

Colombia introduces carbon tax



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**C**olombia's carbon tax, which was passed into law in 2017, is likely to be the most effective policy measure to help the South American country steer its economy towards a lower-carbon development path. This will offset the two other key factors that might otherwise cause the country's greenhouse gas (GHG) emissions to rise: the falling cost of mining coal, and the fact that the country will eventually reach the limits of its hydroelectric power potential.

Even though Colombia's GHG emissions profile is low, relative to global emissions patterns, this is likely to increase if it continues on its current development trajectory. The country still has about 92 years' worth of coal reserves, a resource that will buffer the country against the impact that climate change will have on its water sources, upon which the country's hydroelectricity supply depends.

However, a team of economists and engineering scholars, one of which is Professor Santiago Arango-Aramburo with the School of Mines from Universidad Nacional de Colombia, has worked with the country's National Planning Commission (NPC) to design a carbon tax that they estimate will reduce the country's emissions by 45% by the middle of this century.

These researchers worked over a four-year period to model the potential impact of carbon taxes on the country's gross domestic product (GDP), and to test how emissions targets might reduce carbon-based energy use and drive lower sectorial consumption of energy. The policy recommendations that came out of the analysis worked as inputs for the tax reforms that were enacted in 2017, and were published in the journal *Energy Economics* in 2016. Colombia only contributes about 0,35% to global emissions, based on 2005 figures, and accounts for 3,4% of Latin America's GHG emissions, according to the researchers. In 2004, the energy sector was the second largest source of GHG emissions in Colombia,



*Colombia's new carbon tax could discourage the exploitation of the country's cheap coal reserves, thereby contributing to reducing the country's carbon emissions.*

contributing 37% of country's total emissions. This is in spite of the fact that the energy sector gets 76% of its electricity from hydropower.

However, the largest source of Colombia's emissions is from agriculture, land-use change, and forestry, which together account for 52% of the country's GHG profile. Other important sectors that contribute to Colombia's emissions are waste, which produces 6% of emissions, and industrial processes, which account for another 5%. Projecting the country's likely future energy growth needs, researchers found that the largest energy demands will come from the fossil fuel-based transport system, and the energy sector that is expected to capitalise on its large coal reserves in order to meet its power generation demands.

The modelling process, which was done with the support of the CLIMACAP-LAMP Project, suggested that the greatest potential for reducing Colombia's carbon emissions lay in interventions in its electricity generation sector. The CLIMACAP is the 'Integrated Climate Modelling and Capacity Building Project in Latin America'. It received the support of the European Commission and its aim was to analyse the effects of emissions mitigation strategies in Latin America. The LAMP Project was a similar initiative that received support from the United States' Environmental Protection Agency and the US Agency for International Development.

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The suggested interventions in the Colombian electricity generation sector include topping up the grid's renewable energy contribution from wind and hydro energy power. The analysis also recommends that additional emissions cuts will result from introducing biomass, along with technologies that allow for the capture of carbon from the atmosphere - carbon capture and storage, or CCS - alongside coal and gas use.

A combination of these strategies could result in Colombia becoming a carbon-neutral country through de-carbonising the electricity grid. However, the carbon taxes will result in some Gross Domestic Product (GDP) losses, although the size of these losses will depend on what authorities do with the revenue collected from the carbon tax, says lead researcher Arango-Aramburo.

How widely renewable energy is adopted will also depend on whether the cost of these technologies is competitive in a market environment, given that they will have to compete with traditional fossil fuel-derived sources of electricity. 'In order for the renewable energy market to be competitive, it will need to generate extra sales, and the country will need to take away some of the barriers to accessing the network,' says Arango-Aramburo.

A grid that relies on renewable energy needs additional capacity, so that energy suppliers can guarantee reliable supply, in spite of the variability of the energy source, such as cloud cover disrupting solar supply, or a lull in wind around wind farms. By implementing the carbon tax, researchers believe that this policy may promote the entry of renewables in the Colombian energy market and reduce the energy demand.

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#### Researchers involved

Santiago Arango-Aramburo.

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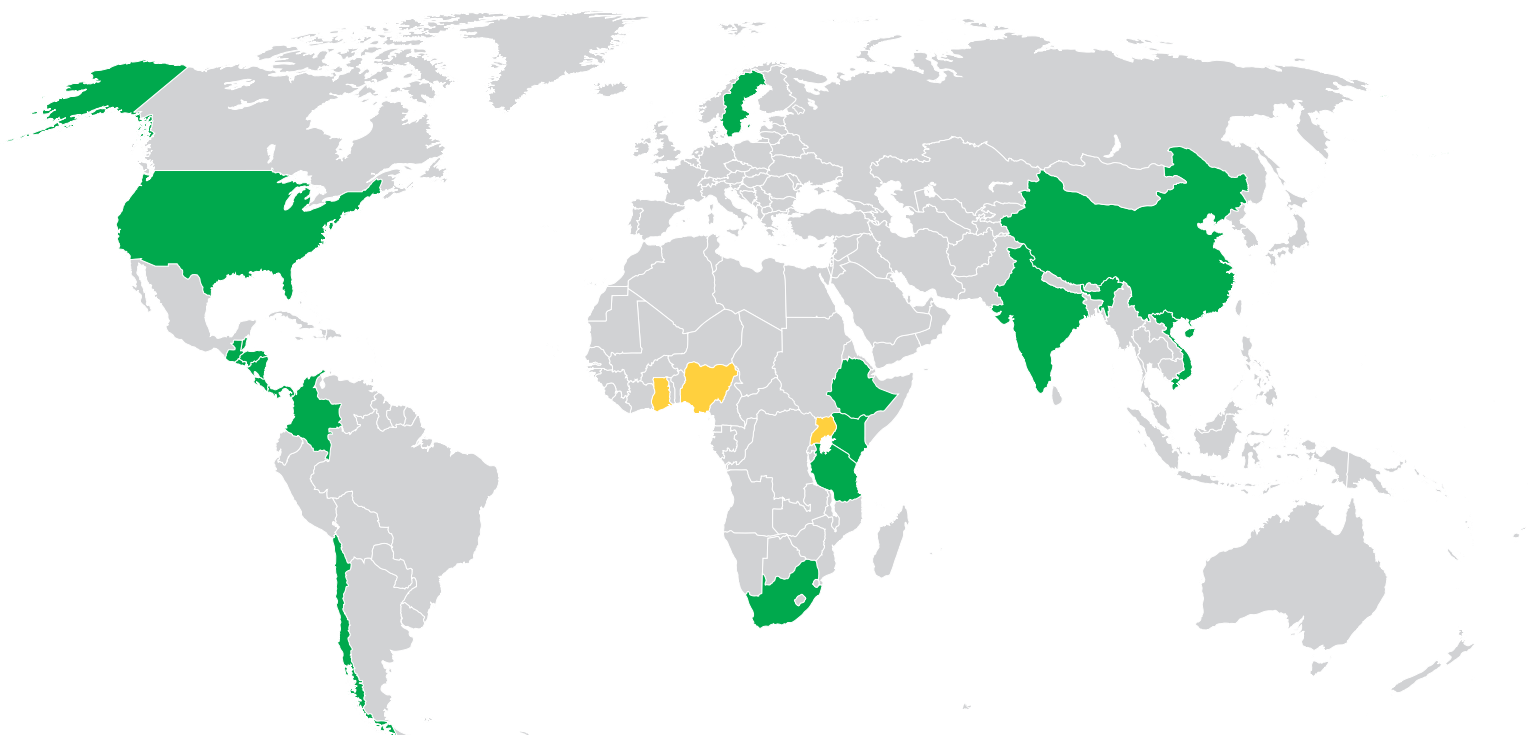
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