Congressional Research Service
Informing the legislative debate since 1914

IN FOCUS

Updated September 24, 2017

Social Costs of Carbon/Greenhouse Gases: Issues for Congress

On March 28, 2017, President Trump issued Executive Order 13783, "Promoting Energy Independence and Economic Growth." It states that "it is essential that agencies use estimates of costs and benefits in their regulatory analyses that are based on the best available science and economics." His order then effectively withdrew the federal "social costs of greenhouse gases" (SC-GHG), a tool to monetize the climate-related benefits of federal regulations and programs that would reduce GHG emissions. The withdrawn SC-GHG could also have been used to estimate the climate-related costs of revising or rescinding regulations that would increase GHG emissions.

Executive Order 12866, issued in 1993 by President Clinton, required most agencies to consider the costs and benefits of economically significant rules and to ensure that the benefits of each rule justify the costs. A 2008 federal appeals court ruled that, despite acknowledged uncertainty, federal agencies must monetize climate-related benefits in their regulatory impact analyses. To comply, agencies used their own, varying estimates of the "social costs of carbon" (SCC or SC-CO_2) from 2008 to 2010. Since 2010, agencies have used interagency-recommended values. The interagency process improved the methods for estimating SC-CO_2 values, increased the consistency of their use across rules, treated uncertainty more extensively than typical in benefits analyses, and dramatically reduced agency costs compared with reconstructing full benefits analysis for each rule. Agencies began using social costs of methane (SC-CH_4) in 2015 and of nitrous oxide (SC-N_2O) in 2016. "SC-GHG" refers to these estimates collectively.

President Trump's executive order withdraws the technical analyses that documented and recommended SC-GHG values and disbands the interagency group that developed them. It also requires agencies to ensure, as permitted by law, that monetization of benefits due to changes in GHG emissions are consistent with 2003 guidance of the Office of Management and Budget (OMB), particularly regarding appropriate "discount rates" (see **text box**) and whether to count global or only domestic damages associated with U.S. emissions.

Issues for Congress

Members of Congress have taken divergent views on the adequacy and application of the SC-GHG. With the values withdrawn, a new set of issues arises:

- Should the SC-GHG substitute for or complement a full description of benefits over decades to centuries, identifying potential disparate damages and gains—some of which could be irreversible and/or catastrophic—accruing to different populations? Is global climate change like other regulatory challenges?
- Will there be a process to develop new SC-GHG, including the improvements recommended by a 2017 panel of the National Academies of Sciences (NAS)? If so, what resources will be required to develop new SC-GHG, and will Congress appropriate them?
- Without the withdrawn SC-GHG, how and at what cost will agencies meet continuing requirements for climate benefit (or damage) analyses? Will agencies be required to execute the complex physical and economic modeling potentially necessary to estimate benefits for each rule or to defend in litigation a decision not to do so?
- Are some aspects of applying the SC-GHG best settled through public policy deliberation because they reflect balancing diverse and difficult trade-offs (e.g., how to value the risks to future generations)?

Previous Uses of the SC-GHG

The SC-GHG are factors (**Table 1** for CO_2) estimating climate-related net losses in *dollars per metric ton* of GHG emissions. The SC-GHG factors can be multiplied by the projected tons of emissions avoided in a year to provide monetary estimates of the climate-related benefits (i.e., by avoiding losses) of a regulation, program, or project. For example, avoiding 1 million tons of CO_2 emissions in 2020, at $42/ton, would yield estimated benefits of $42 million in present values. Since 2010, the SC-GHG have been applied in more than 75 final rulemakings. Reviews suggest that monetized GHG benefits have not driven regulatory stringency except perhaps in a few decisions.

Judicial Rulings on Uses of the SC-GHG

Courts have focused on an agency's justification (or lack thereof) regarding the use of the SC-CO_2 values in its rulemaking or environmental review. In 2008, the U.S Court of Appeals for the Ninth Circuit in *Center for Biological Diversity v. National Highway Traffic Safety Administration (NHTSA)* held that NHTSA's refusal to monetize the value of avoiding CO_2 emissions in its cost-benefit analysis of vehicle efficiency standards was arbitrary and capricious. The court rejected NHTSA's argument that the values were too uncertain, concluding that "while the record shows there is a range of values [for the SC-CO_2], the value of carbon emissions reduction is certainly not zero." In August 2016, the Seventh Circuit court in *Zero Zone, Inc. v. Department of Energy* upheld the use of the SC-CO_2 in a federal cost-benefit analysis. This followed a 2014 district court decision, *High Country Conservation Advocates v. U.S. Forest Service*, that vacated the Bureau of Land Management's approval of a coal exploration plan for failure to justify why the SC-CO_2 was not used in its environmental review. In contrast, in April 2016, in *EarthReports, Inc. v. Federal Energy Regulatory Commission*, the D.C. Circuit Court upheld an agency's decision not to quantify potential GHG impacts in an environmental review under the National Environmental

Policy Act. The agency justified its decision by claiming the values to be "inadequately inaccurate" to use. Withdrawal of the SC-GHG technical support documents does not eliminate requirements for agencies to estimate climate damages in their cost-benefit analyses.

Table 1. August 2016 Revision of the SC-CO_2

in 2007 dollars per metric ton CO_2

At Alternative Discount Rates

Year of Emissions	5% Avg	3% Avg	2.5% Avg	3% 95th
2015	11	36	56	105
2020	12	42	62	123
2025	14	46	68	138
2030	16	50	73	152

Source: Partial table from Interagency Working Group on the Social Costs of Carbon, "Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866," May 2013, revised August 2016.

Notes: "Avg" is the mean of 150,000 model runs representing uncertainties in some assumptions. "95th" is the fifth highest percentile of damages among all the runs. It shows a value for decisionmakers who may be strongly averse to risks of low-likelihood, catastrophic change.

Future Benefits and Discount Rates

Regulatory Impact Analyses typically simplify comparison of costs and benefits by valuing the streams of future costs and benefits as "present values." One debate involves how, in calculating present values, to reflect society's valuation of future benefits compared with values today. Economists use "discount rates" for these calculations. Higher discount rates give less present value than lower discount rates to benefits or costs that accrue in the future. For climate change, this debate has especially strong implications, because many of the benefits of GHG mitigation would occur generations after the year of emission control.

The IWG debated the appropriate discount rates for the SC-CO_2 and used three (**Table 1**). The IWG estimated that an approach relying on long-term Treasury notes after tax would be about 2.7%, roughly consistent with OMB's recommendation in 2003 of 3% as the "consumption rate of interest." It did not support a 7% rate, advocated by some stakeholders as approximating (in 2004) the marginal pretax rate of return on private investment. Nor did it recommend lower discount rates advocated by those who would more heavily weigh the impacts to future generations.

Varied Perspectives on the SC-CO_2 Values

Public comments on the recommended SC-CO_2 values diverge widely. Most reflect on the scope and methods to calculate the values, while some address how the values should (or should not) be used.

Some commenters argue that some potential benefits of CO_2 emissions, such as plant photosynthesis, have not been fully tallied by the models used. Some argue that only benefits to the United States—not worldwide—should count when the costs would be borne by U.S. entities. Some believe that climate is not as sensitive to GHG emissions as the IWG assumed and that the models estimating damages are not well based in empirical research. Some contend that the analysis should have used a 7% discount rate (see **text box**) reflecting private opportunity costs.

Other commenters argue that the models likely underestimate the potential damages. They identify some expected damages that were not counted, such as ocean acidification, air pollution, and loss of cultural values. They also suggest that the models overestimate potential gains of climate change due to carbon fertilization effects and agricultural productivity. Some contend that potential catastrophic damages were incompletely included. Some comment that the focus on global benefits was correct for economic and international cooperation reasons. Some recommend that agencies use not the mean value of the SC-CO_2 but a more risk-averse value, such as the 95th percentile (**Table 1**). Some recommend use of discount rates as low as 1% to be consistent with the intergenerational character of climate change as well as the 2003 guidance of OMB.

Despite the shortcomings of the withdrawn SC-CO_2 values, it is not apparent whether the factors under- or over-estimated the "true" (but unknown) damages of GHGs.

Independent Reviews and Recommendations

Several independent, formal reviews have examined the IWG's SC-CO_2. A 2014 review by the Government Accountability Office found that the IWG's processes reflected consensus-based decisionmaking, existing academic literature and models, and disclosure of limitations. Two NAS panels recommended improvements to the scientific basis for the estimates, characterization of uncertainties, and transparency. The 2017 NAS panel recommended a different structure for modeling, updating the formulations for damages, and a new approach to discount rates that explicitly reflects uncertainties in economic growth and damages. The panel noted that advances would "require significant investments in both economic and climate modeling" (particularly relating to climate damages) and socio-economic and emission projections. The panel recommended research to support quinquennial updates.

For further information, see:

CRS Report R41974, *Cost-Benefit and Other Analysis Requirements in the Rulemaking Process*, coordinated by Maeve P. Carey.

CRS Report R44657, *Federal Citations to the Social Cost of Greenhouse Gases*, by Jane A. Leggett.

CRS Legal Sidebar WSLG1684, *Courts Evaluate How Federal Agencies Put a Price on Carbon*, by Linda Tsang.

Jane A. Leggett, Specialist in Energy and Environmental Policy

IF10625

Disclaimer