

Carbon taxes can be both fair and effective, study shows

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Putting a price on carbon, in the form of a fee or tax on the use of fossil fuels, coupled with returning the generated revenue to the public in one form or another, can be an effective way to curb emissions of greenhouse gases. That's one of the conclusions of an extensive analysis of several versions of such proposals, carried out by researchers at MIT and the National Renewable Energy Laboratory (NREL).

What's more, depending on the exact mechanism chosen, such a tax can also be fair and not hurt low-income households, the researchers report.

The analysis was part of a multigroup effort to apply sophisticated modeling tools to assess the impacts of various proposed carbon-pricing schemes. Eleven research teams at different institutions carried out the research using a common set of starting assumptions and policies. While significant details differed, all the studies agreed that carbon taxes can be effective and, if properly designed, need not be regressive.

An overview report on the 11 studies appears today in the journal *Climate Change Economics*, along with reports on the individual team results. The MIT and NREL team included former MIT postdoc Justin Caron, MIT Joint Program on the Science and Policy of Global Change Co-Director John Reilly, and Stuart Cohen and Maxwell Brown of NREL.

Reilly, who is a senior lecturer at MIT's Sloan School of Management, says the groups looked at several options for a [carbon tax](#) and use of the

resulting revenue. They considered two different starting values (\$25 and \$50 per ton of carbon emissions produced), and two different rates of increase (1 percent or 5 percent per year), as well as three different approaches to dispensing the revenue: an equal rebate to every household, a tax break for individuals, or a corporate tax break.

Of the different levels of fees, the team found, not surprisingly, that the highest starting value and the highest rate of increase produced the greatest emissions reductions. But the study showed that even the lowest taxation rates could in themselves lead to reductions sufficient to meet the U.S. near-term commitment under the 2015 Paris Agreement on climate change, Reilly says.

However, the most efficient way of achieving those reductions, in terms of overall impact on the economy, is to use the revenue to reduce taxes on capital—corporate profits or investment income. Given the relatively high capital taxes in the U.S. (at the time this study was completed) such cuts spur economic growth more than cuts in other taxes or direct rebates to households. However, that option is also the most regressive, with its impact disproportionately falling on lower-income households.

At the other extreme, the option of sending equal payments to everyone was found to be the least efficient for the overall economy, but also the least regressive. Individual tax breaks came in somewhere in between on both criteria.

But the researchers say another scenario, combining the basic strategy of providing tax breaks to corporations but adding a rebate to the low-income families most affected by the tax, could virtually eliminate the regressive aspects of the tax at very little cost in overall efficiency, and thus might be the most appealing option. It could have appeal both for conservatives concerned about the costs of such a program, and for liberals concerned about its possible impacts on those at the lower end of

the economic spectrum.

"It's sort of an obvious solution," Reilly says, "to take some chunk of the money and use it to focus on the poorest households, and use the rest to cut taxes. It doesn't seem like a hard thing." He continued: "It is important to realize that this study was completed before the tax reform that took effect in January that slashed corporate income tax rates. Given that these tax rates have now been cut, and that those cuts will contribute to a growing deficit, we might better consider the revenue as a contribution to closing the deficit."

Reilly's team used an economic model developed at MIT to assess the impacts of different policies on the world's likely climate trajectory, and combined that with a model of the nation's electrical system, developed at NREL. This combination allowed the team to do a much more detailed assessment of the way different policies would affect decisions by the power producers and distributors—a key point, since the electricity sector has the most immediate potential for changes that could reduce emissions, and is the biggest contributor to emissions overall.

While some versions of the carbon-pricing plan were found to be more efficient overall in terms of their impact on the economy, the study found that those impacts are actually quite modest—even without taking into account potential advantages such as better health due to lowered pollution levels. The least-efficient policies still achieved significant emissions reductions, with an overall impact of just four-tenths of a percent on economic growth. For the more efficient options, the same reductions could be achieved at zero cost, or even a net gain to the economy, the researchers found.

Their analysis indicates that starting with a \$50 per ton carbon tax and increasing it by 5 percent per year would lead to a 63 percent reduction in total U.S. [greenhouse gas emissions](#) by 2050, Reilly says. "So that's in

line with what people are talking about, which is needing a 50 percent reduction by 2050, globally," he says, "and getting to net zero beyond that."

Caron, the paper's lead author, who was an MIT postdoc during most of this research but is now a professor at HEC business school in Montreal, says that all of the different research teams largely found similar results, though there were differences in the details. "Qualitatively, we all agree on many of the main conclusions." That includes the fact that carbon taxes can indeed be an effective way to curb emissions.

"By taxing carbon," Caron says, "we will collect a lot of money that can be used to supplant other taxes that we like less. Why tax something that we like?" And, he adds, by using just a small portion of that revenue—less than 10 percent—it's possible "to compensate the lower-income people and neutralize the regressivity."

The actual Paris agreements involved a range of different targets by different nations, but overall, Reilly said, the carbon-pricing scheme is predicted to exceed the targets for emissions reductions for 2030 and 2050, "so that's a healthy reduction." But even at the lowest end of the policies they studied, with a \$25-per-ton initial tax, "that "would be adequate to meet the U.S. pledge in Paris" for 2030. But the rate of increase is important, the study says: "Five percent a year is sufficient. One percent a year is not."

Reilly says "all these tax scenarios at worst meet U.S. commitments for 2030, and the \$50 tax is well exceeding it." Many experts say the Paris Agreement alone will not be sufficient to curb catastrophic consequences of global [climate change](#), but this single measure would go a long way toward reducing that impact, Reilly says.

More information: JUSTIN CARON et al, EXPLORING THE

IMPACTS OF A NATIONAL U.S. CO₂ TAX AND REVENUE RECYCLING OPTIONS WITH A COUPLED ELECTRICITY-ECONOMY MODEL, *Climate Change Economics* (2018). [DOI: 10.1142/S2010007818400158](https://doi.org/10.1142/S2010007818400158)

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