Tax policy may not be enough to combat climate change

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A new paper in *The Review of Economic Studies* indicates that carbon taxes will be less effective at reducing carbon emissions than previously thought. It also finds that tax interventions needed to achieve goals agreed upon in the Paris Climate Agreement of 2016 will need to be larger than previously thought.

There is growing interest among researchers and policymakers in using economic policy to reduce or eliminate carbon dioxide emissions. Policy can reduce carbon emissions in several ways, including pushing the economy towards cleaner sources of energy and decreasing overall energy use.

The researchers here studied the impact of climate policy on total energy use and found that policy-induced reductions in energy use take significantly longer than predicted in existing models. They argue that improvements in energy efficiency technology are an important component of reductions in energy use, but that technological adjustment takes time. The world will not see the benefits of policy immediately.

The researchers developed a model of economic growth and energy efficiency with endogenous technical change to study the impact of climate change mitigation policies on energy use. They argue that this model can accurately recreate patterns of energy use and economic growth observed in the data, and show that the standard model economists use to evaluate climate policy cannot. This is because the standard model does not account for the slow-moving nature of technological progress.

As a result, the standard model overstates the reduction in cumulative energy use achieved by a given energy tax. The results show that policies designed to meet the Paris Agreement target in the standard model miss the target by a significant amount in the newer model that accounts for slow-moving technology dynamics. The newer model requires significantly higher taxes to achieve the target.

The researchers also examined the impact of research and development subsidies meant to improve energy efficiency. They find that combining these policies with taxes helps meet environmental targets at the lowest

cost to the economy. However, these policies are not as effective at decreasing energy use on their own. Subsidies might lead to an initial round of improvements in energy-efficient technologies, but later the incentive for subsequent research and development is reduced.

"In order to achieve environmental policy goals, taxes on energy will need to be higher than previously thought," said the paper's lead author, Gregory Casey. "This is because the impact of taxes on total energy use happens more slowly than suggested by earlier modeling approaches. I only study one facet of climate policy, and I hope that the results will help improve the next generation of climate-economy models."

More information: Gregory Casey, Energy Efficiency and Directed Technical Change: Implications for Climate Change Mitigation, *The Review of Economic Studies* (2023). DOI: 10.1093/restud/rdad001 academic.oup.com/restud/articl … .1093/restud/rdad001

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