

# ECONOMIC AND SOCIAL IMPLICATIONS OF GHG MITIGATION SCENARIOS IN BRAZIL UNTIL 2030

SUMMARY FOR  
DECISION MAKERS



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## INTRODUCTION

The IES-Brasil study has assessed the economic and social implications of different sets of GHG mitigation measures in Brazil up to 2030. Besides this focus, another difference to previous scenario exercises was its use of a Scenario Building Team (SBT), made up of experts from the government, private sector and civil society.

This group agreed upon assumptions for two scenarios with additional mitigation measures going beyond the extension of current governmental plans, one including measures costing up to US\$20/tCO<sub>2</sub>eq, and the other up to US\$100/tCO<sub>2</sub>eq. The study also assessed the macro-economic and social impacts in Brazil should a global carbon tax on burning fossil fuels be agreed, testing both US\$20 and US\$100 per tCO<sub>2</sub>eq.

Follows an overview of the main conclusions of IES-Brazil, grouped according to their corroborative or innovative nature.

In corroboration with previous studies, IES-Brasil concludes that:

1. The effort to regulate and decrease deforestation is the foremost element that will enable the country to meet its emissions reduction targets for 2020, established by law following the agreement made in Copenhagen. **The various governmental mitigation programmes already underway, should taper emissions at 1.27 billion tCO<sub>2</sub>eq in 2020**, which is similar to 2010 levels. This level is far **below the voluntary target** of around 2 billion tCO<sub>2</sub>eq in 2020.
2. **If no additional mitigation efforts are made, there is a tendency for emissions to rise between 2020 and 2030**, namely due to the increase in burning fossil fuels and agriculture & cattle raising activity.
3. **There is a huge potential to reduce national GHG emissions** through the implementation of a wide spectrum of mitigation measures, including: energy efficiency, renewable energy sources, low-carbon agriculture and cattle raising techniques, transport modal shifts, methane capture in the waste sector (landfills and sewage treatment plants), and reforestation with native and fast growth species.
4. **Large part of the mitigation measures are of low cost**, such as those in the agriculture & cattle raising sector, energy efficiency and increased utilisation of renewable energy sources like hydropower and sugarcane ethanol. Adopting these measures can result in a significant level of additional mitigation in relation to current governmental efforts, included and extended in the so-called *Governmental Plan Scenario* (GPS). These results can be seen in the scenarios *Additional Mitigation 1* (AM1) and *Additional Mitigation 1 plus Carbon Tax* (AM1+T).

If other measures are made viable, such as restoration of the Atlantic Forest, large-scale production of charcoal from planted forests, significant increase in intercity freight and urban passenger rail transport, it would be possible to reach a more ambitious level of mitigation. These measures were tested in the second set of mitigation scenarios *Additional Mitigation 2* (AM2) and *Additional Mitigation 2 plus Carbon Tax* (AM2+T).

5. **There are various barriers, both economic or financial, as well as non-economic (legal, regulatory and institutional) for implementing mitigation measures, and different means of overcoming them.** Such means include microeconomic instruments and command/control tools (scenarios AM1 and AM2), or a global tax on the burning of fossil fuels (scenarios AM1+T and AM2+T).

Considering the assumptions adopted to run the economic models used in the IES-Brasil study (such as significant economic growth throughout the period up to 2030), and the hypotheses and mitigation measures selected by the Scenario Building Team (SBT), IES-Brasil shows the following **macroeconomic and social implications of additional mitigation measures beyond the extension of the government plans already underway (GPS):**

1. **The selected mitigation measures, additional to those already underway, can contribute to an increase in economic growth, depending on the way in which they are implemented.**

If these measures were to be implemented solely with microeconomic instruments and command and control mechanisms of the **scenarios that do not consider a carbon tax, GDP would grow** more than in the GPS. However, should the selected measures be implemented with a carbon tax, the impact on GDP will depend of the tax level: up to US\$20/tCO<sub>2</sub>eq, GDP would not grow less than in the GPS, as shown in the result of AM1+T; but with a tax of US\$100/ tCO<sub>2</sub>eq, used in AM2+T, GDP growth would be lower than in GPS, as a result of the decrease in total economic activity due to the tax levied on all countries.

2. **Unemployment rates fall in all additional mitigation scenarios.** In scenarios without carbon tax, this is due to the increase in GDP and in scenarios that include a carbon tax, this results from the assumption that all revenue collected from the tax on burning fossil fuels would be used to relief payroll taxes, in order to foster employment even with a reduction in global and national economic activity generated by levying the tax. In both cases, renewable energy production is responsible for the most job openings.
3. **The selected additional mitigation actions contribute to an increase in average annual household income in all additional mitigation scenarios,** with the largest gain for the poorest families, contributing to a small **improvement in the distribution of income.**
4. **In scenarios with the selected additional mitigation actions, there is an increase in the level of prices** compared to the GPS. This is due to the lower level of unemployment that guarantee better salaries, higher production costs, and as a result, higher prices.
5. **The selected additional mitigation actions have a positive impact on purchasing power,** even given the increase in the level of prices. In the scenarios that consider a global carbon tax, only the richest class would lose purchasing power compared to the GPS, while the purchasing power of the low and middle income classes would remain higher than in the GPS. In the scenarios that do not consider a global carbon tax, the gains in purchasing power are higher for all classes.
6. **In scenarios with the selected additional mitigation actions, there is a slight decrease in total investment and the investment rate,** the reasons for which are distinct between the scenarios that do and do not consider a carbon tax. In the scenarios with no carbon tax, this fall is a consequence of the loss of industry competitiveness due to the increase in prices. In the scenarios that do consider a global carbon tax, the fall compared to the GPS is due to a reduction in global and national economic activity.

7. **The Brazilian trade surplus falls compared to the GPS in scenarios including the selected additional mitigation actions without a carbon tax**, namely due to the increase in the level of prices that reduces the competitiveness of the Brazilian industry.

In scenario AM1+T the Brazilian foreign trade surplus is almost the same as in GPS, while in the **more ambitious scenario with carbon tax (AM2+T) the trade surplus almost doubles compared to the GPS**. In this case, the higher trade surplus is due to the increase in competitiveness of national industry on account of its lower carbon footprint in the production of energy intensive goods (including chemical products, non-ferrous metals, pulp & paper and steel), reducing the imports of some products (such as non-ferrous metals) and increasing the exports of others (such as pulp & paper).

8. **In the period between 2015 and 2030, total investments in the selected additional mitigation actions** of US\$ 45 billion would be necessary for the implementation of the AM1 and AM1+T scenarios, and of US\$ 169 billion for the AM2 and AM2+T scenarios (2005 values). The GDP increase generated in the same period would total US\$ 83 billion in the AM1 and US\$ 277 billion in the AM2 (2005 values).
9. **The selected additional mitigation actions result in a significant reduction of emissions by 2030. This reduction is of 21,7% in the AM1 and AM1+T scenarios, and of 38,5% in the AM2 and AM2+T scenarios, compared to the GPS** (see Figure 1).

**Without adopting new mitigation measures, emissions in the GPS start to grow from 2020, with an increase in emissions particularly in the Energy and Agriculture & Cattle-raising sectors.** This increase could result in 1.67 billion tCO<sub>2</sub>eq in 2030, which is above the 1990 emissions level, but still below the 2005 level.

In the **Additional Mitigation 1** scenario, with the implementation of a selection of significant additional mitigation actions, **emissions in 2030 would be in the order of 1.3 billion tCO<sub>2</sub>eq**, keeping national emissions 5% lower than the 1990 level.

In the **Additional Mitigation 2** scenario, the implementation of a selection of more ambitious mitigation actions would allow the country to continue on a trajectory of decreasing emissions, which, in 2030 would reach approximately **1 billion tCO<sub>2</sub>eq**, 25% lower than the 1990 level.

10. The scenarios illustrate a **future dynamics of partial decoupling between economic growth and the evolution of GHG emissions in the country**. With the reduction in national population growth rate until stabilisation around 2040, even in a scenario of high economic growth, **the mitigation measures already underway in the GPS should enable a stabilisation of emissions between 2010 and 2020 and a moderate increase between 2020 and 2030, well below the rate of growth in the economy. The selected additional mitigation measures could enable the country to reach a level of 51-65% of the 2005 emissions level in 2030**. The ratio between emissions and GDP (measured in tCO<sub>2</sub>eq/million US\$ of 2005), which was halved from 2 to 1 tCO<sub>2</sub>eq per US\$ million between 2005 and 2010, would be 0.66 in the GPS, 0.5 in AM1, and 0.4 in AM2, in 2030 (see Figure 2).

Figure 1 - IES-Brasil – Evolution of Emissions across all scenarios 1990-2030

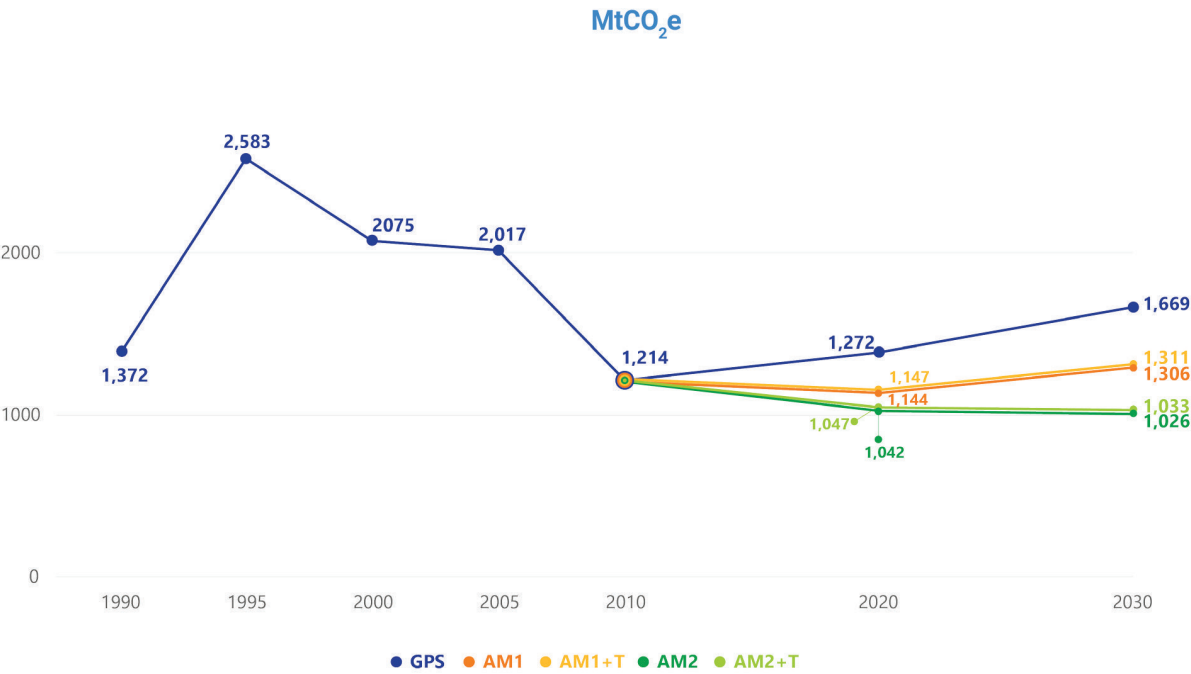
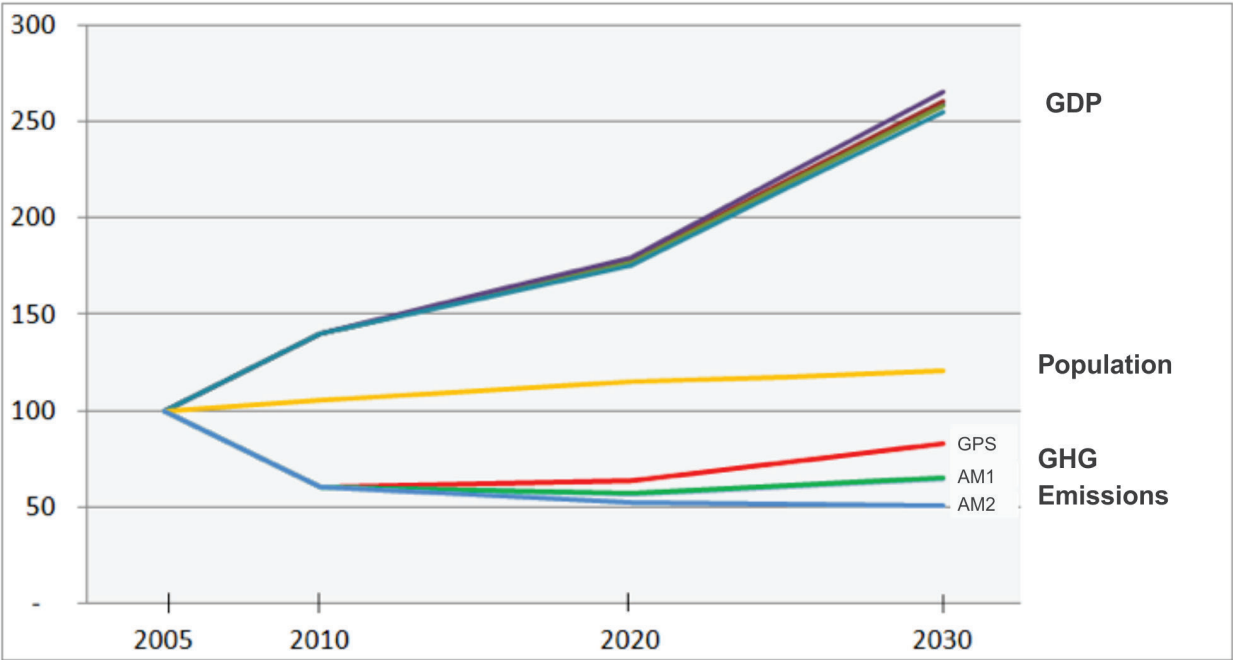
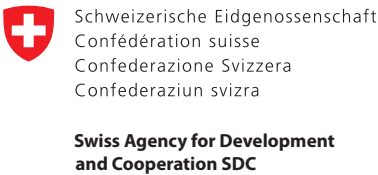


Figure 2 - IES-Brasil –Population, GDP and GHG Emissions across all scenarios 2005 – 2030 (base:2005=100)



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