



Policy Brief

Stanford Institute for Economic Policy Research

U.S. Climate-Change Policy: The Bush Administration's Plan and Beyond

Lawrence H. Goulder

In mid-February President Bush unveiled his administration's climate-change policy plan. This came a year after the Bush administration had rejected the Kyoto Protocol, an international treaty under which industrialized nations would face binding targets for reducing the "greenhouse gases" that contribute to global climate change. The administration had been under intense pressure to take some action on the climate-policy front.

The plan commits the United States to an 18 percent reduction in emissions intensity – the ratio of emissions to real GDP – by a decade from now. The main instruments for achieving this reduction are tax credits to support the invention and adoption of energy-saving technologies and promote expanded carbon dioxide absorption by forestry and agriculture. It also requires expanded record-keeping of greenhouse gas emissions and urges voluntary reductions in emissions by the private sector.

In this policy brief I evaluate some key aspects of the Bush administration's plan. Many have criticized the plan's emissions targets as being too modest. This is an important issue, and I will deal with it below. However, an equally important issue is whether the mechanisms embodied in the plan – tax breaks toward carbon-reducing and carbon-absorbing technologies – can be counted on to achieve greenhouse gas reductions in a cost-effective manner. I will argue that, no matter what is selected as the target for reduced greenhouse gas emissions, the target could be achieved at substantially lower cost through a different approach: one that combines tax incentives to encourage new technologies (as in the Bush plan) with "direct emissions policies" (such as tradable carbon permits or carbon taxes) that raise the price of carbon-based fuels.

February 2002

Perhaps it is no surprise that the Bush administration took an approach that employs the carrot (subsidies to technologies) rather than the stick (quotas or taxes on emissions). The latter policies impose larger burdens on energy industries and face stiff political opposition. However, as I discuss below, it is possible to design "stick" policies in a way that can make them much more attractive politically.

Risks from Action, Risks from Inaction

One of the most important attractions of the plan is its very existence. In announcing a climate-change policy, George W. Bush departed from the stance taken by his father's administration. Bush senior's administration refused to commit to climate-policy action, arguing that such action would be premature in light of the uncertainties about the links between increased concentrations of greenhouse gases, changes in global temperature and climate, and associated biophysical impacts and economic damages.

Surely the uncertainties regarding the potential benefits and costs from climate-policy are vast. One cannot rule out the possibility that taking action now will yield little or no payoff in the form of reduced future damages. There would be little payoff if (contrary to what most climate scientists now believe) the connection between changes in greenhouse gas concentrations and climate change turned out to be quite weak. In this case, future climate patterns -- whether benign or sinister -- would be largely independent of changes in anthropogenic (human-generated) emissions of greenhouse gases, and there would be little benefit from policies to reduce such emissions. At the same time, however, there are risks to postponing action. Future scientific evidence could confirm that changes in greenhouse gas concentrations would cause substantial climate-change and related damages, and that reductions in anthropogenic emissions could

avoid much of the potential damage. In this scenario, given the inertia in the climate system it would be much more costly to avoid significant damages if action were postponed for several decades rather than begun today. Thus, there are risks from inaction as well as from action.

By introducing a climate plan, the Bush administration implicitly regards the latter risk as more serious. This is consistent with results from economic studies, which indicate that the risks from postponement justify initiating climate-policy action today -- despite the possibility that future information will show that such action was unnecessary. In essence, these studies regard climate-policy as insurance: It protects against the serious damages that would be suffered in the event that a particular (possibly low-probability) "bad" scenario were to materialize. This is the scenario in which increased human-caused emissions of greenhouse gases yield very significant economic and social damages.

Are the Targets Stringent Enough?

Although economists tend to agree on the value of climate-policy as insurance, there are substantial disagreements about the stringency of the policy -- how much insurance to buy. The Bush plan calls for 18 percent reduction in emissions intensity -- emissions divided by real GDP -- over the next decade. Since GDP is expected to rise over the decade, the required reduction in emissions is considerably less.

The actual requirement in emissions reduction depends on the rate of GDP growth. The average annual growth rate of GDP over the decade of the nineties was 3.2 percent. The administration's illustrations of its climate-policy plan focus on the case where GDP grows at 3 percent annually. If, on average, GDP grows at that rate, the intensity target would be satisfied with actual emis-

sions increasing by 10.2 percent over the next decade, with an average annual growth rate of about 1 percent. In contrast, on the basis of projected benefits (avoided damages) and costs, climate-economy models typically call for smaller increases or actual reductions in emissions over the next decade. (The Kyoto Protocol would have required the U.S. to reduce its emissions a decade from now to levels about 19 percent below the current levels.) Another useful comparison is between emissions allowed under the Bush plan and those under "business as usual," that is, no climate policy. Various forecasts (including the administration's own estimates) indicate that the plan allows emissions in 2012 to be over 95 percent of what they would have been with no policy.

The administration's targeted reduction for emissions intensity is certainly less than what most climate-economy models justify and appears modest from various perspectives. While one might find fault with the magnitude of the targeted reduction, the focus on emissions intensity, as opposed to emissions levels, is a potential virtue. This allows the emissions target to reflect the growth of the economy. Over a given time interval, the required emissions reduction is less severe if the economy grows fast during that interval, and more extensive if the economy grows slowly. Although one is ultimately concerned about the level of emissions, there is some logic to letting the target levels adjust to rates of economic growth.

Are the Mechanisms Reasonable?

Apart from the targets, another key feature of the administration's climate plan is the type of mechanism for achieving them. As mentioned, the key instruments for achieving reductions in the Bush plan are various subsidies – to low-carbon energy technologies (including solar power), to efforts to improve methane capture from mines and pipelines, or to land-use changes that expand carbon absorption by forestry and agriculture.

Importantly, the administration's plan does not include any policies that would raise the price of carbon-based fuels -- coal, oil, and natural gas. Combustion of these fuels or their refined products leads to emissions of carbon dioxide, the principal greenhouse gas from human sources. Although subsidies to low-carbon technologies can help reduce emissions, raising the price of carbon-based fuels can contribute importantly as well. A policy simulation model that I built with my Stanford colleague Stephen Schneider indicates that achieving a 10 percent reduction in carbon dioxide emissions is ten times more costly when technology subsidies are employed alone, as compared with the situation where technology subsidies are combined with policies that raise the price of carbon. The latter policies -- here termed "direct emissions policies" -- include a carbon tax and (possibly tradable) permits that restrict the supply of fossil fuels. Although the Bush plan does not include such policies, it indicates that firms' "early action" to reduce emissions would be credited against future emissions-reduction obligations if the government at some later point required emissions reductions through tradable permits or emissions caps.

Why are direct emissions policies crucial for cost-effectiveness? The reason is that the problem of climate change stems from two important market failures, and two policy instruments are required to deal with them effectively. One market failure is associated with research and development. Because private firms are unable to appropriate all of the knowledge associated with their expenditures on R&D, the private return (on average) tends to fall short of the social return. Firms thus tend to engage in less R&D than what would maximize social net benefits. The other market failure reflects the external costs from carbon dioxide emissions. The various climate-related damages associated with the combustion of fossil fuels are not generally incorporated in the price of these fuels. The market price is below

social cost. As a result, the demand for these fuels tends to exceed what would be economically most efficient.

Tax breaks to R&D confront the appropriability problem by helping raise the private return. But they do not address the climate-externality problem. To deal with the latter problem, one needs a policy that helps bring the prices of fossil fuels closer to social cost. Carbon taxes and carbon permits can do this.

Overcoming Political Barriers to Direct Emissions Policies

Clearly, direct emissions policies currently face considerable political opposition. In their usual form, they impose significant burdens on energy industries. In contrast, tax breaks for low-carbon technologies benefit (at least some) energy industries. This difference, in combination with the fact that energy industries exert considerable political influence, may partly explain why U.S. energy policy and climate policy consists almost entirely of subsidies to energy industries.

Yet the absence of direct emissions policies carries an economic cost. Can the opposition to such policies be overcome?

I have focused on this issue in recent work with Lans Bovenberg of Tilburg University in the Netherlands. We find that it is possible to design direct emissions policies that are less burdensome to key industrial stakeholders and at the same time relatively cost-effective. One policy is a modified carbon tax with an exemption for "infra-marginal" emissions. Under this policy, producers would face the carbon tax at the margin, and thus the price of fossil fuels (carbon) would be raised just as much as under an ordinary carbon tax. And consumers of fossil fuels would face the same incentives to reduce their use of these fuels. But because of the exemptions, suppliers would be able to retain as "rents" some of the revenues

that otherwise would become tax payments to the government. Bovenberg and I find that a very modest exemption -- equivalent to perhaps 10 or 15 percent of expected emissions -- suffices to prevent profits from falling in the fossil-supplying industries.

Similarly, profits to fossil fuel suppliers could be maintained through a tradable permits program in which 10 or 15 percent of the permits are given out free (or "grandfathered") instead of auctioned. Like the carbon tax, the permits policy causes the price of fossil fuels to rise -- in this case because it constrains the output of fossil fuels. But if some of the permits are given out free, the fossil fuel suppliers enjoy rents as a result of the price increase. Freely allocating a small fraction of the permits provides enough rent to compensate for the gross loss of profit associated with the reduction in output.

These approaches can help improve the attractiveness of direct emissions policies. Additional compensating schemes would be necessary to help attract intensive users of fossil fuels such as electric utilities, petroleum refiners, or metals processors. The good news is that the revenue sacrifice involved in "insulating" the profits in these industries and providing compensation for potential losses in employment is fairly modest. Compensation schemes tend to raise overall policy costs because they involve a sacrifice of government revenue and thus compel the government to rely more heavily on ordinary, distortionary taxes than would be the case under the standard policies (the typical carbon tax or a system of auctioned carbon permits). But our work suggests that the revenue sacrifice is small, and thus the additional policy cost is not great.

Where from Here?

The Bush climate-change plan is an important first step toward confronting the prospect of global climate change. But it is a smaller step than what the bulk of climate-economy models currently endorse. Moreover, it includes no elements that would raise the price of carbon emissions. This seriously reduces the plan's cost-effectiveness. There is substantial political opposition to raising the price of carbon, but this may partly reflect the usual design of carbon taxes or tradable carbon permits systems. Alternative designs, which reduce or eliminate the cost burden on key industrial stakeholders, might stand a better chance of political success. Because the alternative policies forgo potential government revenue, they are somewhat less efficient than the standard carbon tax or permit policies. But the efficiency sacrifice seems small in comparison with the economic sacrifices we now make by failing to let the price of carbon emissions better approximate social cost. Hopefully it will eventually be possible to arrive at policy designs that make these price increases politically acceptable.

© 2002 by Lawrence H. Goulder. All rights reserved.

About the author



Lawrence H. Goulder is the Shuzo Nishihara Professor in Environmental and Resource Economics at Stanford. He is also a Senior Fellow at SIEPR and Stanford's Institute for International Studies, a Research Associate at the National Bureau of Economic Research, and a University Fellow of Resources for the Future.

Goulder's research examines the environmental and economic impacts of U.S. and international environmental policies. He has focused on policies to reduce emissions of "greenhouse gases" that contribute to climate change, and on "green tax reform" – revamping the tax system to introduce taxes on pollution and reduce taxes on labor effort or investment. In other work he has examined the interplay between environmental policies and technological innovation. Goulder has conducted analyses for several government agencies and environmental organizations. At Stanford he teaches courses in environmental economics and policy. He graduated from Harvard College with an A.B. in Philosophy, and received his Ph.D. in Economics from Stanford.

The Stanford Institute for Economic Policy Research (SIEPR) conducts research on important economic policy issues facing the United States and other countries. SIEPR's goal is to inform policy makers and to influence their decisions with long-term policy solutions.

With this goal in mind SIEPR policy briefs are meant to inform and summarize important research by SIEPR faculty. Selecting a different economic topic each month, SIEPR will bring you up-to-date information and analysis on the issues involved.

SIEPR Policy Briefs reflect the views of the author. SIEPR is a non-partisan institute and does not take a stand on any issue.

For additional copies, please see SIEPR website at: <http://SIEPR.stanford.edu>