# An input-output analysis of the key drivers in $CO_2$ emissions from a supply perspective: an application to the Brazilian states

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## 1. Overview of the Project

There is rarely a simple path between production and emissions, complicated by increasingly fragmented production chain that have resulted in economies becoming more dependent on transportation systems – a further and an increasing source of $CO_2$ emissions. Hence, the contribution of the diverse productive sectors to $CO_2$ emission will be established, considering the technological structure of the economy, the interrelations among sectors, and the sectoral capacity of generating value-added (especially income to employees). The nature and structure of the production interdependence, income and consumption will be important factors in determining the economic dynamics of a region. Further, In Brazil, there are significant income and production inequalities that exist in the country, both within regions (intraregional) and between regions (interregional).

The research project will build a model capable of simulating the impact of a different policies on the Brazilian economy, focusing on dimensions such as spatial (national, regional), social (income distribution) and sectoral (different industries). The primary value-added of the research will be

the identification of the "key" agents responsible for $CO_2$ emissions. To achieve this goal, the environmental components (initially, with a focus on $CO_2$ emissions) will be harnessed to an inter-regional input-output matrix (showing the links between the 27 states of the Federation) that differentiates between 68 productive sectors for 2015.

## 2. Research in Progress

The economic model is nearing completion; attention is now focused on harnessing environmental data, especially emissions, to the economic sectors in the model. The primary sources of emissions' data will come from the Greenhouse Gas Emissions and Removals Estimation System (SEEG), an initiative by the Climate Observatory that involves the production of annual estimates of greenhouse gas emissions in Brazil, analytical documents on the evolution of emissions, and a digital platform hosting the system's data and methodology. Over the next several months, the integration of the economic and emissions' data will be the primary focus of attention.

## 3. Next Steps

Once the model integration is complete, the combined system will be used to Identify the "key" agents (*i.e.* productive sectors, households) responsible for $CO_2$ emission. We will focus on the impact of an increase in the value-added of the different productive sectors on total $CO_2$ emissions and identify the productive sectors and regions responsible for the increase in $CO_2$ emissions when there is an increase in the income of the economy. The approach shows the contribution of the various agents and regions to $CO_2$ emission from a production perspective and allows us to identify the agents and regions that deserve more consideration for investment in mitigation policies. The analysis will be able to identify whether the notion of a pollution haven (location of more polluting activities in less developed regions) has operated in Brazil. The final phase of the project will explore the impact of policies such as carbon taxes not only on the production system but also their impacts of different sectors and regions. The final initiative will explore the impact on income inequality at the regional and personal levels.