



Updating the United States Government's Social Cost of Carbon

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The social cost of carbon (SCC), the total cost to society from the release of a ton of CO₂ emissions, is vital in evaluating the benefits and costs of climate policies. To bring the SCC to the frontier of knowledge, Carleton and Greenstone recommend that the Biden administration immediately update it by using a discount rate of no higher than 2 percent and including global damages. These changes would produce a social cost of carbon of \$125 per metric ton. As a second step, they recommend that the Biden administration form an interagency working group with the goal of returning the SCC to the frontier of understanding about the science and economics of climate change.

The Challenge and the Policy

The social cost of carbon (SCC), the monetized damages of an additional metric ton of CO₂, is a key tool in evaluating which climate policies will lead to benefits that exceed costs. In the United States, the first consistent government-wide SCC came in 2010 after the Obama administration formed an Inter-agency Working Group (IWG) to provide a scientifically robust evaluation. The figure was updated to reflect the best available science in 2013 to be \$52 per ton of CO₂ in 2020.

Since its release, the U.S. SCC has played a central role in climate policy both inside the United States and internationally. As of 2017, the federal government had used the SCC to assess the value of more than 80 regulations with a combined \$1 trillion in estimated gross benefits. Further, several countries, including Canada, Mexico, the United Kingdom, France, Norway and Germany, have taken inspiration from the United States to implement their own SCC estimates, with some wholesale adopting the IWG framework.

Rapid scientific and economic advances mean that there is now an urgent need to update the SCC. In fact, in 2017, the

National Academies of Sciences, Engineering, and Medicine (NAS) released a report on how to bring the SCC closer to the scientific frontier. Unfortunately, the Trump administration disbanded the IWG and reduced the SCC to between \$1 and \$7, making changes in assumptions that were difficult to justify based on science and economics. In the past four years, the controversial and substantially lower SCC estimates used by the Trump administration have paved the way for the rollback of key environmental regulations, such as fuel economy standards.

Recommendations

To return the SCC to the frontier of knowledge, a two-step approach could be considered:

IMMEDIATE CHANGES

First, simply and immediately, the Biden administration can carry out the approach used to develop the initial estimate under the Obama administration (which included global damages, unlike the Trump SCC), but with a discount rate of no higher than 2 percent to reflect profound changes in international capital markets that

make the current discount rate difficult to justify. This would result in a substantially higher social cost of \$125 per ton of carbon.

- **Based on recent asset market trends, the discount rate, measuring the present value of future damages to society, should be set at no higher than 2 percent.** In order to compare future costs and benefits to costs and benefits of actions taken today, a discount rate is used to reduce future values. Profound changes in global capital markets in recent years point to using a discount rate of 2 percent or lower.
- **Global damages should be incorporated.** Although focusing exclusively on the domestic costs of climate change may appear to put U.S. interests first, the opposite has been shown to be true. For example, the United States leveraged 6-7 tons of CO₂ reduction commitments from other countries for every ton that it pledged to cut in the Paris Climate Agreement. Ultimately, the United States' leadership in global diplomacy is necessary to protect its citizens from climate damages caused by emissions in all countries. To use a domestic SCC would be to abandon this role and risk losing out on the benefits from foreign emissions reductions.

COMPREHENSIVE UPDATE

As a second step, the Biden administration can launch a reconstituted Inter-agency Working Group and task it with comprehensively updating the SCC. Doing so would require several essential updates (in addition to those above), and several other useful changes, as outlined here.

Essential Updates

- **Use an updated climate model to more accurately reflect the effect of emissions on the climate system.** Existing climate models behind the SCC substantially underestimate the speed of temperature increase. A simple Earth system model that can conduct uncertainty analysis while also matching predictions from more complex, state-of-the-art models is necessary. This model can be paired with semi-empirical models of sea level rise.
- **The measurement of damages from changes in the physical climate (e.g., temperature and sea level rise) should be updated to meet three important criteria.** Damage functions in the current SCC are derived from ad-hoc assumptions and simplified relationships. But large-scale empirical evidence has since deepened our understanding of the economic impacts

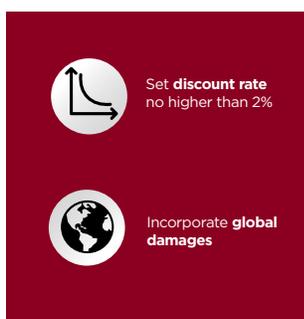
of climate change. An updated damage function should: 1) be derived from empirical estimates that reflect plausibly causal impacts of weather events on socioeconomic outcomes; 2) capture local-level nonlinearities for the entire global population (not just high-income, temperate regions); and 3) account for future adaptation.

Other Updates

- **Rely on a set of socioeconomic projections that can be linked to the widely-used Representative Concentration Pathway (RCP) emissions scenarios or on new probabilistic projections that combine statistical methods with expert elicitation.** Any SCC calculation relies on a set of predictions regarding how the global economy, population, and CO₂ emissions will evolve in the future. Unfortunately, there has been only modest scientific progress in developing these scenarios due to the stubborn difficulties in making long-run population and economic growth projections. We recommend either combining standard socioeconomic projections (e.g., SSPs) with the RCP emissions scenarios, or using new probabilistic estimates relying on statistical and expert elicitation approaches.
- **The SCC should account for the considerable uncertainty about climate change damages.** There are several sources of uncertainty in the calculation of the SCC (i.e. future socioeconomics, the sensitivity of the climate to emissions, economic damages from climate change), and evidence reveals that people dislike risk and are willing to pay to reduce uncertainty. Previous SCC estimates, however, chose not to account for uncertainty in valuing climate damages. Due to recent advances in computing, it is now possible to characterize these uncertainties and to incorporate their value into the calculation of the SCC.
- **While a strong case for equity weighting exists, incorporating it should not be done until wider guidance is issued across the government.** A marginal dollar is worth more to a poor person than a wealthy one. Applying this principle to the SCC would require “equity-weighting” such that a given amount of climate damages projected to occur in poorer areas contribute more to the SCC than equal damages that occur in wealthier regions. However, conducting equity weighting would represent a significant departure from standard United States cost-benefit analysis—having significant precedential implications beyond climate regulations and environmental policy.

Summary of Recommendations

Step 1: Immediate Changes



Step 2: Comprehensive Update

