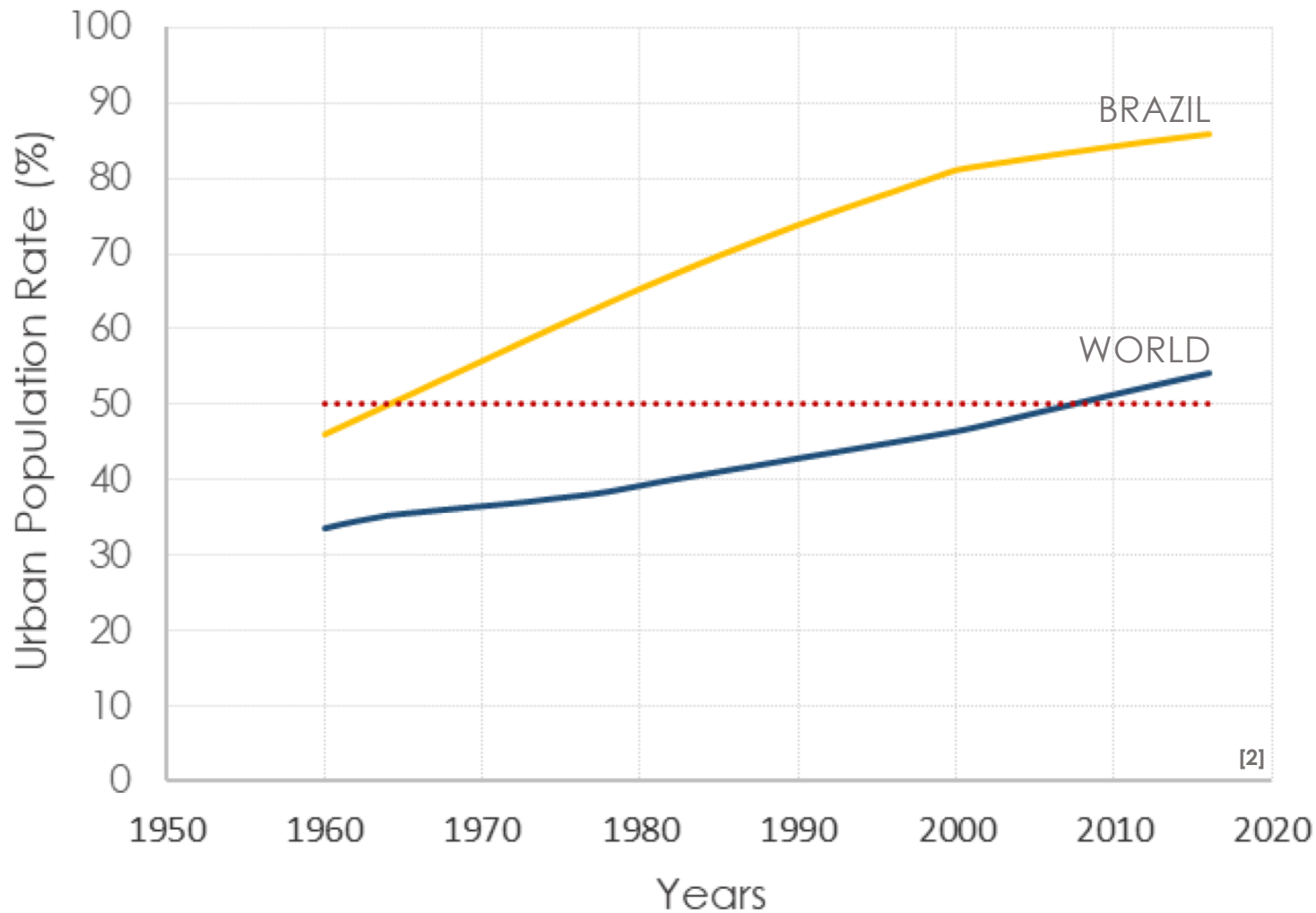




urban areas and climate change



likely correlation
between **climate
change** and
urbanization growth

(IPCC, 2014)

**vulnerability of urban
areas** to
consequences of
climate change

urban areas and climate change

URBAN HEAT ISLAND EFFECT



Temperature



FLOODING



...and each place will be affected differently

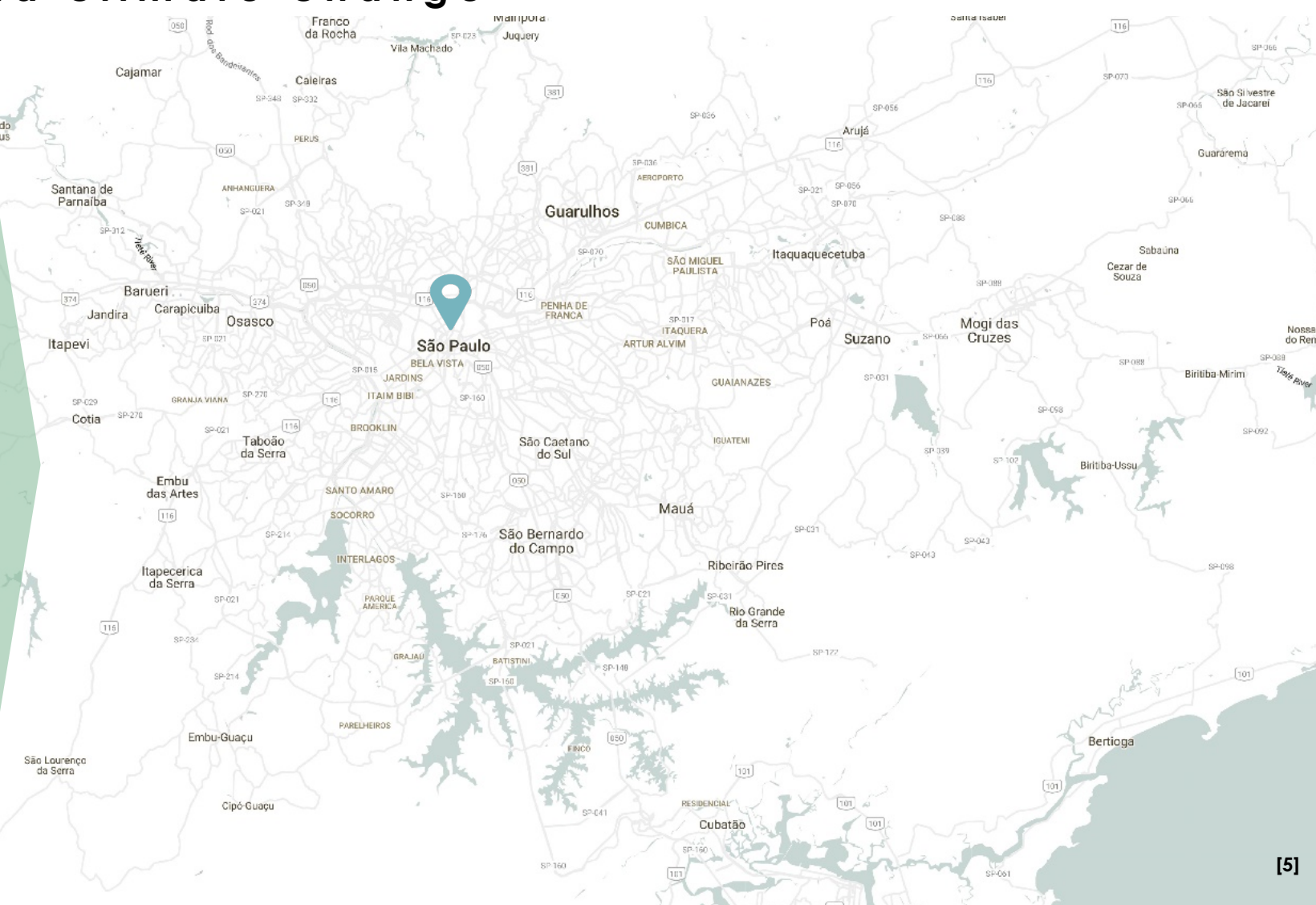
urban areas and climate change

located in the southeast of Brazil
highest GDP and population in the country

(IBGE, 2011)

first city in Brazil to address climate change through laws and policies

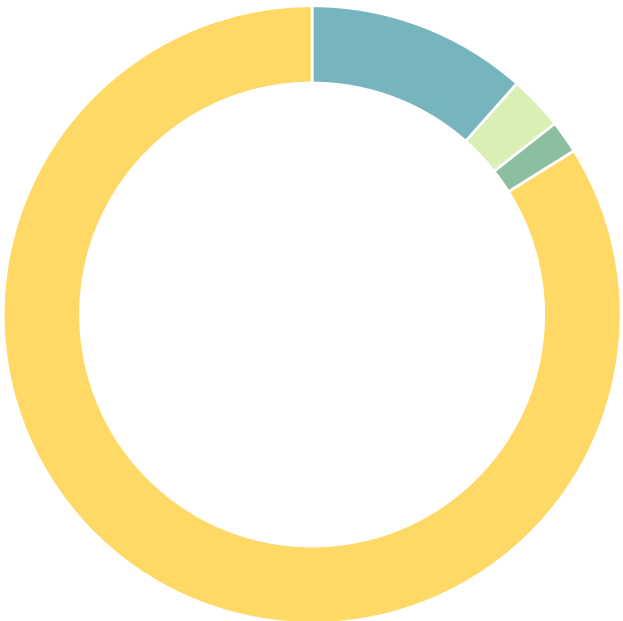
(de Macedo, Setzer & Rei, 2016)



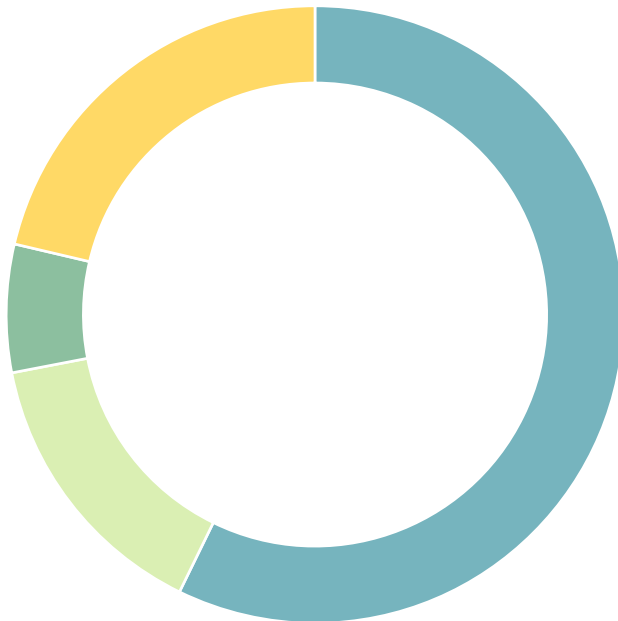
[5]

Distribution of CO₂eq Emissions

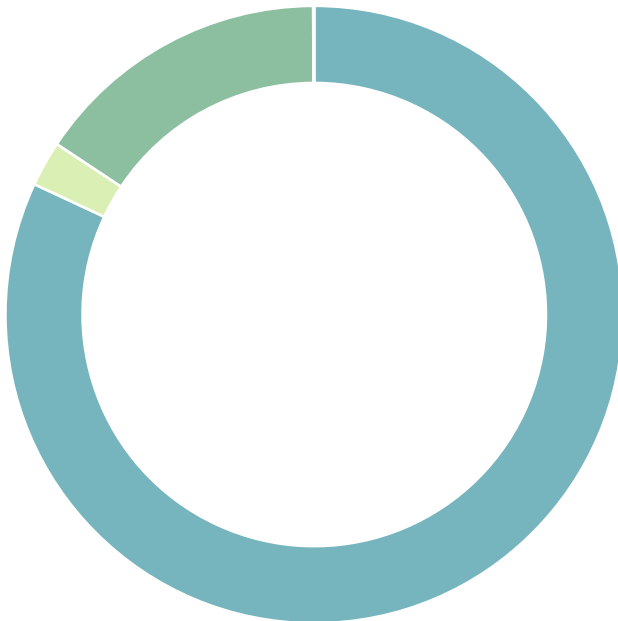
CO₂eq National Emissions (2005)



CO₂eq State Emissions (2005)



CO₂eq Municipality Emissions (2005)



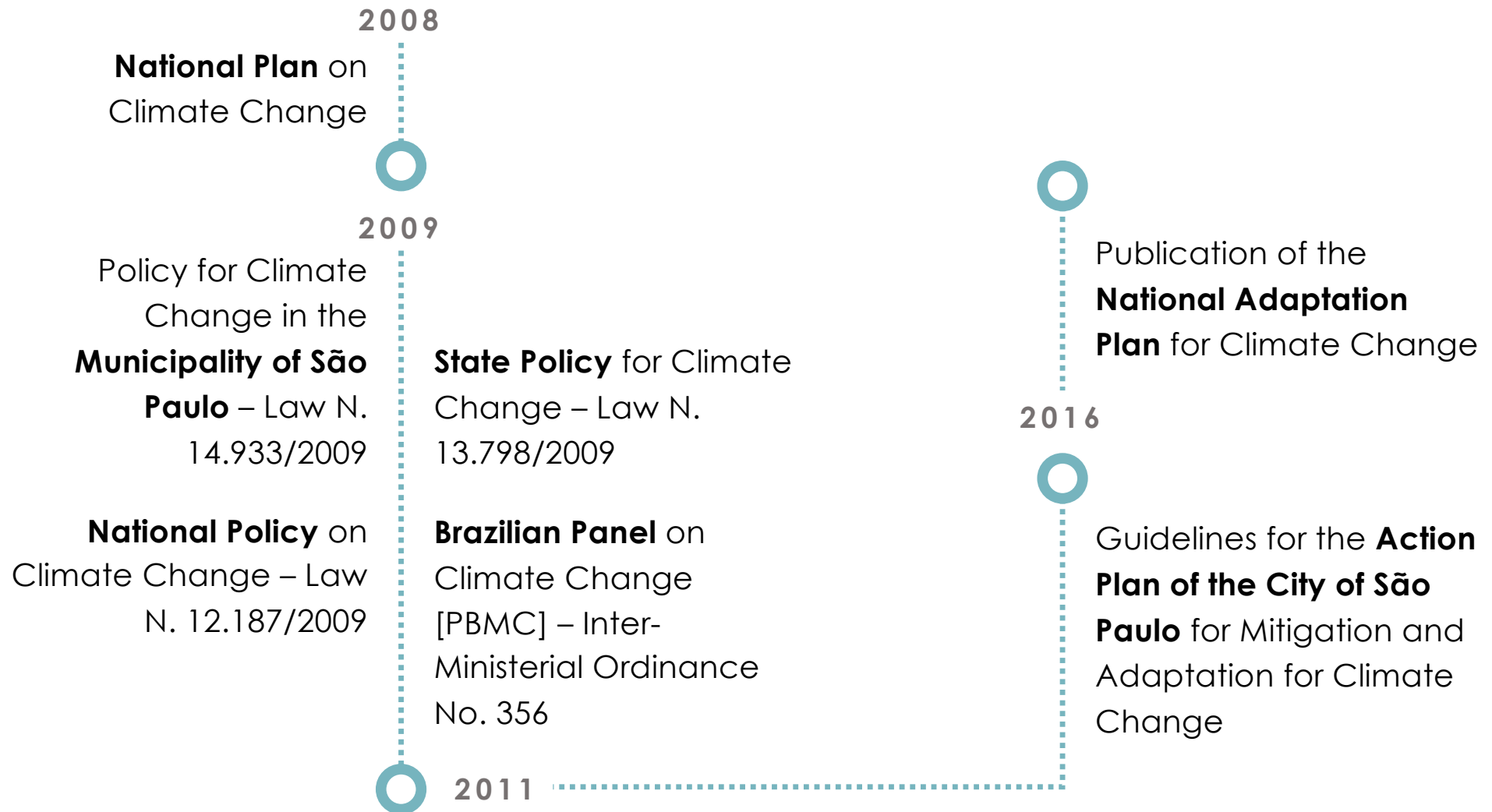
■ Agriculture, forestry and other land use

■ Energy

■ Industry

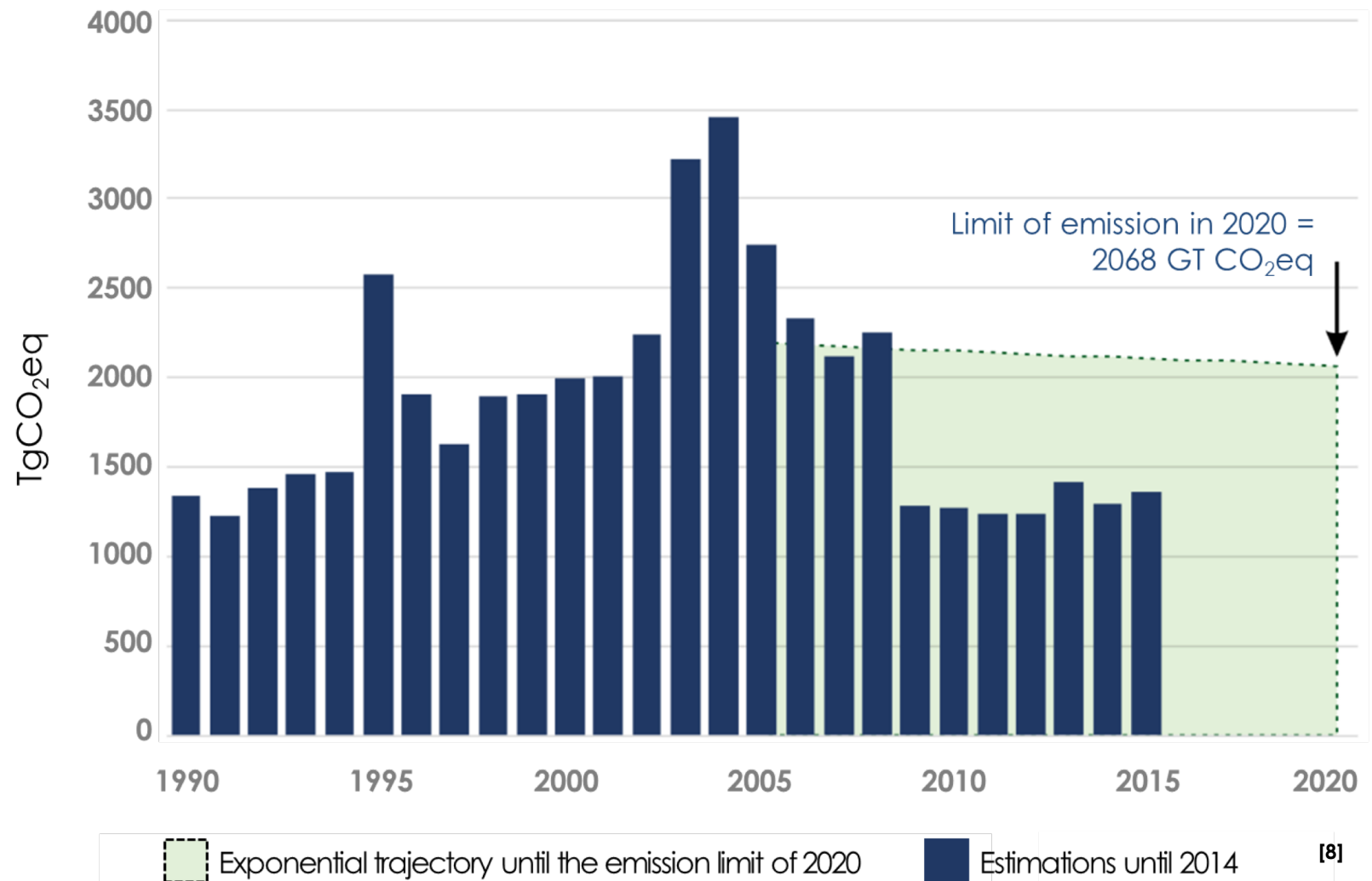
■ Waste

panorama of climate change policies



national level | national policy on climate change

- . **framework** for mitigation and adaptation to climate change
- . **voluntary commitment** for reduction of projected emissions
- . **no clear incentives nor consequences** related to the achievement or not of the goals specified in the document



national level | national plan on climate change

- . compatibility with the national policy framework
- . **sectorial overview**, with more specific guidelines to reach the goal set by the national policy
- . emphasis **synergetic solutions**
- . development of **sectorial plans**, to support the update of the national plan.

Agriculture, forestry and other land use

- . Action Plan for Prevention and Control of the Legal Amazon Deforestation
- . Action Plan for Prevention and Control of Cerrado Deforestation
- . Low Carbon Agriculture Plan

Health

Industry

- . Plan for Emission Reduction for the Steel Industry
- . etc.

Energy

- . Ten Year Energy Plan
- . Sectorial Plan for Transport and Urban Mobility for Climate Change Mitigation

national level | national adaptation plan to climate change

- . same structure as the **national plan on climate change**
- . includes a chapter on **strategies for cities**
- . emphasis **synergetic solutions**
- . development of **sectorial strategies**, with higher level of details



(...)climate variability already poses a **significant challenge** and that future climate change seems inevitable. This makes it imperative to **develop strategies for adaptation**, in view of the issues of **ethical and social justice** these entail.



(National Adaptation Plan to Climate Change, 2016, p.58)

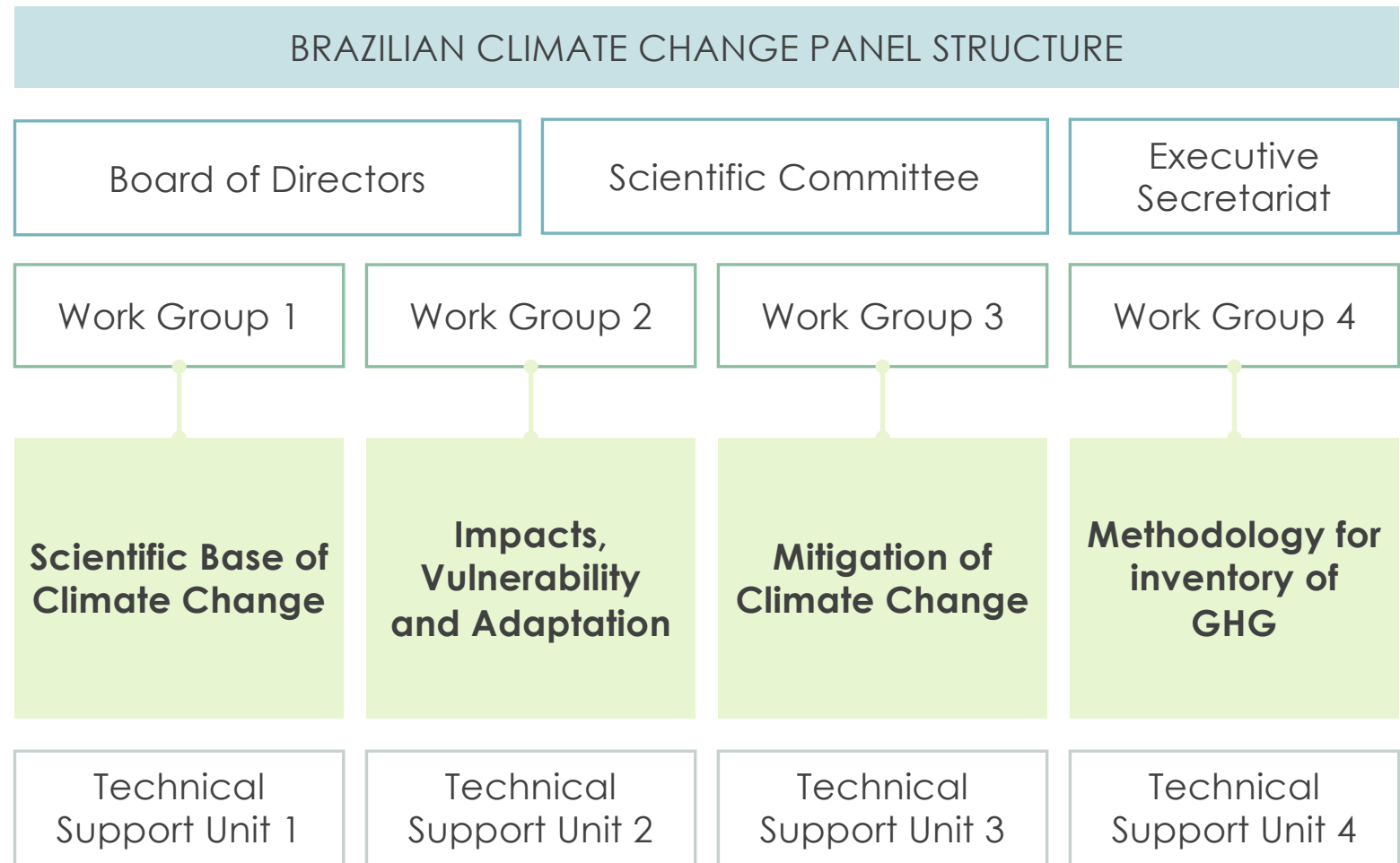
national level | brazilian panel on climate change

. organ created by the **Ministries of Science and Technology and of the Environment**

. Intergovernmental Panel on Climate Change (IPCC) as a model

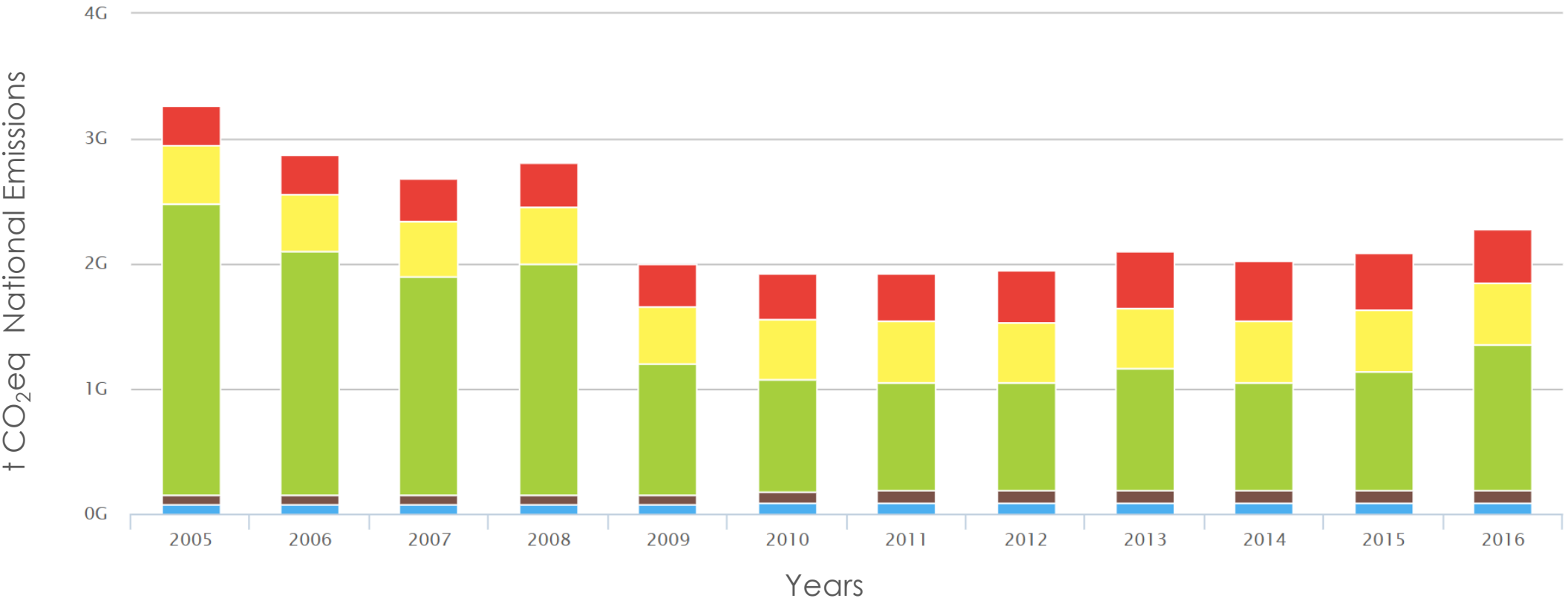
. provides **information** to policy-makers and society

(Portaria Interministerial No. 356, 2009)



[9]

national level | achieved results



Energy Agriculture and Livestock Land Use and Forestry Industry Waste

state level | state policy for climate change

- . published **before the national legislation**
- . commits to a **emission reduction of 20%** (ref. 2005) by 2020
- . produced the **Emissions Inventory** of the state and proposes **Strategic Environmental Assessments**
- . lack of recent publications

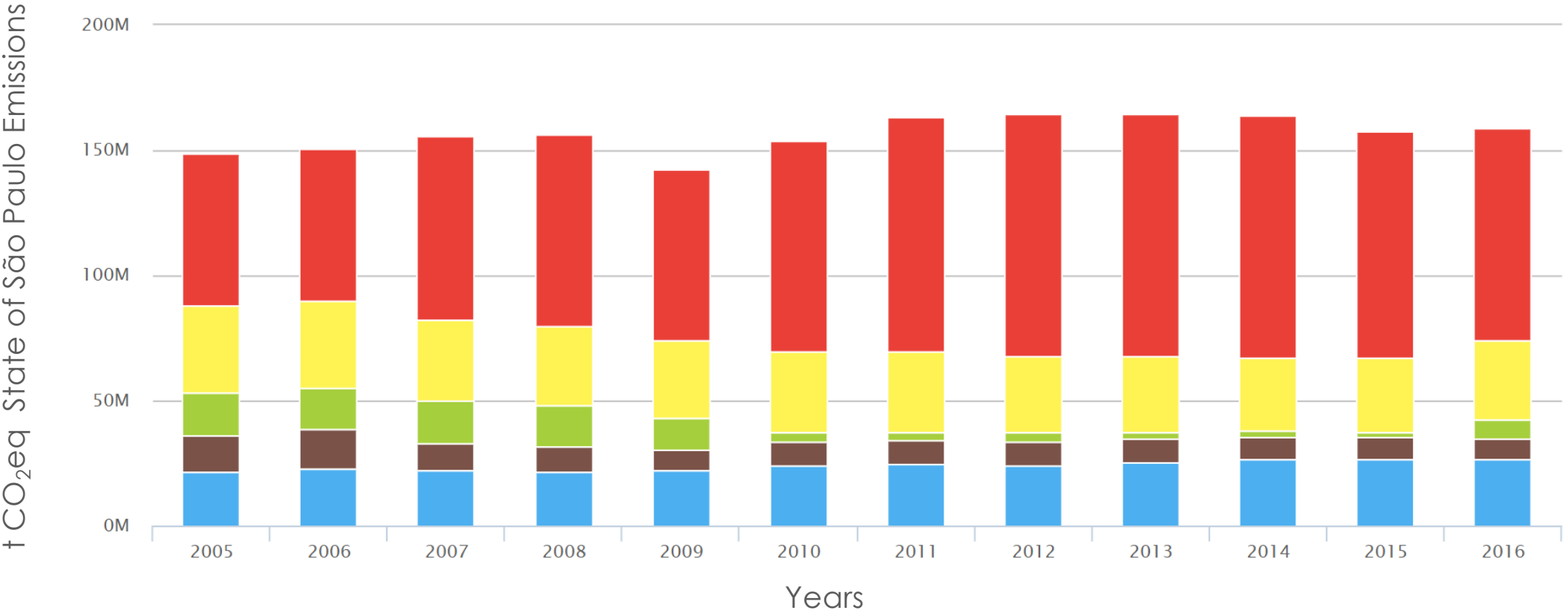


Desde o início do ano os moradores de São Paulo têm ido dormir sem saber se haverá água pela manhã em suas casas. Por meio de diferentes fontes, reunimos informações para levantar as causas, consequências e soluções para a crise hídrica que atinge o Estado.

[11]

... the **Participative Plan for Adaptation to Climate Change** is still being developed.

state level | achieved results



Energy Agriculture and Livestock Land Use and Forestry Industry Waste

municipality level | transnational network, laws and policies

- . participation in **transnational network**: ICLEI
- . participation **international events**, such as COP 15
- . **early elaboration of inventories, laws and policies**
- . **early commitment** and ambitious goals in terms of reduction of GHG emissions

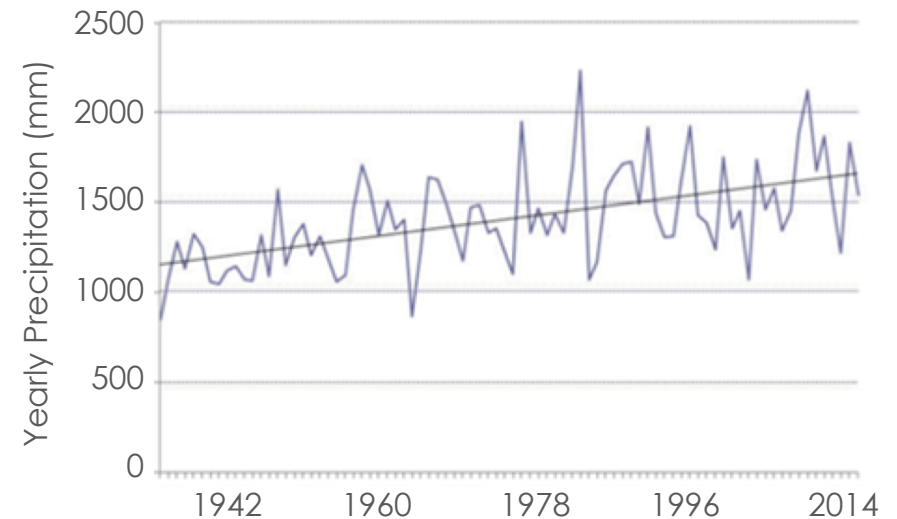


[13]

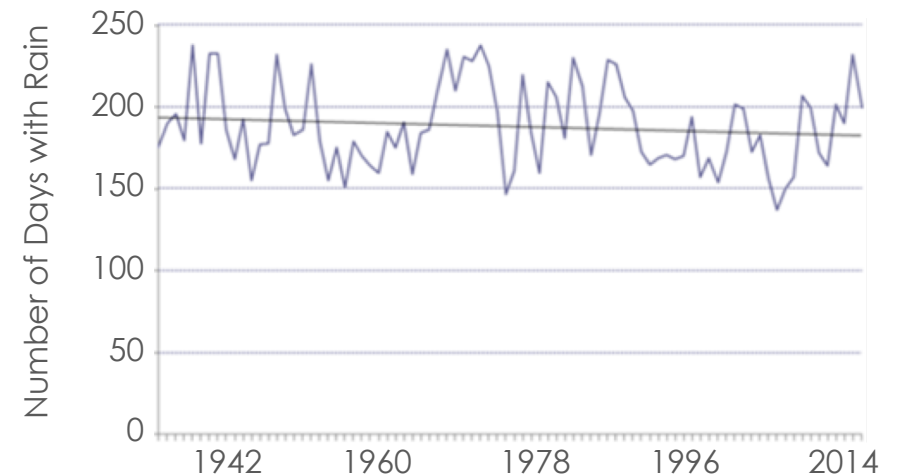
municipality level | action plan for mitigation and adaptation

- . Guidelines of the City of São Paulo Action Plan for the **Mitigation and Adaptation** to Climate Changes
- . efforts towards **reduced GHG** emissions and a more **resilient city**
- . delineates actions to **optimize each sector** mentioned in the Municipal Law

The plan reports **changes** that already took place due to climate change (e.g.: **rainfall regimes**, temperature, etc.) and alerts to the **risks** that result from these changes. An adaptation plan is needed to guarantee the safety of the population.

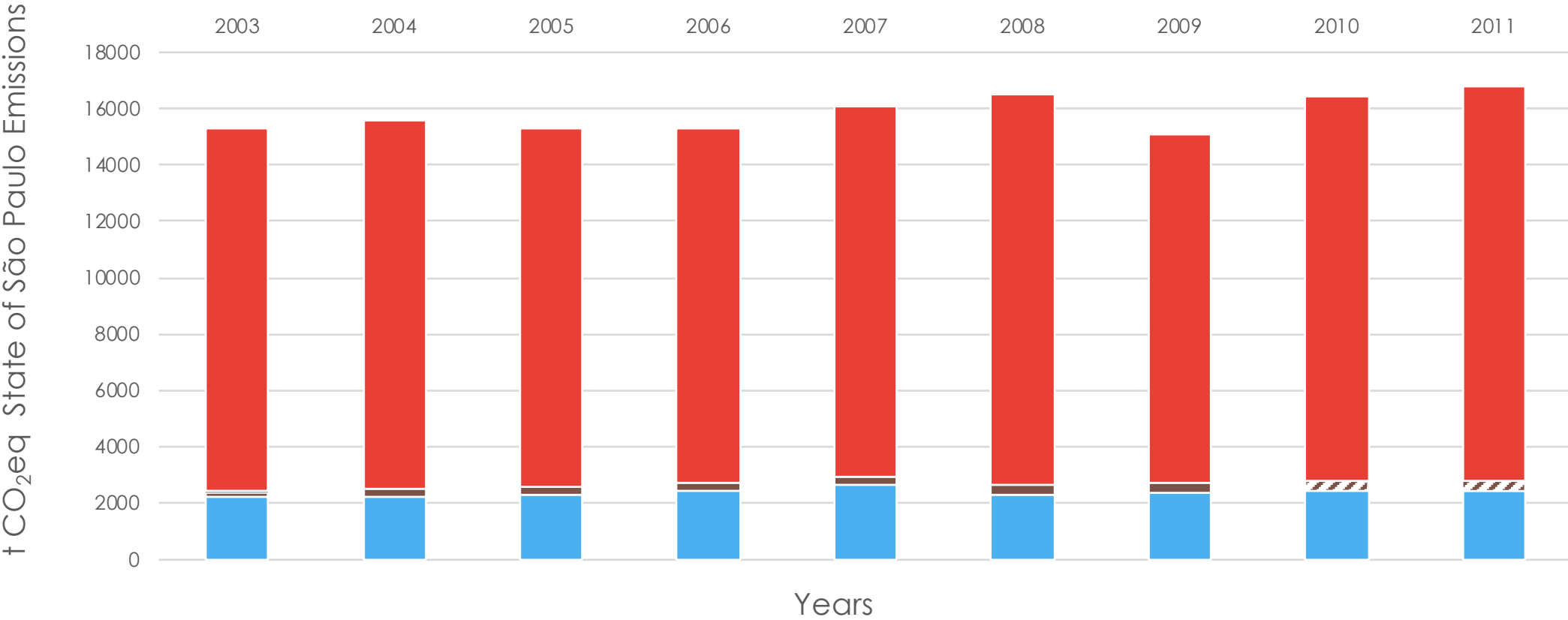


[14]



[15]

municipality level | achieved results



■ Energy
 ■ Agriculture, Livestock, Land Use and Forestry
 ■ Industry
 ■ Waste

* The hatched sections of the graphic indicates results not updated for the years 2010 and 2011.

coordinated action

E N V I R O N M E N T

shared responsibility

national level

state level

municipality level



- . possibility to assess environmental issues from **different perspectives** and within the **diverse scales**
- . possibility of **participative instruments** besides representative ones, allowing the civil society to contribute directly to the development and implementation of initiatives (Scardua & Bursztyn, 2003)



- . the integration among federal and sub-national policies is always **limited** by federal boundaries (Motta, 2011)
- . National Legislation **does not clarify how** the State and Municipal Levels should articulate their policies to the national one (Motta, 2011)

panorama

different administrations and political agendas : different positions on the climate change topic

2006 to 2012

- . focused on the **development of policies and strategies** (de Macedo et al., 2016)
- . active participation **in international events and networks** regarding global warming (de Macedo et al., 2016)
- . this regulatory progress had **little positive reflection** in the accounting of GHG emissions

2013 to 2016

- . development of the climate change policies was **not a priority in the political agenda** (de Macedo et al., 2016)
- . several of the actions implemented during his management may have a positive result regarding the decrease of GHG emissions and the adaptation to climate change, but the accounting may be complicated

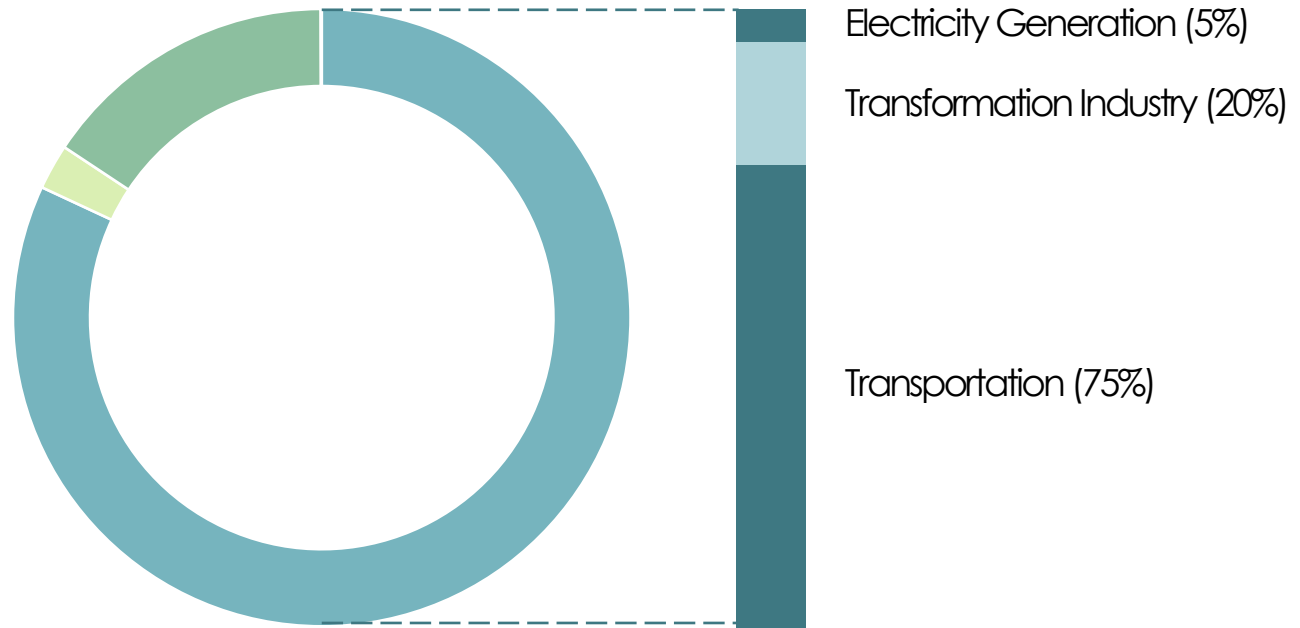


compromise : **connection** of these different approaches

mitigation

Mitigation actions focused on **transportation** (75% of the energy sector and over 60% within the total GHG emissions) and **waste management** (over 15% of total emissions) make the most sense within the municipality scope

CO₂eq Municipality Emissions (2009)



mitigation | bandeirantes landfill

- . usage of methane gas to **produce electricity**
- . first waste to energy project implanted in Brazil **certified by the CDM** (de Macedo et al., 2016)
- . many positive effects regarding **knowledge development, reduction of emissions and profit**

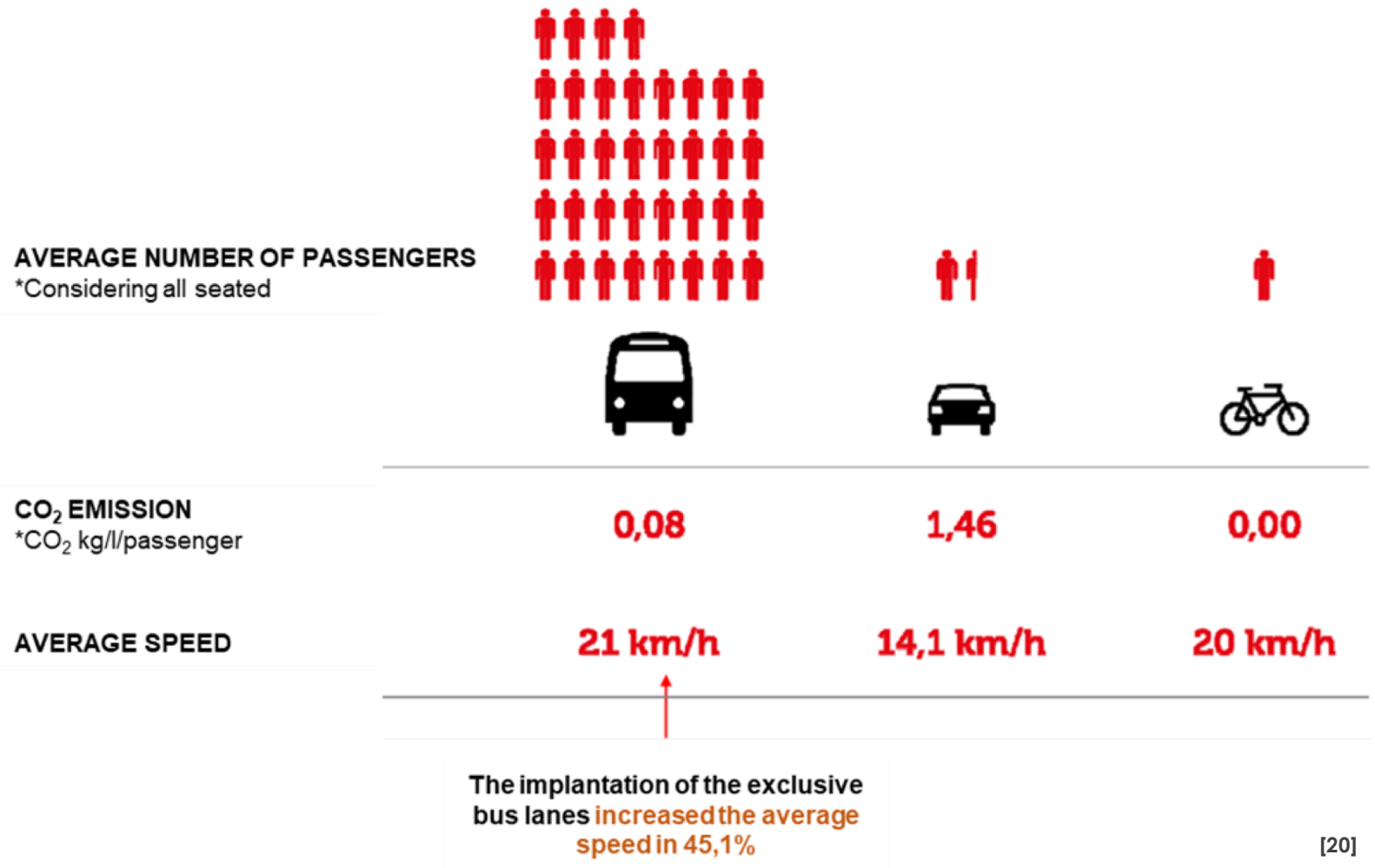


[19]

mitigation | mobility plan for São Paulo

. most of the travels in the Metropolitan Region are through **motorized individual transportation** (METRO, 2007)

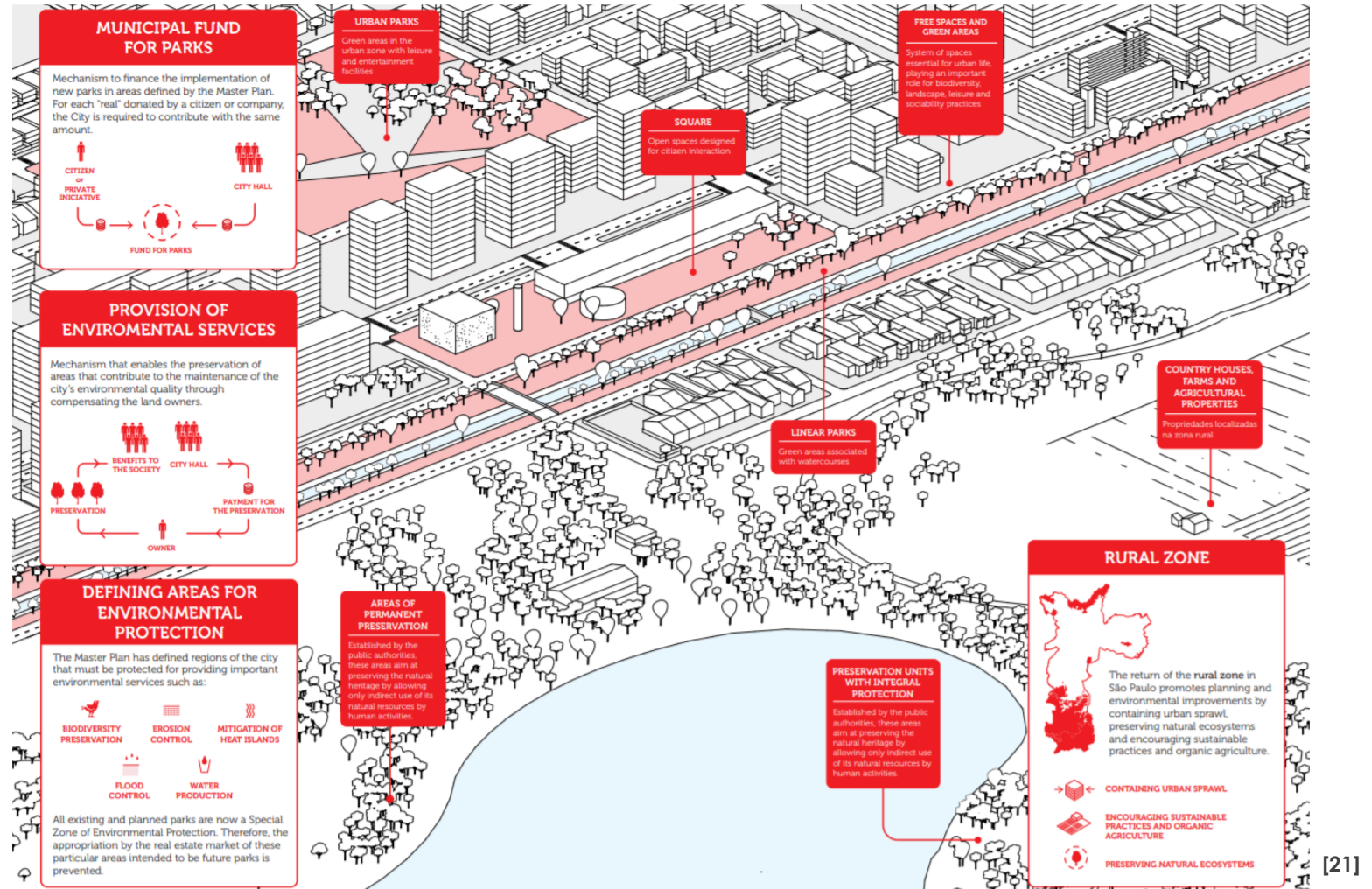
. strategies to improve the **quality of collective transportation** and incentive the **use of bicycles and walking commutes**



adaptation | strategic masterplan

adapt to a the effects of climate change means to **guarantee the safety and well-being of the city's residents**

the Strategic Masterplan for São Paulo's environmental dimension refers mostly to **climate change adaptation measures**

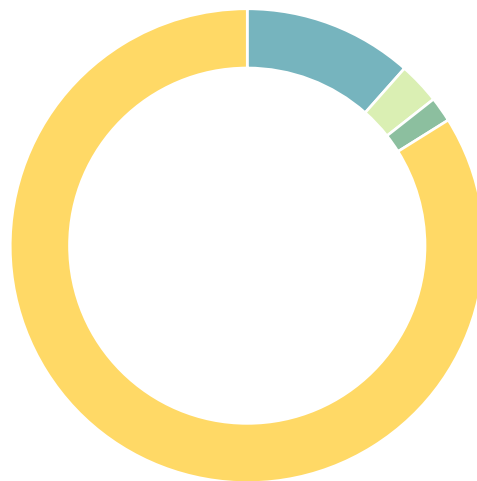


[21]

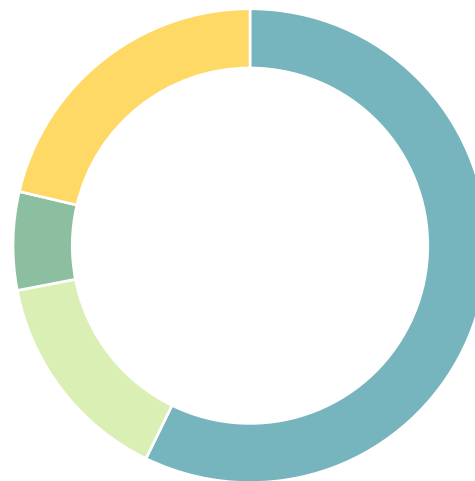
Lessons learned and how to proceed

- . scaling down the country's conditions does not generate a model of the conditions of the cities in it
- . smaller scales, with a limited number of stakeholders, **synergistic solutions** are more likely, and eventual **trade-offs will have a limited impact**

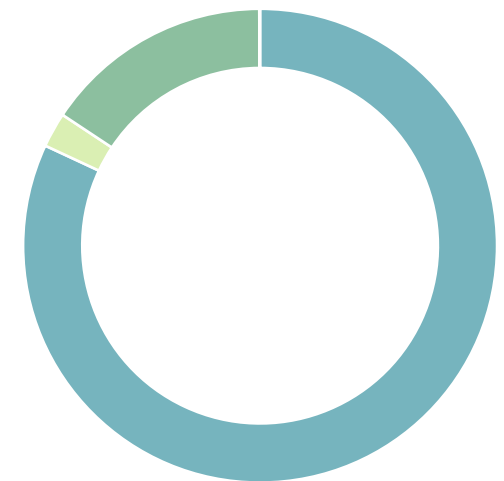
CO₂eq National Emissions (2005)



CO₂eq State Emissions (2005)



CO₂eq Municipality Emissions (2005)



■ Agriculture, forestry and other land use

■ Energy

■ Industry

■ Waste

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Fig.[3]: NASA. (1997). Measurement of surface temperatures for Atlanta, Georgia. Image retrieved on August 9th, 2018 from: https://commons.wikimedia.org/wiki/File:Atlanta_thermal.jpg

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Fig.[9]: Camara, C.M. (2018). PBMC Structure. Adapted from "O Painel Brasileiro de Mudanças Climáticas – PBMC", by PBMC, n.d., (<http://www.pbmc.coppe.ufrj.br/pt/organizacao/o-pbmc>).

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