

## What Carbon Costs Us

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Appropriately valuing the cost of carbon dioxide (CO<sub>2</sub>) emissions to society is critical to good long-term decision-making in the energy industry and other key economic sectors. It is also a point of contention, as demonstrated most recently by reactions to the US Environmental Protection Agency's (EPA's) Clean Power Plan (Section 111(d) of the Clean Air Act), which aims to cut carbon emissions from the power sector by 30 percent below 2005 levels.

In her speech announcing the Clean Power Plan in June 2014, EPA Administrator Gina McCarthy said the ruling was not just about protecting the environment, but about protecting local economies and jobs. "Climate inaction is costing us more money, in more places, more often," she said. "2012 was the second most expensive year in US history for natural disasters. Even the largest sectors of our economy buckle under the pressures of a changing climate, and when they give way, so do businesses that support them and local economics that depend on them."

In stark contrast, Marita Noon, executive director for Energy Makes America Great Inc., described the Clean Power Plan in a blog post for the Heartland Institute as a "forced, premature elimination of American's electric capacity," claiming it would threaten America's electric reliability, chase away American industry, and kill hundreds of thousands of jobs, while having "virtually no impact on the reported goal of stopping global climate change." Also opposing the Clean Power Plan are 12 states that have decided to sue the EPA. West Virginia Attorney General Patrick Morrisey said that, among these, the EPA's proposed rule will have "devastating effects on West Virginia's jobs and its economy" by forcing some coal-fired plants to close.

Similar arguments regarding economic impacts have been used for decades by parties opposed to regulation of pollutants. When it comes to CO<sub>2</sub>, what the doomsayers fail to recognize is that federal agencies have used a dollar figure to estimate the climate benefits of rulemaking in various sectors, including the energy sector, since 2010. Called the social cost of carbon (SCC), the value is a measure of the damages expected to occur from an additional ton of CO<sub>2</sub> emitted into the atmosphere in a given year. Including the SCC value in a cost-benefit analysis helps federal agencies better understand whether a proposed rule will result in net benefits. Factoring the SCC into rulemakings has yet to have wrecked the US economy; however, if not calibrated to our best, most up-to-date scientific understanding of our climate crisis, the SCC value could have a negative impact by failing to give the appropriate value to expected climate damages.

The SCC is developed by the US Interagency Working Group on Social Cost of Carbon, which, in addition to the EPA, includes participants such as the Departments of Agriculture, Commerce, Energy, Transportation, and Treasury. In 2013, the Working Group updated the 2010 SCC estimates (the values are dollar-year- and emissions-year-specific). The resulting increase is a step in the right direction: A higher SCC means more stringent regulations are approved. However, the methodology the Working Group has used to arrive at this figure is flawed and likely underestimates the true cost of climate damages.

The Working Group relies on three integrated assessment models (IAMs) of climate and economy to calculate the SCC: DICE, PAGE, and FUND. This choice of models has not been adequately justified. Before the group released the 2010 SCC, it held no public hearings and did not solicit comments on its methodology or model choices. The technical support document released by the group says little about the decision to use these models other than that they are "frequently cited in the peer review literature and used in the [Intergovernmental Panel on Climate Change] assessment." When the update to the SCC was released in 2013—again, without prior announcement or public hearing—the methodology was unchanged. The values changed simply because the three models each released new estimates.

The Working Group should be more transparent about its choice of models and invite public discussion prior

to any future updates, particularly in light of the fact that the three IAMs fail to represent state-of-the-art research on climate impacts. Two of the models, DICE and PAGE, are among the simplest climate economics models—hardly an ideal criterion for selecting models used to set critical governmental policy. Neither model approaches the level of complexity in estimating damage costs that is represented in the current climate economics literature. The third model, FUND, offers a more complex analysis, but assumes that there are important climate benefits from higher temperatures (for instance, reduced space heating costs and increased agricultural productivity in some regions). The optimum temperatures assumed by FUND are based on outdated literature; the most recent documentation cites no sources published since 1996 in the discussion of agriculture estimates. As a result, FUND produces average SCCs that are dramatically lower than those produced by DICE or PAGE.

The three models have other shortcomings: They underestimate potential damages from catastrophic events, devaluing the important role that climate policy can play as insurance against worst-case scenarios. The 2013 update to the SCC was based primarily on revisions to the PAGE model, including its treatment of catastrophic events; but the other two models were not similarly updated. In addition, these IAMs are run as “scenario models” that evaluate potential futures based on exogenous events instead of investigating the impact of mitigation efforts. The five scenarios of future emissions used in the analysis are essentially arbitrary choices selected with little explanation from other models.

Finally, the Working Group’s current methodology approaches the task of monetizing damages from CO<sub>2</sub> emissions from the problematic angle of cost-benefit analysis. Since it is impossible to put a meaningful price on damages to human lives and livelihoods, vulnerable ecosystems, and the continued existence of particular species, the Working Group would do well to explore, instead, the use of cost-effectiveness analyses. Cost-effectiveness analyses set a physical limit (e.g., a maximum permissible temperature increase, or an inflexible cap on emissions) and determine which policy solutions are most cost-effective given this constraint. This approach would allow the Working Group agencies—and ideally other members of society in public fora—to determine a cap on emissions that absolutely cannot be surpassed, instead of weighing the continued destruction of invaluable resources against the financial benefits of emitting CO<sub>2</sub>.

Given the modeling limitations of the Working Groups cost-benefit methodology, it is likely that the current SCC underestimates damages. The Intergovernmental Panel on Climate Change agrees, as noted in its Fourth Assessment Report. So far, placing a price on carbon emissions—and giving an explicit value to preventing damages from climate change in our assessments of federal regulations—has yet to drag our economy to a halt. Naysayers to both the Clean Power Plan and to raising the SCC need to support their claims with fact-based evidence, not hyperbole and scare tactics. Tough climate regulations based on sound science will protect both our economy and the well-being of future generations.



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