Study suggests aggressive carbon taxation could help US meet targets in Paris agreement

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Nearly all the countries of the world ratified the Paris Agreement in 2016. The accord aims to limit the increase of the world's temperature to less than 2 degrees Celsius above pre-industrial temperatures. To do this, global greenhouse gas emissions would have to decrease roughly 25% below 2010 levels by 2030 and reach almost zero by 2070. As one of the

largest emitters of greenhouse gases, the United States—which intends to withdraw from the Paris Agreement—will play a central role in whether these targets are met.

In this context, a new study looked at U.S. tax policy as it relates to carbon dioxide (CO_2), from 2015 through 2030. The study found only limited short-term opportunities for decarbonization (reducing greenhouse gas emissions) outside the electricity sector. The result is substantial CO_2 tax revenue. The findings shed light on future tax policy decisions.

The study, conducted by researchers at Carnegie Mellon University (CMU), appears in *Environmental Research Communications*.

"Our findings point to clear opportunities to replace revenue from distortionary taxes (like the income tax) with revenue from carbon taxes, which enhance the efficiency of the U.S. economy." says Nicholas Muller, Associate Professor of Economics, Engineering, and Public Policy at CMU's Tepper School of Business, who coauthored the study.

The researchers used an energy-optimization model to simulate energy use by sector, fuel type and technology, system costs, and pollution emissions under two carbon tax policies. Their analysis included CO_2 emissions as well as emissions of local air pollutants such as sulfur dioxide, nitrogen oxides, and particulate matter.

The study found that opportunities for significant reductions of CO_2 in the short-term were limited to the electric-generation sector. As such, the other sectors subject to carbon taxation continued emitting. This will produce substantial carbon tax revenue. In total, revenues amounted to between 8% and 34% of all federal income tax revenue. Because carbon taxes provide strong incentives for innovation in low-carbon technologies, the authors project that enduring carbon taxes will enhance

abatement in other sectors which will reduce future revenue.

Deep uncertainties in the climate system and the future effects of climate change on human civilization mean that the correct carbon tax rate is not known. Acknowledging this uncertainty, the authors explored the consequences of erroneous CO_2 taxes. They found that it would be four times more costly to the economy to under tax CO_2 than to over tax it, which they argue makes the case for invoking the precautionary principle (erring on the side of more aggressive CO_2 policy rather than lax policy) on the grounds of efficiency.

"The reductions in CO_2 emissions that we project would put the United States on track to meet the nationally determined contributions established under the Paris Agreement," says Michael Buchdahl Roth, doctoral student in the Department of Engineering and Public Policy at CMU. "But our results also suggest a need for cost-effective low carbon technology innovation that would allow decarbonization beyond the electricity generation sector. It's possible that the dynamic incentives that result from imposing environmental taxation could spur such technological developments."

More information: Michael Buchdahl Roth et al, Near term carbon tax policy in the US Economy: limits to deep decarbonization, *Environmental Research Communications* (2020). DOI: 10.1088/2515-7620/ab8616

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