

POLICY: Researchers say the social cost of carbon will be 6 times the Obama administration's estimate

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Climate change could have much larger impacts on the economy than the U.S. government is anticipating, according to an analysis released yesterday that suggests the social cost of carbon should be six times higher.

A paper by two Stanford University researchers argues that the true cost of releasing greenhouse gases is about \$220 a ton because rising temperatures could badly hinder a nation's economic growth over decades or centuries. The Obama administration estimates that the social cost of carbon is \$37 a ton.

The paper, published yesterday in the journal *Nature Climate Change*, adds to a growing number of voices calling for improvements to the complicated process of establishing the cost estimate, which is used to measure the benefits of regulations. A dozen federal agencies set the price using three computer models that project emission rates, economic activity and climate damages.

The Stanford paper bases its findings on prior research showing that the economic health of a country suffers during periods of high temperatures. Heat can harm agricultural and industrial output, while increasing political instability. In that way, the Stanford analysis subscribes to emerging calls among experts to incorporate new observations into the trio of models that date back to the 1990s.

"The social cost of carbon is almost certainly larger of what's being used so far," said co-author Frances Moore, a doctoral candidate at Stanford's School of Earth Sciences.

In a key departure from the government's analysis, the [paper](#) uses the previous empirical research to assert that climate impacts could damage a nation's economic growth rate over time, rather than just harassing its year-to-year economic output.

That could mean that nations face permanent malfunctions, like economic declines in labor, capital and technology from severe weather and other "temperature shocks." The authors say these bigger impacts have a "compounding effect" that is more damaging to the economy than temporary strains from heat on agricultural output and more expensive air conditioning costs.

"So the economy is kind of permanently lower," Moore said. "If you have repeated shocks, in that

these really big effects over time."

It's an 'overestimate'

The social cost of carbon is used in the cost-benefit analysis of some federal regulations. If the impact of emissions is deemed expensive for society, it could justify more aggressive policies to reduce their release by industry. Opponents of climate action criticized the Obama administration for raising the social cost of carbon in 2013 by almost 50 percent.

William Pizer, a Duke University professor and former Obama administration official who has worked on the estimate, applauded the Stanford researchers for applying updated observations into their carbon estimates. He and several other former Obama advisers say the administration should improve its use of updated science when establishing the price.

But Pizer also questioned the methodology of the Stanford analysis. The empirical research it relied on tracked short-term temperature spikes and their impacts on nations' economies -- not long-term trends that might show permanent economic reductions.

"To me, it just seems like it has to be an overestimate," Pizer said of the Stanford result of \$220.

"I think it's great they're doing this," he added. "I just think this is another data point that someone needs to weigh as they're trying to figure out what the right social cost of carbon is. But this isn't like a definitive new answer."

Moore acknowledged the uncertainties in her research. For example, she noted that there's not enough evidence to know if climate change will continue to have outsized impacts on poorer countries or if as their economies grow they'll be able to adapt and decrease their damage.

A grimmer outcome consists of "biophysical temperature thresholds" -- the idea that the heat will prevent large economic advances. Both scenarios effect the speed and aggressiveness with which emissions should be reduced -- and the price of their social cost of carbon.

Moore hopes the new research will help inform the administration that a larger spectrum of damages should be considered when establishing the monetary estimate.

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