Climate change efforts backfire in Brazil's steel industry

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New research shows that climate change mitigation efforts in Brazil's steel industry have failed. Instead of reducing greenhouse gas pollution, scientists discovered that programs under an international climate treaty led to an overall doubling of carbon dioxide emissions in the industry.

The study, "Carbon emissions due to deforestation for the production of charcoal used in Brazil's steel industry," was published in the February 9 online edition of the journal *Nature Climate Change*.

"In an attempt to reduce CO2 emissions, Brazil's steel industry is transitioning from coal to carbon-neutral charcoal sourced from plantation forests," says Laura Sonter, a scientist at the University of Vermont and the lead author on the new study.

"Our study found that increased global demand for steel, and a lack of available plantation forest in Brazil, increased the industry's use of charcoal sourced from native forests, which is not carbon neutral and emits up to nine times more CO2 per ton of steel than coal," said Sonter, formerly from The University of Queensland's Sustainable Minerals Institute and currently at UVM's Gund Institute for Ecological Economics.

The findings show that increased native charcoal use in steel production doubled the industry's CO2 emissions from 91 million to 182 million metric tons of CO2 between 2000 and 2007, despite an overall decline in coal use during this time, said Chris Moran, the study's co-author, and

director of UQ's Sustainable Minerals Institute.

"Our findings are significant because the steel industry generates about seven percent of global anthropogenic CO2 emissions," Moran said.

The initiative to move to plantation charcoal from coal in Brazil's steel production emerged from financial incentives under the 1997 global climate treaty, the Kyoto Protocol. These incentives, through the so-called "Clean Development Mechanism" established in the treaty, earned Brazil valuable credits for some of the plantation forests used in its steel production.

But the steel industry doesn't exist in a policy or economic vacuum. "This outcome is attributed to narrow implementation of climate change mitigation mechanisms," Moran said. "It's a failure to see the steel industry as part of a broader system involving other land users generating CO2 emissions."

And other steel-producing countries face similar carbon-accounting risks like those experienced by Brazil, the scientist conclude. Most worrisome, China produced nearly half of the world's steel in 2012, and, like Brazil, Chinese steel production also qualifies for credits under the Kyoto Protocol.

While the strategy of using plantation-forest-sourced charcoal can be effective in reducing CO2 emissions, the team of four scientists note, policies need to comprehensively account for all emissions, particularly those from changes in land use, and not be applied to specific industries in isolation.

The scientists suggest adopting "wall-to-wall" carbon accounting in order to capture all carbon sources and sinks across landscapes—so that emissions reductions by industries do not lead to increased emissions

elsewhere.

These findings come at an important time as policy makers are preparing for the 21st session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in Paris later this year, where strict emission targets are expected to be set in an attempt to limit global temperature increases to two degrees above pre-industrial levels.

More information: Carbon emissions due to deforestation for the production of charcoal used in Brazil's steel industry, DOI: 10.1038/nclimate2515

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