including wood-processing industries.<sup>10</sup> In 2011, Indonesia developed the [National Forestry Plan \(2011-2030\)](#), a national planning instrument for forest management and the sustainable and fair use of forest resources. Indonesia also participates in the UN-REDD Programme and the Forest Carbon Partnership Facility, both of which support national level planning and implementation for Reducing Emissions from Deforestation and forest Degradation and the conservation and sustainable management of forests and enhancement of forest carbon stocks (REDD+). In 2012, Indonesia launched its [REDD+ strategy](#) and has more than 60 REDD+ activities that are active or in the preparation phase.

**Energy:** WRI CAIT data show that Indonesia's energy sector emissions increased by 289 MtCO<sub>2e</sub> between 1990 and 2013, with electricity and heat production driving this increase (42%). According to the International Energy Agency, electricity generation increased more than six fold between 1990 and 2013.<sup>11</sup> The BUR notes that the increase in total electricity generation was driven by the increasing share of coal, which grew from 37% in 2000 to 51% in 2012. In contrast, during the same period, the share of power generation from renewable energy including hydroelectric and geothermal sources decreased 4% and 0.5%, respectively.<sup>12</sup> Indonesia's National Energy Policy sets out to transform the energy mix by 2025 as follows: 30% coal, 22% oil, 23% renewable resources, and 25% natural gas.<sup>13</sup> Despite feed-in tariffs and tax incentives to support renewable energy projects,<sup>14</sup> deploying renewable energy remains challenging (e.g., harmonizing national and subnational policies) while power generation from coal continues to expand and is expected to remain dominant for the next 10 years.<sup>15</sup> As of 2013, the share of renewable energy for electricity generation (including large hydropower) was only 13%.<sup>16</sup>



Source: WRI CAIT 2.0, 2017

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

According to WRI CAIT data, Indonesia's GHG emissions increased 62% from 1990 to 2013, averaging 3.9% annually, while GDP grew by 199%, averaging 5% annually. Although GDP grew faster than GHG, as of 2013, the Indonesian economy emitted approximately 5 times more GHGs relative to GDP than the world average, indicating significant potential for improvement. Coal-fired electricity generation is largely responsible for the increase in carbon intensity.<sup>17</sup>

### Climate Change Mitigation Targets and Plans

In 2009, Indonesia pledged at the G20 Summit to reduce its GHG emissions 26% below the business as usual (BAU) level by 2020 through unilateral actions, and by 41% with international support. In 2011, Indonesia enacted the National Action Plan for GHG Emission Reduction by a presidential decree that included 70 multi-sectoral programs to reduce GHG emissions, to be conducted by the central and local governments, private sector, and civil society.<sup>18</sup> In its [Intended Nationally Determined Contribution \(INDC\)](#), Indonesia committed to reducing its GHG emissions unconditionally, by 26% by 2020 (in line with the 2009 pledge) and by 29% by 2030 compared to a BAU scenario. The commitment will be implemented through land use and spatial planning, sustainable forest management (including social forestry programs), restoring degraded ecosystems, improving agricultural and fisheries productivity, energy conservation, promotion of clean and renewable energy sources, and improved waste management. The INDC notes that the 2030 target could be strengthened to a 41% reduction with international support through bilateral cooperation including technology development and transfer, capacity building, payment for performance mechanisms, technical cooperation, and access to financial resources.<sup>19</sup>

<sup>10</sup> Republic of Indonesia. [National Forest Reference Emissions Level for Deforestation and Forest Degradation](#), 2015.

<sup>11</sup> International Energy Agency (IEA) Statistics: Indonesia Electricity and Heat [2000 and 2013](#).

<sup>12</sup> IEA Statistics: Indonesia Electricity and Heat [2000 and 2012](#).

<sup>13</sup> IEA. Policies and Measures – Indonesia. [National Energy Policy \(Government Regulation No. 79/2014\)](#), viewed on February 27, 2017.

<sup>14</sup> Grantham Research Institute on Climate Change and the Environment, 2015. The Global Climate Legislation Study – [Indonesia](#).

<sup>15</sup> PwC Indonesia. Energy, Utilities & Mining Publications, [Release of long-awaited 2016 - 2025 RUPTL – a positive sign for IPP investors](#), July 2016.

<sup>16</sup> IEA Statistics: Indonesia Electricity and Heat, [2013](#).

<sup>17</sup> Republic of Indonesia and World Bank. [Low Carbon Development Options for Indonesia: Status and Findings](#), 2008.

<sup>18</sup> Grantham Research Institute on Climate Change and the Environment, 2015. The Global Climate Legislation Study – [Indonesia](#).

<sup>19</sup> Republic of Indonesia. Indonesia's Intended Nationally Determined Contribution (INDC) to the UNFCCC, 2015.