



# Greenhouse Gas Emissions in Armenia

## Armenia Numbers at a Glance (2013)

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

Total GHG emissions  
(0.02% of world total)

World: 48,257 MtCO<sub>2</sub>e

**2,992,192**

Population

World: 7,176,092,192

**2.82**

tCO<sub>2</sub>e per capita

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

**US\$ 10,737 Million**

GDP\*\*

World: US\$71,059 Billion

**787**

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

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

**-14 MtCO<sub>2</sub>e (-62%)**

Change in GHG emissions  
(1990 - 2013)

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

Sources: WRI CAIT 2.0, 2017.

Emissions including Land-Use Change and Forestry

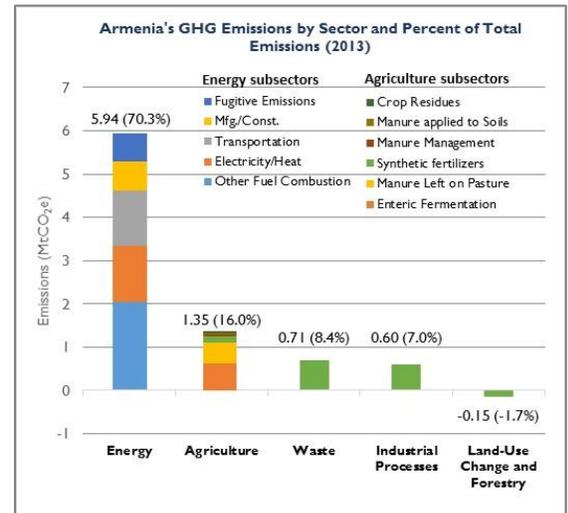
\*Million metric tons of carbon dioxide equivalent. Global Warming Potentials are from the Intergovernmental Panel on Climate Change Second Assessment Report

\*\*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), Armenia's<sup>1</sup> GHG profile was dominated by emissions from energy in 2013, accounting for 70.3% of the country's total emissions.<sup>2</sup> Within the energy sector, other fuel combustion contributed 34%, and electricity/heat generation and transportation contributed 22% each.<sup>3</sup> Agriculture was the second most significant source (16.0%), with enteric fermentation and manure left on pasture contributing 81% of agriculture emissions.<sup>4</sup> Waste and industrial processes (IP) contributed 8.4% and 7%, respectively.<sup>5</sup> Land use change and forestry (LUCF) activities absorbed 0.15 MtCO<sub>2</sub>e, representing a net carbon sink equivalent to 1.7% of total gross emissions.



Sources: WRI CAIT 2.0, 2017, FAOSTAT, 2017.

Armenia's First [Biennial Update Report \(BUR\)](#) to the UNFCCC, submitted in 2016, includes a GHG inventory for 2011 and 2012. Like WRI CAIT, the BUR shows energy to have been the greatest emission source in 2012, followed by agriculture. It also shows LUCF to have been a carbon sink, absorbing 0.52 MtCO<sub>2</sub>e in 2012.<sup>6</sup> The second BUR is currently under preparation that will include a GHG inventory for 2013.

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

According to WRI CAIT, Armenia's GHG emissions decreased by 14 MtCO<sub>2</sub>e from 1990 to 2013. The dramatic decline in GHG emissions in the 1992-1994 period corresponds to a sharp economic downturn following the collapse of the Soviet Union in 1991.<sup>7</sup> The average annual change in total emissions in the period 1990-2013 was -1.3%, with sector-specific average annual changes as follows: energy (-3.1%), waste (0.7%), and IP (6.9%).<sup>8</sup> The average annual change for agriculture (0.6%) and LUCF (-10.5%) is for the period 1992-2013. The change in emissions in the two highest emitting sectors is discussed below.

<sup>1</sup> Armenia became a [UN Member State](#) in 1992, and acceded to the [UNFCCC](#) in 1993.

<sup>2</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 \(SAR\)](#). WRI CAIT draws on data from the International Energy Agency (IEA), primarily, for energy emissions, the US Environment Protection Agency for IP and waste emissions, and the Food and Agriculture Organization for LUCF and agriculture emissions.

<sup>3</sup> Ibid. Other Fuel Combustion includes emissions from biomass combustion (charcoal or fuel wood), stationary and mobile sources (not allocated in the Transportation sub-sector) and other sectors (commercial/ institutional activities, residential, and agriculture/forestry/fishing as well as other emissions not specified elsewhere) (WRI, [CAIT Country Greenhouse Gas Emissions: Sources & Methods](#), 2015).

<sup>4</sup> Food and Agriculture Organization of the United Nations Statistics Division (FAOSTAT). Armenia, [Emissions – Agriculture total](#), viewed on April 3, 2017.

<sup>5</sup> WRI CAIT 2.0, 2017.

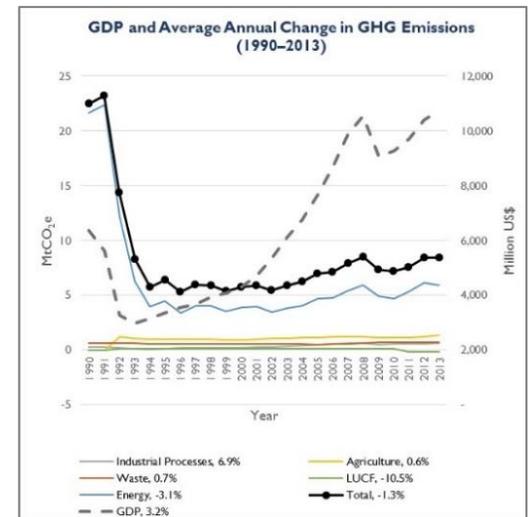
<sup>6</sup> Republic of Armenia. Armenia's [Biennial Update Report \(BUR\)](#) to the UNFCCC, 2016. The BUR uses GWPs from the IPCC SAR.

<sup>7</sup> Republic of Armenia. Armenia's [Third National Communication \(TNC\)](#) to the UNFCCC, 2015.

<sup>8</sup> WRI CAIT 2.0, 2017. WRI does not show agriculture, LUCF, and total GHG emissions for 1990 and 1991. Energy, waste, and IP emissions are approximated for 1990-1991 according to the methodology WRI uses to calculate emissions for newly formed countries. (WRI, [CAIT Country Greenhouse Gas Emissions: Sources & Methods](#), 2015). Total GHGs in 1990-1991 are calculated based on emissions from energy, IP, and waste only. 1992 is the first year for which emissions from all sectors are included in the national total.

**Energy:** According to WRI CAIT, Armenia's energy sector emissions decreased by 15.69 MtCO<sub>2</sub>e from 1990 to 2013. International Energy Agency data from 1990-2013 show that primary solid biofuels consumption decreased 43%,<sup>9</sup> and electricity generation decreased 26%, along with a gradual and complete phase out of fuel oil from the electricity mix, while heat generation decreased 99%.<sup>10</sup> The BUR notes that an economic and energy crisis in 1991-1993 led to a sharp decrease in primary energy consumption, driven by a fuel blockade by Azerbaijan and Turkey and low self-sufficiency.<sup>11</sup> To address the crisis, Armenia re-opened its nuclear power plant in 1995.<sup>12</sup> As of 2013, 41% of electricity was generated by natural gas, followed by nuclear (31%), and hydro (28%).<sup>13</sup> Armenia imports refined oil products and natural gas from the Russian Federation and Europe, and a relatively small amount of natural gas from Iran.<sup>14</sup> Armenia's total installed electricity generation capacity as of 2013 is 4,200 megawatts, of which 45% are not operational due to the old age and inefficiency of power plants; nevertheless, Armenia meets domestic electricity demand and trades electricity with neighboring countries.<sup>15</sup> In its [2014-2025 Development Strategy](#), Armenia articulates plans to maximize use of domestic energy resources (especially renewables), replace old power plants, diversify energy supply for regional integration, and promote energy efficiency in all energy-consuming sectors.<sup>16</sup>

**Agriculture:** The agriculture sector, composed mostly of small farms, represents almost 20% of Gross Domestic Product and employs about 40% of the total workforce.<sup>17</sup> The BUR notes a 48% increase in agriculture areas between 1990 and 2012. WRI CAIT data show that agriculture emissions increased 9% from 1992 to 2013, driven by an increase in enteric fermentation from livestock and manure left on pasture.<sup>18</sup> During this time, there was a 17% increase in the number of cattle and a 26% increase in the number of goats.<sup>19</sup>



Source: WRI CAIT 2.0, 2017.

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

According to WRI CAIT, Armenia's GHG emissions decreased 62% from 1990 to 2013, averaging -1.3% annually, while GDP grew 69%, averaging 3.2% annually. Although GDP grew much faster than GHG emissions, in 2013 Armenia's economy emitted slightly more GHGs relative to GDP than the world average, indicating potential for improvement.

## Climate Change Mitigation Targets and Plans

In its [Intended Nationally Determined Contribution \(INDC\)](#), Armenia describes its approach to establishing a level of GHG emissions of 633 MtCO<sub>2</sub>e that it will not exceed during the period 2015-2050. This is based on Armenia's estimate of 1990 global average emissions of 189 tons per capita, multiplied by Armenia's 1990 population of 3.35 million. The INDC notes Armenia's 2010 GHG emissions of 2.14 tons per person. It also states that Armenia will strive to achieve GHG emissions of 2.07 tons of CO<sub>2</sub>e/capita per year in 2050 if it receives adequate international financial, technological and capacity-building assistance. If Armenia's emissions do not exceed 633 MtCO<sub>2</sub>e or average annual emissions of 5.4 tons of CO<sub>2</sub>e/capita, the INDC asserts that Armenia can credit its non-utilized reduction to the carbon market or transfer it to the balance of emissions limitation envisaged for the period of 2050-2100. GHG mitigation will be mainly from renewable energy and energy efficiency, development of electrical transport, urban development (buildings and construction), IP (construction materials and chemical production), waste management, and afforestation, forest protection, and carbon storage in soil.<sup>20</sup> Armenia ratified the Paris Agreement in March 2017.<sup>21</sup>

<sup>9</sup> IEA. Armenia Renewables and Waste, [1990](#) and [2013](#). [IEA Definitions](#): Primary solid biofuels are any plant matter used directly as fuel or converted into other forms before combustion. However, the BUR indicates that solid biofuels consumption increased significantly, from 2.1 kilotonnes of oil equivalent (ktOE) in 1990 to 163.1 ktOE in 2012. [Armenia's Energy Balance for 2015](#) shows that 197.8 ktOE of wood and manure combined were consumed that year.

<sup>10</sup> IEA. Statistics: Armenia Electricity and Heat [1990](#) and [2013](#). The share of hydroelectricity increased from 15% in 1990 to 28% in 2013, peaking (68%) in 1993.

<sup>11</sup> European Commission FP7 project ENER2I - ENERgy Research to Innovation: Reinforcing cooperation with ENP countries on bridging the gap between energy research and energy innovation. [Armenia Country Report](#), 2014.

<sup>12</sup> *Ibid.* Armenia's nuclear power plant had been decommissioned after a severe earthquake in 1988.

<sup>13</sup> IEA. Statistics: Armenia Electricity and Heat [2013](#).

<sup>14</sup> Asian Development Bank (ADB). [Sector Assessment \(Summary\): Energy](#), 2014. The summary is based on a background study "Armenia Energy Sector Assessment" (unpublished), various technical assistance reports by the ADB, and consultations with relevant government agencies and other stakeholders.

<sup>15</sup> *Ibid.*

<sup>16</sup> Government of Armenia. [Armenia Development Strategy for 2014-2025](#), 2014.

<sup>17</sup> FAO. [Armenia at a Glance](#), viewed on April 3, 2017.

<sup>18</sup> FAOSTAT, 2017.

<sup>19</sup> FAOSTAT. [Armenia - Live Animals](#), viewed on April 3, 2017.

<sup>20</sup> Republic of Armenia. Armenia's [Intended Nationally Determined Contribution \(INDC\)](#) to the UNFCCC, 2015.

<sup>21</sup> UNFCCC, [Paris Agreement - Status of Ratification](#), viewed on April 3, 2017.