



# Greenhouse Gas Emissions in South Africa

## South Africa Numbers at a Glance (2012)

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

Total GHG emissions  
(0.97% of world total)  
World: 47,599 MtCO<sub>2</sub>e

**52,341,695**

Population  
World: 7,043,181,414

**8.86**

tCO<sub>2</sub>e per capita  
World: 6.76 tCO<sub>2</sub>e

**US\$ 316,737 Million**  
GDP\*\*

World: US\$55,261 Billion

**1,464**

tCO<sub>2</sub>e/million US\$ GDP  
World: 861 tCO<sub>2</sub>e/million US\$ GDP

**+142 MtCO<sub>2</sub>e (+44%)**

Change in GHG emissions  
(1990–2012)

World: +13,661 MtCO<sub>2</sub>e

Sources: WRI CAIT 2.0, 2015  
Emissions including Land-Use Change and Forestry

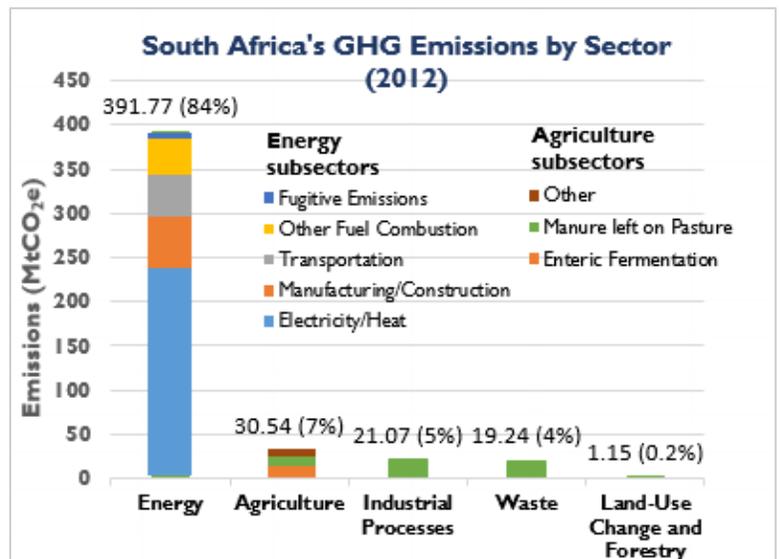
\*Million metric tons of carbon dioxide equivalent

\*\*Gross Domestic Product (GDP) in constant 2005 US\$

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## Greenhouse Gas (GHG) Emissions by Sector

According to the World Resources Institute Climate Analysis Indicator Tool (WRI CAIT), South Africa's GHG profile is dominated by emissions from the energy sector, which accounted for 84% of South Africa's total emissions in 2012. Of this, 60% of energy emissions were due to electricity and heat, 15% to manufacturing and construction, 12% to transportation, and 12% to other energy subsectors. Agriculture is the second highest emitting sector and contributes 7% of total GHGs, of which 42% is due to enteric fermentation, 33% to manure left on pasture, and 25% to other agriculture subsectors.<sup>1</sup>



Sources: WRI CAIT 2.0, 2015; FAOSTAT, 2016

## Change in GHG Emissions in South Africa (1990-2012)

South Africa's total GHG emissions grew 44% from 1990-2012. The average annual change during this period was 1.7%, with sector-specific average annual changes as follows: energy (1.9%), agriculture (<1%), IP (5.3%), waste (1%), and LUCF (1.7%).<sup>2</sup>

**Energy:** According to WRI CAIT, South Africa's energy emissions increased by 127 MtCO<sub>2</sub>e from 1990 to 2012. With 95% of Africa's total coal reserves but limited oil and natural gas, South Africa meets most of its energy needs through coal, in particular for electric power generation which accounts for more than half of the country's coal consumption. According to the U.S. Energy Information Administration, most coal power plants in South Africa are outdated, poorly maintained, and working at their maximum capacity.<sup>3</sup> The national power utility, Eskom, plans to bring online new coal-fired power plants to alleviate blackouts and to meet growing demand.<sup>4</sup> Meanwhile, South Africa is also diversifying its electricity generation mix and is expanding renewable electricity generation capacity through the Renewable Energy Independent Power Producer Procurement Program (REIPPPP), through which South Africa's Independent Power Producer office reports that 6,327 MW have been procured between November 2011 and August 2014, with nearly 3,000 MW expected to be connected to the grid by the end of 2016.<sup>5</sup> Electric power generated from a wide range of technologies is eligible

<sup>1</sup> World Resources Institute Climate Analysis Indicator Tool (WRI CAIT) 2.0, 2015: South Africa.

<http://cait.wri.org/profile/South%20Africa>.

<sup>2</sup> Ibid.

<sup>3</sup> U.S. Energy Information Administration (EIA), 2015. Country Analysis Brief: South Africa:

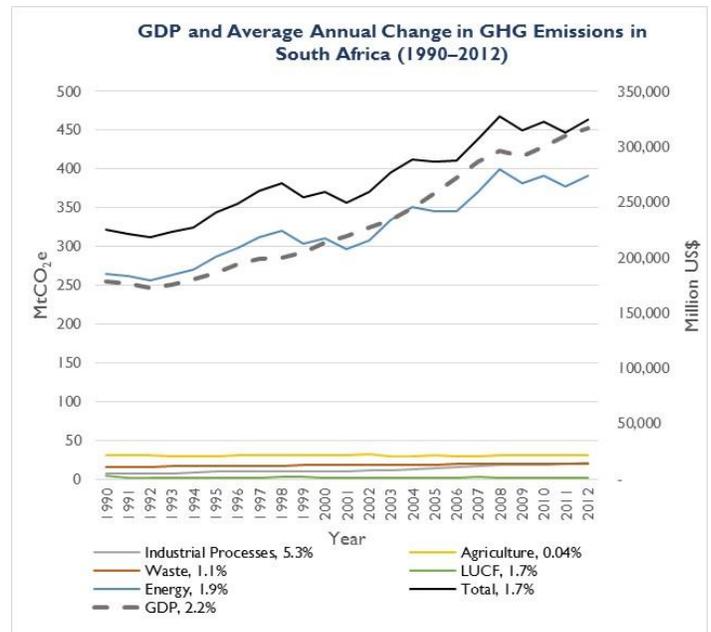
[http://www.eia.gov/beta/international/analysis\\_includes/countries\\_long/South\\_Africa/south\\_africa.pdf](http://www.eia.gov/beta/international/analysis_includes/countries_long/South_Africa/south_africa.pdf).

<sup>4</sup> Ibid.

<sup>5</sup> Mangondo, Lena. The South African Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) – Lessons Learned, March 17, 2016: <http://www.irena.org/EventDocs/RECC/30.%20REIPPPP%20South%20Africa.pdf>.

to compete for procurement, including wind, solar, hydro, biomass, biogas, and landfill gas.<sup>6</sup> As of 2012, 94% of electricity in South Africa was produced from coal, followed by nuclear (5%), hydro (2%), and biofuels and non-hydro renewables (<1%).<sup>7</sup> In 2013, the electricity generation mix had changed slightly, with the percentage of coal-fired generation decreasing to 93%, and nuclear increasing to 6%, with the proportion of other sources remaining the same.<sup>8</sup>

**Agriculture:** According to WRI CAIT, agriculture emissions grew slightly, 0.05 MtCO<sub>2</sub>e, from 1990-2012. More recently, for the period 2000-2010, South Africa reported in its [Biennial Update Report \(BUR\)](#) to the UNFCCC that emissions from agriculture, forestry, and other land-use (AFOLU) declined by 15.7%.<sup>9</sup> The BUR attributed the main cause of this decrease to reduced emissions from the livestock subsector which dropped 6.9% from 2000 to 2010, primarily because of decreasing livestock numbers. Still, livestock and livestock products contribute an estimated 51% of the agricultural income.<sup>10</sup> As of 2012, agriculture contributes 2.6% to the country's GDP and represents about 5% of employment.<sup>11</sup> It employs 661,000 people, of which 9% are skilled workers and the remaining are labor workers.<sup>12</sup>



Source: WRI CAIT 2.0, 2015

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

According to WRI CAIT, South Africa's GHG emissions grew 142 MtCO<sub>2</sub>e from 1990 to 2012, averaging 1.7% annually, while GDP grew by 77%, averaging 2.7% annually.<sup>13</sup> South Africa's BUR states that the energy intensity of the economy has resulted in an emissions profile that differs substantially from that of other developing countries at a similar stage of development.<sup>14</sup> In its National Climate Change Response Strategy, South Africa notes that it is a relatively significant contributor to global climate change, with significant GHG emissions from its energy intensive, fossil-fuel powered economy.<sup>15</sup> With its relatively high emissions<sup>16</sup> and the carbon intensity of its economy being almost 4 times the world average, there is potential to reduce South Africa's GHG emissions relative to GDP.

## Climate Change Mitigation Targets and Plans

South Africa's [Intended Nationally Determined Contribution \(INDC\)](#) defines its GHG mitigation target according to its "peak, plateau and decline" (PPD) emissions trajectory. According to this plan, emissions will peak between 2020 and 2025, plateau for approximately a decade, then decline in absolute terms, ranging between 398 and 614 MtCO<sub>2</sub>e between 2025 and 2030. South Africa considers this PPD range to be an equitable contribution to the global mitigation effort, given the country's current and historical emissions and its national circumstances. This international commitment is backed by a comprehensive suite of national-level policies, programs and regulations to address climate change, complemented by a set of sector-specific policies. The 2011 [National Climate Change Response White Paper](#) is the

<sup>6</sup> Ibid.  
<sup>7</sup> International Energy Agency (IEA), 2015. Energy Balances, viewed August 26, 2016: <http://www.iea.org/statistics/statisticsearch/report/?country=SOUTHAFRIC&product=electricityandheat&year=2012>. Numbers do not sum to 100% due to rounding.  
<sup>8</sup> IEA, 2015. Energy Balances, viewed November 15, 2015: <http://www.iea.org/statistics/statisticsearch/report/?country=SOUTHAFRIC&product=balances&year=2013>. Numbers do not sum to 100% due to rounding.  
<sup>9</sup> Republic of South Africa, Department of Environmental Affairs. 2014. GHG Inventory for South Africa 2000-2010. November 2014: [https://www.environment.gov.za/sites/default/files/docs/greenhousegas\\_inventorysouthafrica.pdf](https://www.environment.gov.za/sites/default/files/docs/greenhousegas_inventorysouthafrica.pdf).  
<sup>10</sup> Republic of South Africa, Department of Agriculture Forestry and Fisheries. 2009. Quarterly economic overview of the agriculture sector: [http://www.nda.agric.za/docs/Economic\\_analysis/EconomicOverview\\_Oct-Dec2009.pdf](http://www.nda.agric.za/docs/Economic_analysis/EconomicOverview_Oct-Dec2009.pdf).  
<sup>11</sup> Republic of South Africa. Department of Agriculture, Forestry and Fisheries, Abstract of Agricultural Statistics, 2013: <http://www.nda.agric.za/docs/statsinfo/Abstact2013.pdf>  
<sup>12</sup> Ibid.  
<sup>13</sup> WRI CAIT 2.0, 2015.  
<sup>14</sup> Republic of South Africa. South Africa's 1<sup>st</sup> Biennial Update Report. November 2014: <http://unfccc.int/resource/docs/natc/zafbur1.pdf>  
<sup>15</sup> Republic of South Africa. The National Climate Change Response White Paper, 2011.  
<sup>16</sup> CAIT Climate Data Explorer. 2015. Washington, DC: World Resources Institute: <http://cait.wri.org>. CAIT data show that South Africa's 2012 emissions including LUCF put South Africa as the world's 19<sup>th</sup> highest emitter of GHGs.

government key climate change policy and describes its vision for a long-term transition to a climate-resilient and lower-carbon economy and society. It also identifies near-term priority initiatives through several “flagship programmes.” Other sectoral plans include the integrated energy and electricity plans, which aim to diversify South Africa’s energy- and electricity-generation mix.<sup>17</sup> South Africa has also been developing policy instruments, including a carbon tax, desired emission reduction outcomes (DEROs) for particular sectors, company-level carbon budgets, and regulatory standards and controls for specific GHG pollutants and emitters.<sup>18</sup> However, the full implementation of South Africa’s mitigation policy instruments and related actions requires increased human, financial and institutional capacity.

<sup>17</sup>South Africa. South Africa’s INDC, 2015: <http://www4.unfccc.int/submissions/INDC/Published%20Documents/South%20Africa/1/South%20Africa.pdf>.

<sup>18</sup>Ibid.