

# STATE COMMUNICATION

1ST DIRECT AND INDIRECT GREENHOUSE GASES  
ANTHROPOGENIC EMISSIONS INVENTORY OF SAO PAULO STATE

EMISSIONS FROM LAND  
USE, LAND-USE CHANGE,  
AND FORESTRY SECTOR

# EXECUTIVE SUMMARY

SAO PAULO STATE GOVERNMENT • ENVIRONMENT SECRETARIAT  
CETESB - SAO PAULO STATE ENVIRONMENT AGENCY

The image features a scenic landscape with rolling green hills and a small blue house with a red roof in the distance. In the foreground, there are trees with vibrant purple flowers. A semi-transparent green banner is overlaid across the middle of the image, containing the text "EXECUTIVE SUMMARY" in bold, dark green, uppercase letters.

# EXECUTIVE SUMMARY

## Executive Summary

### The State Policy on Climate Change

Due to increasing atmospheric concentrations of greenhouse gases (GHG) and their relationship with the warming of the climate system, not only national governments that are part of the United Nations Framework Convention on Climate Change (UNFCCC) (BRASIL, 1992), but also local governments (states, provinces and municipalities), have tried to make estimates of net anthropogenic emissions of greenhouse gases in order to support the society in identifying local priorities and adopting suitable measures to reduce those emissions.

In that sense, the Government of Sao Paulo State, in November 09, 2009, published the Law 13,798 (SÃO PAULO, 2009), establishing the State Policy on Climate Change (PEMC), regulated by Decree 55,947, June 24, 2010 (SÃO PAULO, 2010). In Article 6 of the Law are set the guidelines for the preparation, periodic updating and publication of GHG anthropogenic emissions inventories by sources and removals through sinks, for gases not controlled by the Montreal Protocol, with the employment of both nationally and internationally comparable methods.

### The Inventory

This publication "Emissions from Land Use, Land-use Change, and Forestry Sector" is a product of the contract established in 2009, between the Foundation for Space Science, Technology and Applications (FUNCATE) and the Sao Paulo State Environment Agency (CETESB), with support from the National Institute on Space Research (INPE) and resources from the contract with the British Embassy, through the "Sao Paulo State Policy on Climate Change Support Project". Several meetings were held involving researchers, specialists and institutions so this document would be possible.

This publication presents the estimates of

net anthropogenic emissions of carbon dioxide, and the emissions and removals balance from Land Use, Land-use Change, and Forestry Sector (LULUCF) in Sao Paulo State, for the periods: 1994-2002, 2002-2005, and 2005-2008. This is one of the Reference Reports that, once reviewed and consolidated, resulted in the 1st Direct and Indirect Greenhouse Gases Anthropogenic Emissions Inventory of Sao Paulo State (CETESB, 2011).

Developed by institutions of excellence and experts, this report fulfills its role, following with clarity and transparency the methodological principles established by the Good Practice Guidance for Land Use, Land-use Change, and Forestry (GPG/LULUCF) of the Intergovernmental Panel on Climate Change (IPCC, 2003).

In addition, it has been in Public Consultation on the website of CETESB for a period of six months, starting in November 2010.

### Estimates

The preparation of this inventory was guided by the Good Practice Guidance for Land Use, Land-use Change, and Forestry (IPCC, 2003) of the Intergovernmental Panel on Climate Change (IPCC), from which methodologies and methodological approaches were used following the principles of transparency, consistency and accuracy recommended by the Panel, in the preparation of national inventories of greenhouse gases.

The estimates of net anthropogenic emissions from this sector involved an extensive work of collection and interpretation of remote sensing data. The state's territory was divided into spatial units in polygons, which resulted from the integration of various data sources such as: municipal borders; limits of Brazilian biomes contained in Sao Paulo State; map of the original vegetation; map of the ground; maps of land use and land cover in different dates, makes possible the analysis of changes in carbon stocks, occurred between the analyzed time periods.

### Results of Net Anthropogenic Emissions Associated with Land Use, Land-use Change, and Forestry Sector

In this publication were mapped 24,823,681 ha for the three inventoried periods (1994-2002, 2002-2005, and 2005-2008). Figure 1 below, shows the CO<sub>2</sub> emissions and removals balance for these analyzed periods, showing the extent of the CO<sub>2</sub> removals in the State.

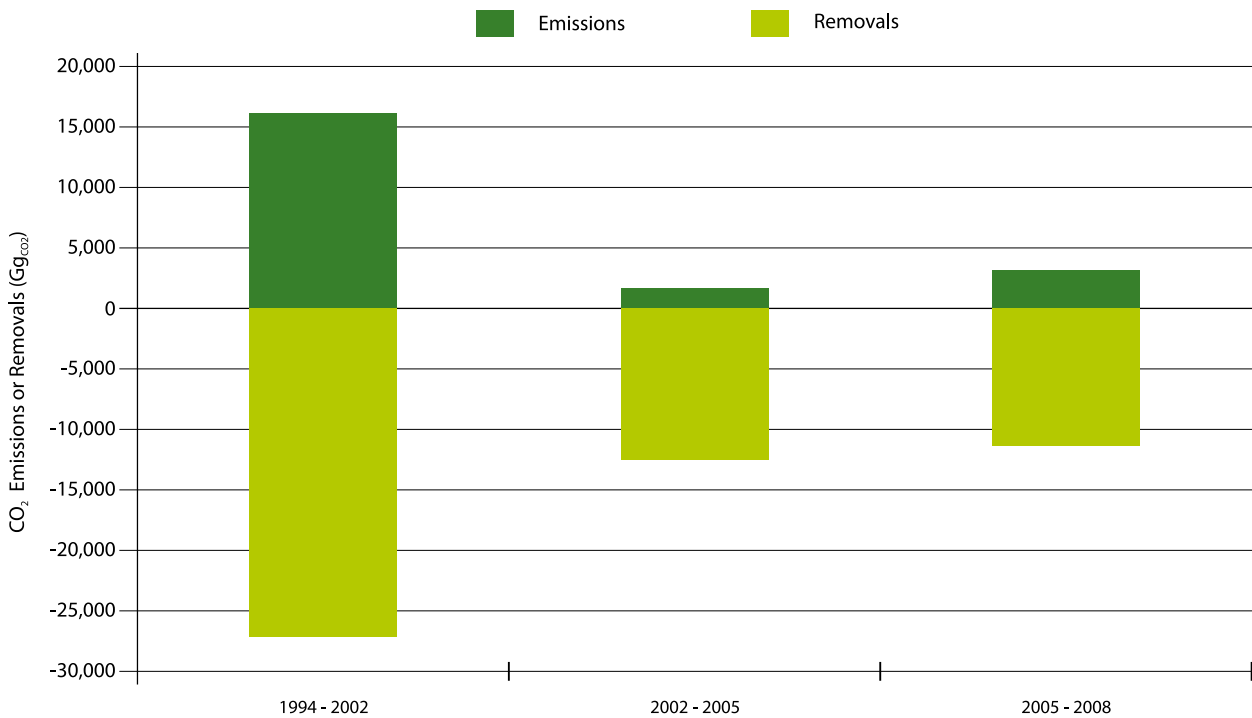
In the period between 1994 and 2002, the net anthropogenic emissions totaled -10,663.29 Gg<sub>CO2</sub> (negative result indicates a CO<sub>2</sub> net removals), and from the mapped area, there was land-use change on 62,480 ha (0.25%).

In the period between 2002 and 2005, the net anthropogenic emissions totaled -11,753.35 Gg<sub>CO2</sub>, and from the mapped area, there was land-use change on 46,426 ha (0.19%).

In the period between 2005 and 2008, the net anthropogenic emissions totaled -9,846.08 Gg<sub>CO2</sub>, and from the mapped area, there was land-use change on 64,618 ha (0.26%).

From the estimates of net anthropogenic emissions, was calculated the CO<sub>2</sub> annual average removals, shown in Table 1.

**Figure 1.** CO<sub>2</sub> Balance in the Periods: 1994-2002, 2002-2005, and 2005-2008, in Sao Paulo State (Gg<sub>CO2</sub>)



**Table 1.** CO<sub>2</sub> Annual Average Removals in the Period 1990-2008 in Sao Paulo State

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	[Gg <sub>CO2</sub> -year <sup>-1</sup> ]									
LULUCF	NE	NE	NE	NE	NE	1,333	1,333	1,333	1,333	1,333
	2000	2001	2002	2003	2004	2005	2006	2007	2008	
	[Gg <sub>CO2</sub> -year <sup>-1</sup> ]									
LULUCF	1,333	1,333	1,333	3,918	3,918	3,918	3,282	3,282	3,282	

Note – NE: Not Estimated;  
Source: CETESB (2011).

**Profile of the National and Sao Paulo State Net Anthropogenic Emissions Related to the LULUCF Sector**

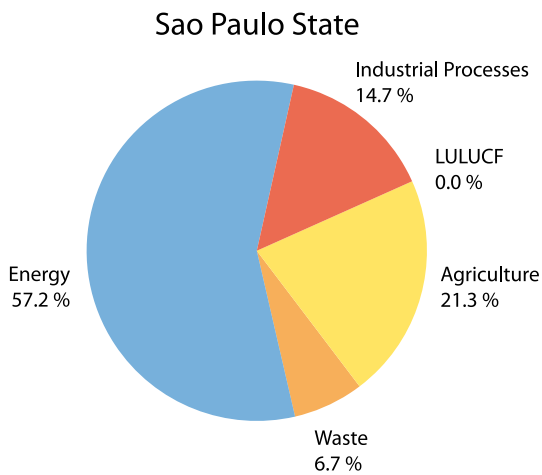
The analysis of the net anthropogenic emissions in national level (BRAZIL, 2010) and state level (Sao Paulo), allows identify the profile of those emissions and the categories where the mitigation actions of greenhouse gases may be concentrated. Figure 2 and Figure 3 show the percentage contribution of the analyzed sectors (Energy, Waste, Industrial Processes, Agriculture, and Land Use, Land-use Change, and Forestry).

It is observed that the contribution of the LULUCF Sector to CO<sub>2</sub> total state emissions

are null, although this is the sector that contributes the most to the total national emissions (60.6%).

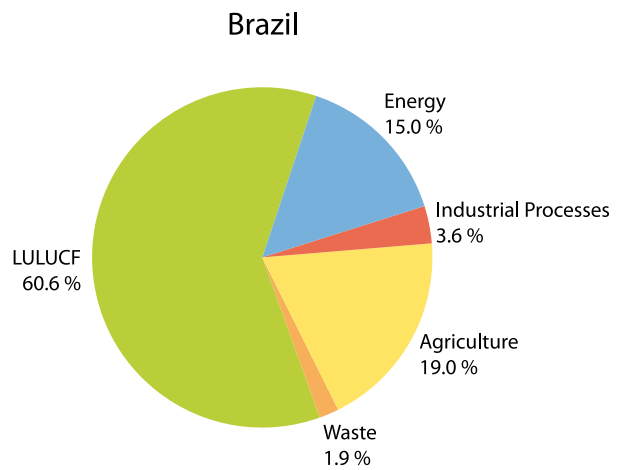
Figure 2 shows the Sao Paulo State emissions that resemble an emission standard of more industrialized states, in which the largest emitter is derived from the Energy Sector, while the emissions of Brazil, presented in Figure 3, represent a country profile with large territorial extensions and forest, where the biggest emissions are coming from the LULUCF Sector.

**Figure 2.** GHG Emissions in 2005 in Sao Paulo State



Source: CETESB (2011).

**Figure 3.** GHG Emissions in 2005 in Brazil



Source: CETESB (2011).

Support



British Embassy  
Brasilia



GOVERNO DO ESTADO  
**SÃO PAULO**

Secretaria do Meio Ambiente