Decarbonizing the U.S. Economy Has Substantial, Impressive Benefits

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President Biden has called for reducing net emissions of U.S. greenhouse gases to zero by 2050. The ambitious nature of this goal reflects a growing understanding of the significant risks that climate change poses to our well-being. The good news is that such rapid decarbonization of the economy would deliver dramatic benefits: the International Monetary Fund estimates that U.S. carbon dioxide emissions last year will cause nearly $200 billion in climate-related damages.

The IMF calculation builds on the pioneering work of William Nordhaus of Yale University, in which he estimated the Social Cost of Carbon as the present-day value of the economic damages of an additional metric ton of carbon dioxide emitted to the atmosphere. Since a single molecule of CO_2, once emitted, could reside in the atmosphere for centuries, an economic assessment of this molecule must account for its impacts next year, and the following year, and for hundreds of years into the future. We calculate the SCC using models that integrate the globe's economic, energy, and climate systems over the long run.

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To inform its ambitious climate agenda, the Biden administration recently announced that it would use estimates of the SCC based on the integrated assessment modeling work of the federal government's technical experts in 2016. The Biden White House also launched an interagency working group to update the SCC over the next year to reflect the latest insights from the research community.

Recent scholarship has advanced our understanding of climate change damage functions, such as how heat waves under a changing climate could increase premature mortality and reduce labor productivity, as well as how changing temperature and precipitation patterns could affect agricultural production.

Economists use a percentage called the discount rate to monetize future benefits in present-day terms. Recent understanding of discount rates — as revealed by behavior in financial markets — suggests that lower rates should be employed, increasing the present value of future benefits. The updated damage functions and the lower discount rates would each result in integrated assessment models producing higher estimates of the SCC.

This metric can play several key roles in public policy. First, some statutes require regulatory agencies to set standards based on explicit consideration of the regulation's benefits and costs, such as for the energy efficiency of appliances and the fuel economy of cars and light trucks. Indeed, the George W. Bush administration first used a SCC in evaluating regulations in response to a 2008 federal court ruling that remanded a Department of Transportation fuel economy standard because it had initially failed to account for the benefits of reducing carbon dioxide in the setting of the standard.

Second, regulatory agencies must conduct regulatory impact analyses of their major rules. For those regulations that reduce carbon dioxide emissions, the SCC can illustrate how the benefits justify the costs. Public communication of these results can enhance understanding of the serious risks posed by climate change as well as demonstrate that a given regulation represents a good investment on behalf of the American people.

Finally, the SCC can also inform the design of new policies. For example, some economists have advocated for an economy-wide carbon tax that is set equal to the SCC. If new legislation set a carbon tax equal to the interim SCC adopted by the Biden administration of $50 per ton, then it would result in a tax on gasoline of about 45 cents per gallon and a tax of about 5 cents per kilowatt-hour of coal-fired power. Economic models of such a carbon tax suggest this would halve U.S. carbon dioxide emissions economy-wide by 2035.

A federal clean electricity standard could require increasing shares of renewable and other zero-carbon power in the electricity sector. Building on the experience under some states' renewable portfolio standards, a national clean electricity standard could include an alternative compliance payment that would effectively cap compliance costs. This could provide insurance that the costs of the policy — and hence the increase in utility rates — do not become unexpectedly high if there is insufficient supply of clean power. The SCC could serve as the basis for setting such an alternative compliance payment.

The SCC can also play a role in international diplomacy. It signals to the rest of the world that the United States accounts for the global benefits of its greenhouse gas emission reductions. If other countries reciprocate — each taking actions that also reflect the global benefits of doing so — then the world can make meaningful progress on the goals set forth in the 2015 Paris Agreement limiting future temperature increases.