POLICY FORUM

CLIMATE POLICY

Keep climate policy focused on the social cost of carbon

A proposed shift away from the SCC is ill advised

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In the context of climate change, the application of cost-benefit analysis to inform mitigation policies can help to achieve the best outcomes and avoid the worst: spending trillions of dollars but failing to get the job done (*1*). The costs of a climate policy are the abatement costs of reducing emissions of carbon dioxide (CO_2) (or other greenhouse gases). The standard measure of the benefits of a climate policy is the social cost of carbon (SCC), which measures the avoided economic damages associated with a metric ton of CO_2 emissions. Recently, however, there have been calls for an alternative approach to policy evaluation that ignores the benefits of avoided climate damages and instead focuses only on minimizing the compliance costs of a given, politically determined climate objective (*2*, *3*). We argue here that a shift from use of the SCC and cost-benefit analysis to an alternative approach for evaluating policy that focuses on costs alone would be misguided. Rather than advocate for alternative approaches, now is the time to support efforts to update the SCC and its application to official climate policy evaluation.

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THE SCC

The economic value of a policy's climate benefits is the sum of current and future damages that are avoided. The SCC is the monetized value of these benefits per metric ton of CO_2 abated. Those avoided damages include impacts on agricultural production, reductions in labor productivity, property damage (particularly along coastal areas), mortality and morbidity impacts, and induced migration, among others.

SCC estimations need to integrate climate and economic models, make economic projections into the distant future, and put those damages on a current-day basis by discounting them back to the present (*4*). And all of this must take place in the context of considerable scientific and economic uncertainty. In the United States, the original federal government estimates of the SCC (*5*) used the results of scientific and economic research that were then available to develop initial estimates and subsequent updates. Although the Trump administration asserted an alternative set of assumptions to vastly reduce the value of the SCC, it never questioned the use of the SCC for cost-benefit analysis, nor were its alternative set of assumptions adopted more broadly or supported by the economics community.

From 2008 to 2019, SCC estimates were used in 60 federal regulatory analyses (see supplementary materials). In addition to such analyses, SCC estimates can be used to inform the design of carbon-pricing climate policy instruments, which use price signals to bring about emissions reductions, typically either as a carbon tax or as a CO_2 cap-and-trade system (for example, British Columbia's carbon tax and the European Union's emissions trading system). A substantial number of state governments use the federal SCC to evaluate their own energy and climate policies. In New York and Illinois, the SCC serves as the basis for the value of "zero-emission credits" paid to electric utilities under state clean-energy legislation. In Colorado, Minnesota, and Washington, electric utilities are required to use the federal SCC in their resource planning. And in California, legislation requires regulators to incorporate the SCC in policy analysis. Outside of the United States, the Canadian government has adopted the estimation methodology, and several other national governments as well

PHOTO: GORDON WELTERS/LAIF/REDUX

Cleanup begins after floods in Bad Münstereifel, North Rhine-Westphalia, Germany, 19 July 2021. Estimating impacts of climate change, such as damages from extreme weather events, that could be averted by curbing carbon emissions is critical for policy analysis.

as the International Monetary Fund have developed their own SCC estimates or drawn on the US experience, including France, Germany, Mexico, and Norway (*6*).

On his first day in office, President Biden issued an executive order (*7*) to reestablish the Interagency Working Group on the Social Cost of Greenhouse Gases and directed it to produce within 30 days an "interim SCC" and a final SCC no later than January 2022. The administration recently issued its interim SCC, with a primary value of $51/ton and ranging from $14 to $152/ton (in 2020 US dollars) (*8*), which is in line with the SCC used under the Obama administration (*5*) after adjusting for inflation. These numbers, or any subsequent revisions, are to be used to quantify the climate benefits of federal policies in official cost-benefit analyses (*1*). In practice, their use can change an overall assessment from negative to positive net benefits (*9*). President Biden has also tasked agencies to consider applying the SCC to monetize the climate benefits of budget, procurement, and other government actions (*7*).

A TARGET-CONSISTENT PRICE

Cost-benefit analysis is not the only way economists evaluate policies. An alternative is cost-effectiveness analysis, which is used to compare policies with the same objective. In the case of climate policy, this involves identifying some target, such as a maximum increase in the global average temperature or a date by which zero net emissions of CO_2 is to be achieved, and then comparing the costs of alternative approaches to achieve that target.

With a given target and the cost-effectiveness approach, policy evaluation no longer entails comparing costs to benefits but rather focuses on adopting the lowest cost policy to achieve the target. In practice, the menu of all possible policies is not available, nor are their costs. Still, it is possible to compare the cost of a particular candidate policy with some threshold, which is a modeled estimate of the minimum-cost policy consistent with achieving the given target. In the context of climate policy, the minimum costs are actually a time path of carbon prices equal to the estimated marginal costs of abatement in each future year until the target is met. To be clear, these carbon prices are not equivalent to—and are not intended to reflect—the marginal benefits of lowering emissions, as with the SCC. Instead, they reflect an estimate of the marginal abatement costs of implementing cost-effective policies that align with the target, and they are called target-consistent carbon prices. In practice, the SCC is a tool for cost-benefit analysis, and the target-consistent price is a tool for cost-effectiveness analysis. Also, these target-consistent prices should not be confused with the specific prices used in carbon-pricing policy instruments such as carbon taxes or cap-and-trade.

Although cost-benefit analysis using the SCC has been the dominant approach to climate policy assessment in practice in the United States, there has been some use of cost-effectiveness analysis with target-consistent pricing. For example, since 2009, the United Kingdom has been using a target-consistent price to assess climate policies (*6*). In the US context, this approach has recently been promoted by a pair of prominent economists, Lord Nicholas Stern and Nobel Laureate Joseph Stiglitz (*2*), who argue that for the purpose of policy evaluation, the target-consistent price should replace the SCC as the benchmark for assessment.

The main arguments for relying on cost-effectiveness analysis and a target-consistent price are as follows: Climate policy cost-benefit analysis is fine in theory but cannot be implemented in practice because too little is known to estimate the SCC credibly. Beyond that, it may be argued that climate change raises questions of moral responsibility to future generations and Earth's ecosystem that surpass what economists can monetize, so any SCC will necessarily underestimate damages. Hence, the argument goes, we should be guided by science and moral considerations to identify some goal, such as keeping warming within 1.5°C, and then translate that into a policy target, such as achieving net zero emissions by 2050. If politicians adopt a given policy target, the task of the policy analyst is then simply to help achieve that target as cost-effectively as possible.

Given a target, the technical task is therefore to compute a target-consistent price to use for comparison with the cost of a specific policy. In most climate-economic models, an analyst can estimate a cost-effective emissions time path for achieving a given temperature objective in any future year. Associated with this cost-effective emission time path is an implicit carbon price trajectory, which is the target-consistent price of carbon.

PITFALLS OF A TARGET-CONSISTENT PRICE

Which to use for evaluating climate policy: an assessment of benefits and costs using the SCC, or cost-effectiveness analysis with a target-consistent price? Some advocates of the target-consistent price call it an alternative estimate of the SCC, which it decidedly is not. Terminology matters. The SCC measures the benefits of reducing CO_2 emissions, whereas the target-consistent price is a cost estimate that takes no account whatsoever of benefits.

Our view is that a push to replace cost-benefit analysis and the SCC with cost-effectiveness analysis and a target-consistent price could set back climate policy, just as the United States is poised to take meaningful climate action. Despite the apparently logical appeal of using some politically defined target as an operational, bright-line rule in the face of uncertainty, we find that calls for the target-consistent approach are unwise for four main reasons.

First, the target-consistent approach replaces scientific assessments of damages from storms, floods, fires, and a myriad of other climate impacts with subjective judgments about policy targets and choices. The starting point and necessary condition for the target-consistent price is a political decision about the goal: an emissions objective in a specified future year. Much of the developed world has adopted a target of net zero emissions by 2050, but ultimately that is a political decision. The Trump administration had no such target, so its target-consistent price would have been zero. A future US administration may have a different view on the target from that of the current administration—perhaps more ambitious, perhaps less—resulting in yet another price. The anchor for the target-consistent price is fundamentally political, not scientific, and therefore subject to arbitrary change. This is not to say that the cost-benefit approach using the SCC is completely immune from political interference in its application to policy

analysis, but that it is more consistent with how scientific assessments are typically undertaken. The cost-effectiveness approach to analyzing policies with the target-consistent price involves scientific estimates in regard to future technological change; the benefit-cost approach using the SCC places greater reliance on the science of climate change because the SCC is an estimate of future damages of climate change.

Moreover, as a technical matter, calculating the target-consistent price requires making assumptions about a myriad of complementary policies over the next several decades (*3*). Those assumptions matter tremendously. For example, the UK target-consistent price trajectory for achieving an 80% reduction in emissions by 2050 (a goal set in a 2008 law) assumed that the UK would purchase emission reductions from other countries after 2030 (*6*). The analysts were thus able to substantially lower the target-consistent carbon price and thus make the approach more appealing politically, by assuming that policies far from certain will unfold. This illustrates another way that the target-consistent price depends on policies and political projections, not science, in sharp contrast with the SCC.

Second, the target-consistent price calculation depends not only on assumptions about future politically determined public policies but also on critical assumptions about technologies that are not commercially available today. Many energy-economic models that can solve for ambitious climate goals—such as limiting warming to 1.5°C or net-zero emissions by 2050—do so by assuming aggressive global deployment of bioenergy with carbon capture and storage in the power sector. Uncertainty about this prospect (and uncertainties characterizing other emerging technologies, such as direct air capture) helps explain the large variation in target-consistent prices in the literature for a given goal. The Intergovernmental Panel on Climate Change (IPCC) 2019 special report illustrated that limiting warming to 1.5°C would require carbon prices ranging from $135 to $5500/ton (*10*). Such uncertainty is also demonstrated by the broad distribution of target-consistent prices for limiting warming to 2°C in the IPCC fifth assessment report's (AR5) integrated assessment modeling database. A common critique of the SCC is its considerable uncertainty, yet the AR5 target-consistent prices exhibit substantially greater dispersion than the distribution of SCCs estimated through hundreds of thousands of modeling runs in the US Interagency Working Group's Monte Carlo Simulations of the SCC (*11*).

Third, a target-consistent approach seems unlikely to meet legal requirements, at least in the US context. In 2008, a federal court ruled that fuel economy standards must account for the benefits of reducing CO_2 emissions (*9*). In addition, the Department of Energy must show that the benefits of appliance efficiency standards exceed their economic burdens (*12*). Under Executive Orders issued by Democratic and Republican presidents since 1981, federal regulatory agencies are required to compare the costs of major regulations with their benefits (*1*). Because the target-consistent price is based on costs, with no regard for benefits, it would not fulfill these requirements, posing substantial legal hurdles for officially adopting the approach in the coming years, precisely when meaningful climate action is most needed.

Fourth, the target-consistent approach is entirely inward-looking for any country that adopts it because it is essentially a go-it-alone approach to evaluating domestic climate policy. By contrast, the SCC inherently builds in the notion of reciprocity among countries because it reflects the global damages of emissions. A future in which all countries seek to guide domestic policy by using the SCC can lead to progress on addressing climate change in a globally efficient and least-cost way. The same cannot be said of the alternative approach. Although it is true that signatories of the Paris Agreement have agreed on a global target for temperature changes, vast uncertainty remains on how emissions will be reduced by each country and on what timetable.

THE PATH AHEAD

Over the coming months, the Biden administration intends to complete its update to the SCC. We believe that it is critical that the Interagency Working Group should keep its focus on the SCC rather than commencing work on a target-consistent price. This is important not only for the continued use of cost-benefit analysis in the United States but also for maintaining an objective and defensible basis for climate policy around the world.

Correctly estimating the SCC is by no means an easy task. In 2017, the National Academy of Sciences (NAS) developed a list of needed improvements (*13*). Fortunately, research on the NAS list has progressed substantially. In the coming months and beyond, the Biden administration's Interagency Working Group can pull together the large body of new research on damages, uncertainty, discount rates, socioeconomic projections, and other considerations, including those identified by the NAS and others (*13*, *14*, *15*). In particular, estimates of biophysical and monetized damages have continued to improve, and today's economic environment suggests an update of the discount rate previously used.

Aside from the immediate goal of improving the estimate, a broader goal should be to establish a process by which science drives policy, not the reverse. By establishing a procedural and substantive record, such as periodic peer review through NAS (*9*, *13*), it will be more difficult for a future administration with less ambitious climate goals to undercut the SCC. Although the Trump administration attempted just this (with its inappropriately high discount rate of 7% and no consideration of damages outside the United States), it never gained traction because it was out of step with standard and objective economic analysis, and the process for estimating the SCC was originally intended to be separate from political decision-making. The same cannot be said of the target-consistent approach, which hinges on political decisions.

We recognize the value of research that can promote cost-effective ways of achieving climate goals, but this is only one side of the cost-benefit comparison. It is critically important to maintain focus on the benefits of addressing climate change as a means for evaluating and justifying climate policy. With this goal in mind, now is not the time to change lanes and advocate the alternative approach. Instead, we need credible and updated estimates of the SCC. ■

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SUPPLEMENTARY MATERIALS

science.sciencemag.org/content/373/6557/850/suppl/DC1

10.1126/science.abi7813

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Science **373** (6557), 850-852.
DOI: 10.1126/science.abi7813