Want to cut emissions that cause climate change? Tax carbon

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Putting a price on producing carbon is the cheapest, most efficient policy change legislators can make to reduce emissions that cause

climate change, new research suggests.

The case study, published recently in the journal *Current Sustainable/Renewable Energy Reports*, analyzed the costs and effects that a variety of policy changes would have on reducing carbon dioxide emissions from electricity generation in Texas and found that adding a price, based on the cost of climate change, to carbon was the most effective.

"If the goal is reducing carbon dioxide in the atmosphere, what we found is that putting a price on carbon and then letting suppliers and consumers make their production and consumption choices accordingly is much more effective than other policies," said Ramteen Sioshansi, senior author of the study and an integrated systems engineering professor at The Ohio State University.

The study did not examine how policy changes might affect the reliability of the Texas power system—an issue that became acute and painful for Texas residents last month when a winter storm caused the state's power grid to go down.

But it did evaluate other policies, including mandates that a certain amount of energy in a region's energy portfolio come from renewable sources, and found that they were either more expensive or not as effective as carbon taxes at reducing the amount of carbon dioxide in the air. Subsidies for renewable energy sources were the also not as effective at reducing carbon dioxide, the study found.

The researchers modeled what might happen if the government used these various methods to cut carbon emission to be 80% below the 2010 level by the end of 2040.

They found that carbon taxes on coal and natural-gas-fired producing

units could achieve those cuts at about half the cost of tax credits for renewable energy sources.

The study was led by Yixian Liu, a former graduate student in Sioshansi's lab, who is now a research scientist at Amazon. It modeled the expenses and carbon reductions possible from five generation technologies—wind, solar, nuclear, natural gas and coal-fired units—along with the costs and carbon reductions associated with storing energy. Storing energy is crucial, because it allows energy systems to manage renewable energy resources as sources shift from climate-change-causing fossil fuels—natural gas and coal—to cleaner sources like wind and solar.

Sioshansi said the results of the study were not surprising, given that a similar program has been in use to reduce levels of sulfur dioxide, one of the chemicals that causes acid rain.

"We have known for the last 40 or more years that market-based solutions can work on issues like this," Sioshansi said.

Although subsidies for renewable sources would work to decrease carbon emissions, the costs of those subsidies would be an issue, the study found.

"If no one had to pay for the subsidies and they were truly free, that would be a great option," Sioshansi said. "Unfortunately, that is not how they work."

More information: Yixian Liu et al, How Climate-Related Policy Affects the Economics of Electricity Generation, *Current Sustainable/Renewable Energy Reports* (2021). DOI: 10.1007/s40518-020-00169-x

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