# CBO TESTIMONY

**Statement of**
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# Approaches to Reducing Carbon Dioxide Emissions

**before the**
**Committee on the Budget**
**U.S. House of Representatives**

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Mr. Chairman, Congressman Ryan, and Members of the Committee, thank you for the invitation to discuss issues related to reducing U.S. emissions of greenhouse gases, most prominently carbon dioxide ($CO_2$).

Global climate change is one of the nation's most significant long-term policy challenges. Human activities are producing increasingly large quantities of greenhouse gases, particularly $CO_2$. The accumulation of those gases in the atmosphere is expected to have potentially serious and costly effects on regional climates throughout the world. The magnitude of such damage remains highly uncertain. But there is growing recognition that some degree of risk exists for the damage to be large and perhaps even catastrophic.

Reducing greenhouse-gas emissions would be beneficial in limiting the degree of damage associated with climate change, especially the risk of significant damage. However, decreasing those emissions would also impose costs on the economy—in the case of $CO_2$, because much economic activity is based on fossil fuels, which release carbon in the form of carbon dioxide when they are burned. Most analyses suggest that a carefully designed program to begin lowering $CO_2$ emissions would produce greater benefits than costs.

The specific policy approach adopted to reduce emissions can have significant effects on the costs involved and on their distribution. In particular, an incentive-based approach for curbing $CO_2$ emissions is substantially more economically efficient than alternative "command-and-control" policies, which might dictate specific technologies or set standards for particular products or producers. An incentive-based approach to lowering $CO_2$ emissions could be implemented in two main ways: by regulating the price of those emissions (for example, by taxing emissions) or by adopting a market-based system to regulate the quantity of emissions (for example, by establishing a "cap-and-trade" program for them). Either approach would raise the price for consuming goods and services that result in $CO_2$ emissions. Those price increases could provide an effective financial incentive for firms and households throughout the economy to take actions that would decrease emissions.

My testimony makes the following key points about those issues:

- The risk of potentially catastrophic damage from climate change can justify taking action to reduce that risk in much the same way that the hazards we all face as individuals motivate us to buy insurance. Some of society's resources may best be devoted to addressing climate change even if the most severe risks ultimately do not materialize.

- Although both a tax on emissions and a cap-and-trade system use the power of markets to achieve their desired results, a tax is generally the more efficient approach. The efficiency of a cap-and-trade program can be enhanced, however, through various design mechanisms, such as a "safety valve" that would allow additional emission allowances to be sold when the price of an allowance exceeded a specified level.

- Under a cap-and-trade program, a key decision for policymakers is whether to sell emission allowances or to give them away. The value of those allowances would probably be substantial: Under the range of cap-and-trade policies now being considered by the Congress, the annual value of emission allowances would be roughly $50 billion to $300 billion by 2020 (measured in 2006 dollars). More-stringent caps would result in higher total allowance values.

- Policymakers' decisions about how to allocate the allowances could have significant effects on the overall economic cost of capping $CO_2$ emissions, as well as on the distribution of gains and losses among U.S. households. Giving allowances away to companies that supply fossil fuels or that use large quantities of fossil fuels in their production processes could create "windfall" profits for those firms. The reason is that the cap-and-trade program would still result in higher prices for consumers and households but would not impose additional costs on those firms. Even if the companies received allowances for free, they would still raise prices to their customers because the cost of using an emission allowance for production—rather than selling it to another firm—would be embodied in the prices that they would charge for their goods and services. The resulting price increases would disproportionately affect people at the lower end of the income scale.

- If the government chose to sell emission allowances, it could use the revenue to offset the disproportionate economic burden that higher prices would impose on low-income households. Selling allowances could also significantly lessen the macroeconomic impact of a $CO_2$ cap. Evidence suggests that the macroeconomic cost of a 15 percent cut in U.S. emissions (not counting any benefits from mitigating climate change) might be more than twice as large if policymakers gave allowances away than if they sold the allowances and used the revenue to lower current taxes on labor or capital that discourage economic activity, such as income or payroll taxes.

- The budgetary treatment of a federal cap-and-trade system for $CO_2$ emissions is an important topic that has received relatively little attention. If the federal government sold emission allowances, the proceeds would clearly be scored as federal receipts. The appropriate treatment of allowances issued at no charge is less clear. There is a solid case to be made that even allowances that were given away by the government should be reflected in the budgetary scoring process—specifically, that the value of any allowances initially distributed at no cost to the recipients should be scored as both revenues and outlays, with no net effect on the budget deficit. A different perspective would suggest that issuing allowances at no charge should be viewed as a straightforward regulatory action, with no direct budgetary consequences.

## The Benefits of Reducing Greenhouse-Gas Emissions

Human activities—industry, transportation, power generation, and land use—produce large quantities of greenhouse gases. Those gases are accumulating in the atmosphere more rapidly than natural processes can remove them. Atmospheric concentrations of $CO_2$, for example, have risen from 280 parts per million in the preindustrial era to about 380 parts per million today. The result of that and other greenhouse-gas accumulation has been a gradual warming of the global climate: Average temperatures have already increased by about 0.8°C (1.4°F).

Under a business-as-usual case, the total stock of greenhouse gases in the atmosphere would rise significantly, and estimates suggest that the global climate could warm by at least another 2°C to 6°C (4°F to 11°F) over the coming century. Such warming would impose economic and social costs—for example, by raising sea levels, altering agricultural zones, and increasing the severity of storms and droughts. At the higher end of the range of projections, the amount of warming to come would be at least as great as the amount that has occurred since the depths of the last ice age and could produce unexpected, rapid, and very costly changes in the Earth's climate. Some experts think that the effects of climate change could be modest, especially if society is ingenious in adapting to the change. However, other experts are concerned that rising concentrations of greenhouse gases could produce much more severe consequences for the global and U.S. economies than have generally been projected—as well as other costs, such as mass species extinction, that are difficult to quantify in economic terms.

Curbing greenhouse-gas emissions would help reduce not only the expected costs of future global climate change but also the chances of irreversible or potentially catastrophic damage. The Congressional Budget Office (CBO) has no basis to judge the scientific merits of the more extreme outcomes. But in general, the possibility of such extreme costs provides an economic motivation for additional action to moderate the growth of emissions—and, potentially, to reduce emissions to very low levels in the longer run. Individuals take actions, such as mitigating risky behavior or buying insurance, to reduce their harm from extreme events. Similarly, societies or governments do and should take actions to avoid catastrophic collective harm. The difficulty for policymakers is determining the appropriate cost to be paid today to reduce what may be a small risk of a potentially catastrophic event in the future.[1]

## Incentive-Based Approaches to Reducing Emissions

Any effort to limit $CO_2$ emissions would have two principal effects: It would produce long-term economic benefits by avoiding some future climate-related damage, and it would impose immediate economic costs by reducing the use of fossil

1. For more discussion of policy choices in the face of catastrophic costs, see Cass R. Sunstein, *Worst-Case Scenarios* (Cambridge, Mass.: Harvard University Press, 2007).

fuels. Most analyses suggest that a carefully designed program to begin lowering $CO_2$ emissions would produce greater benefits than costs.

Employing incentive-based policies to reduce $CO_2$ emissions would be much more cost-effective than using more-restrictive command-and-control approaches (such as imposing technology standards on electricity generators). Command-and-control approaches rely on policymakers to determine where or how emissions should be cut. Incentive-based policies, by contrast, use the power of markets to identify the least expensive sources of emission reductions. Thus, they can better reflect technological advances, differences between industries or companies in the ability to make low-cost emission reductions, and changes in market conditions.

The two main incentive-based approaches to reducing $CO_2$ emissions are to tax such emissions or to establish a cap-and-trade program for them. Under a tax, a levy would be imposed on $CO_2$ emissions or on the carbon content of goods (which is ultimately released in the form of $CO_2$). Under a cap-and-trade program, policymakers would set a limit (the cap) on total emissions during some period and would require regulated entities to hold rights, or allowances, to the emissions permitted under that cap. After allowances were initially distributed, entities would be free to buy and sell them (the trade part of the program). Reducing emissions to the level required by the cap would be accomplished mainly by stemming demand for carbon-based energy through increasing its price.[2] The size of the required price increase would depend on the extent to which emissions had to be reduced—larger reductions would require larger price increases to reduce demand sufficiently.

## Efficiency Advantages of a Tax on $CO_2$ Emissions

Although both types of incentive-based approaches are significantly more efficient than command-and-control policies, studies typically find that over the next several decades, a well-designed tax would yield higher net benefits than a cap-and-trade approach. A tax creates relative certainty about the *cost* of emission reductions each year, because firms will undertake such reductions until the cost of decreasing emissions by another ton just equals the tax on an additional ton of emissions. A cap-and-trade program, by contrast, creates relative certainty about the *quantity* of emission reductions each year, because the cap limits total annual emissions. In terms of the impact on the climate, however, it does not matter

2. Emissions could also be reduced to some extent through "carbon sequestration" —the capture and long-term storage of $CO_2$ emissions underground (geological sequestration) or in vegetation or soil (biological sequestration). For more information, see Congressional Budget Office, *The Potential for Carbon Sequestration in the United States* (September 2007).

greatly whether a given cut in emissions occurs in one year or the next.[3] From that perspective, a tax has an important advantage: It allows emission reductions to take place in years when they are relatively cheap. Various factors can affect the cost of emission reductions from year to year, including the weather, the level of economic activity, and the availability of new low-carbon technologies (such as improvements in wind-power technology). By shifting emission-reduction efforts into years when they are relatively less expensive, a tax can allow the same cumulative reduction to occur over many years at lower cost than can a cap-and-trade program with specified annual emission levels. In addition, by avoiding the potential volatility of allowance prices that might result from a rigid annual cap, a tax could be less disruptive for affected companies.

The relative advantages of a tax and a cap-and-trade program could change over time, however. For example, because a cap creates relative certainty about the level of emissions, it could become more efficient than a tax if additional emissions were likely to trigger a sharp increase in damage, or if new technologies offered the opportunity to make extremely large cuts in emissions at a low and fairly constant cost. Analysts who have tried to define more precisely the conditions under which a cap would be more efficient than a tax have found those conditions to be quite narrow and not likely to be relevant in the near term. Specifically, scientists would need to have fairly precise knowledge about the level of an emissions threshold—beyond which additional emissions would trigger a sharp increase in total global damage—and such a threshold would have to be sufficiently close that policymakers would want to make very large cuts in emissions each year to avoid crossing it.[4] In the absence of those conditions, a tax offers a more efficient approach for reaching a multiyear emission-reduction target.

## Enhancing the Efficiency of a Cap-and-Trade System

Although a tax is a more efficient policy in the near term, the efficiency of a cap-and-trade approach can be enhanced by various design features. In addition, some participants in the policy discussion believe that analytical comparisons of a tax

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3. Although it is difficult to measure, the long-term cumulative nature of climate change implies that the *benefit* of emitting one less ton of $CO_2$ in a given year—referred to as the marginal benefit—is roughly constant. In other words, the benefit in terms of averted climate damage from each additional ton of emissions reduced is roughly the same as the benefit from the previous ton of emissions reduced, and shifting the reductions from one year to another does not materially affect the ultimate impact on the climate. In contrast, the *cost* of emitting one less ton of $CO_2$ in a given year—the marginal cost—tends to increase with successive emission reductions. The reason is that the least expensive reductions are made first and progressively more-expensive cuts would then have to be made to meet increasingly ambitious targets for emission reductions.

4. See William A. Pizer, *Climate Change Catastrophes,* Discussion Paper 03-31 (Washington, D.C.: Resources for the Future, May 2003).

and a cap-and-trade system ignore the idea that policymakers may be more inclined to set a tight cap than a correspondingly high tax.[5]

Policymakers could capture some of the efficiency advantages of a tax, while maintaining the structure of a cap-and-trade program, by adding features that would help keep the price of allowances in line with the anticipated benefits of emission cuts. For example, a price cap—typically referred to as a safety valve—and a price floor could keep the price of allowances from climbing too far above or falling too far below the anticipated benefits of emission reductions. The government could implement a safety valve by agreeing to sell as many allowances as firms wanted to buy at a specified price. (If the safety valve was triggered, emissions would exceed the level of the cap.) A price floor could be implemented if policymakers decided to sell a significant fraction of the allowances in an auction and set an auction reserve price. Alternatively, rather than setting a price floor, policymakers could allow firms to "bank" allowances when the cost of reducing emissions was low and to use those allowances in the future when costs were higher. Banking would keep the price of allowances from falling too low, provided that prices were expected to be higher in the future.

The effects of a cap-and-trade system would also depend substantially on whether the allowances were sold or issued at no cost, as discussed below.

## The Distributional Consequences of a Cap-and-Trade Program

By establishing a cap-and-trade program, policymakers would create a new commodity: the right to emit $CO_2$. The emission allowances—each of which would represent the right to emit, say, one ton of $CO_2$—would have substantial value. Based on a review of the existing literature and the range of $CO_2$ policies now being debated, CBO estimates that the value of those allowances could total between $50 billion and $300 billion annually (in 2006 dollars) by 2020. The actual value would depend on various factors, including the stringency of the cap (which would need to grow tighter over the years to keep $CO_2$ from continuing to accumulate), the possibility of offsetting $CO_2$ emissions through carbon sequestration or international allowance trading, and other features of the specific policy selected.[6]

Policymakers would need to decide how to allocate the allowances that would correspond to each year's $CO_2$ cap. One option would be to have the government

5. Some analysts also suggest that a cap-and-trade program could be more politically acceptable than a tax because distributing the allowances for free could provide a method of directly compensating producers in the most affected industries. See Robert N. Stavins, *A U.S. Cap-and-Trade System to Address Global Climate Change* (Washington, D.C.: Brookings Institution, October 2007). The revenues from a tax could be used in a similar fashion, however.

6. For information about carbon sequestration, see footnote 2.

capture their value by selling the allowances, as it does with licenses to use the electromagnetic spectrum. Another possibility would be to give the allowances to energy producers or some energy users at no charge. The European Union has used that second approach in its 2-year-old cap-and-trade program for $CO_2$ emissions, and nearly all of the allowances issued under the 12-year-old U.S. cap-and-trade program for sulfur dioxide emissions (which contribute to acid rain) are distributed in that way. Policymakers' decision about whether to sell the allowances or to give them away would have significant implications for the distribution of gains and losses among U.S. households and for the overall cost of the policy.

The ultimate distributional impact of a cap-and-trade program would be the net effect of two distinct components: the distribution of the cost of the program (including the cost of paying for the allowances) and the distribution of the allowances' value (because someone will pay for them, someone will benefit from their value). Market forces would determine who bore the costs of a cap-and-trade program, but policymakers would determine who received the allowance value. The ultimate effect could be either progressive or regressive.

## Market Forces Would Determine Who Bore the Costs of a Cap

Obtaining allowances—or taking steps to cut emissions to avoid the need for such allowances—would become a cost of doing business for firms that were subject to the $CO_2$ cap. However, those firms would not ultimately bear most of the costs of the allowances. Instead, they would pass along most such costs to their customers (and their customers' customers) in the form of higher prices. By attaching a cost to $CO_2$ emissions, a cap-and-trade program would thus lead to price increases for energy and energy-intensive goods and services that contribute the most to those emissions. Such price increases stem from the restriction on emissions and would occur regardless of whether the government sold emission allowances or gave them away. Indeed, the price increases would be essential to the success of a cap-and-trade program because they would be the most important mechanism through which businesses and households were encouraged to make investments and behavioral changes that reduced $CO_2$ emissions.

The rise in prices for energy and energy-intensive goods and services would impose a larger burden, relative to income, on low-income households than on high-income households. For example, not incorporating any benefits to households from lessening climate change, CBO estimated that the price increases resulting from a 15 percent cut in $CO_2$ emissions would cost the average household in the lowest one-fifth of the income distribution about 3.3 percent of its

**Table 1.**

## Effects on U.S. Households of the Higher Prices Resulting from a 15 Percent Cut in $CO_2$ Emissions

| | Average for Income Quintile | | | | |
|---|---|---|---|---|---|
| | Lowest | Second | Middle | Fourth | Highest |
| Annual Cost Increase in 2006 Dollars | 680 | 880 | 1,160 | 1,500 | 2,180 |
| Annual Cost Increase as a Percentage of Income[a] | 3.3 | 2.9 | 2.8 | 2.7 | 1.7 |

Source: Congressional Budget Office, *Who Gains and Who Pays Under Carbon-Allowance Trading? The Distributional Effects of Alternative Policy Designs* (June 2000).

Notes: These numbers do not reflect any of the benefits from reducing climate change.

The policy examined here is a cap-and-trade program designed to lower U.S. carbon dioxide ($CO_2$) emissions by 15 percent from 1998 levels. (CBO performed the analysis in 2000 and used 1998 emission levels so that the distributional effects could be based on actual, rather than projected, data on consumer spending and taxes.) CBO assumed that the full cost of cutting emissions would be passed along to consumers in the form of higher prices and that the price increase for a given product would be proportional to the amount of $CO_2$ emitted from the fossil fuels used in its production.

These numbers reflect data on each quintile's cash consumption and estimates of cash income. (A quintile contains one-fifth of U.S. households arrayed by income.) Because of data limitations, the numbers should be viewed as illustrative and broadly supportive of the conclusions in this analysis rather than as precise estimates.

a. The cost increases are equivalent to percentage declines in households' after-tax income.

income but the average household in the top quintile about 1.7 percent of its income (see Table 1).[7]

The higher prices that would result from a cap on $CO_2$ emissions would reduce demand for energy and energy-intensive goods and services. Thus, those price increases would create losses for some current investors and workers in the sectors that produce such goods and services. Investors could see their stock values decline, and workers could face the risk of unemployment as jobs in those sectors were cut. Stock losses would tend to be widely dispersed among investors, because shareholders typically have diversified portfolios. In contrast, the costs borne by

7. Those calculations are based on cash income, which excludes in-kind transfers and accrued but still unrealized income. CBO could have presented results based on alternative measures of income, such as adjusted family income, which adjusts for family size. Using that measure would alter the quantitative results slightly but would not affect the conclusions of the analysis in any qualitative way. The numbers are based on an analysis that CBO conducted using 1998 data; see Congressional Budget Office, *Who Gains and Who Pays Under Carbon Allowance Trading? The Distributional Effects of Alternative Policy Designs* (June 2000). In an updated analysis, the qualitative findings would be unlikely to change, but the quantitative results could be significantly different because of various factors, including changes in the distribution of income and in marginal tax rates.

existing workers would probably be concentrated among relatively few households and, by extension, their communities.

## Policymakers Would Determine Who Received the Value of the Allowances

Although the price increases triggered by a cap-and-trade program for $CO_2$ emissions would be regressive, the policy's ultimate distributional effect would depend on policymakers' decisions about how to allocate the emission allowances. As noted above, those allowances would be worth tens or hundreds of billions of dollars per year. Who received that value would depend on how the allowances were distributed.

Lawmakers could more than offset the price increases experienced by low-income households or the costs imposed on workers in particular sectors by providing for the sale of some or all of the allowances and using the revenue to pay compensation. For example, CBO examined the ultimate distributional effects of a cap-and-trade program that would reduce U.S. $CO_2$ emissions by 15 percent and concluded that lower-income households could be better off (even without including any benefits from reducing climate change) as a result of the policy if the government chose to sell the allowances and used the revenue to pay an equal lump-sum rebate to every household in the United States. In that case, the size of the rebate would be larger than the average increase in low-income households' spending on energy and energy-intensive goods.[8] Such a strategy would increase average income for households in the lowest income quintile by 1.8 percent (see the top panel of Figure 1). At the same time, average income for households in the top quintile would fall by 0.7 percent, CBO estimates.

Conversely, giving all or most of the allowances to energy producers to offset the potential losses of investors in those industries—as was done in the cap-and-trade program for sulfur dioxide emissions—would exacerbate the regressivity of the price increases. On average, the value of the $CO_2$ allowances that producers would receive would more than compensate them for any decline in profits caused by a drop in the demand for energy and energy-intensive goods and services that cause emissions. As a result, the companies that received allowances could experience "windfall" profits, with the government regaining only part of that windfall through corporate income taxes. For example, one study suggested that if emissions were reduced by 23 percent and all of the allowances were distributed for free to producers in the oil, natural gas, and coal sectors, stock values would double for oil and gas producers and increase more than sevenfold for coal producers,

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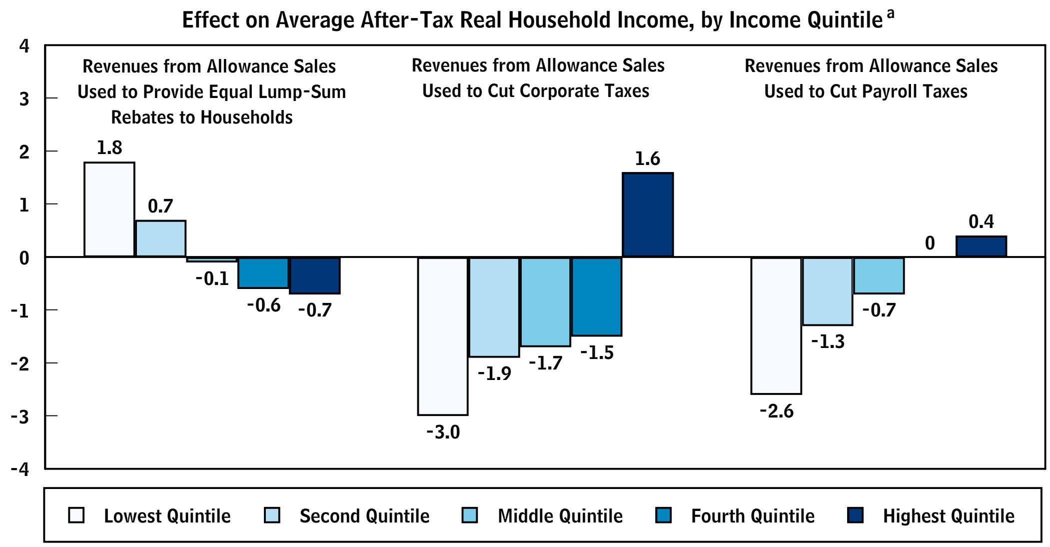
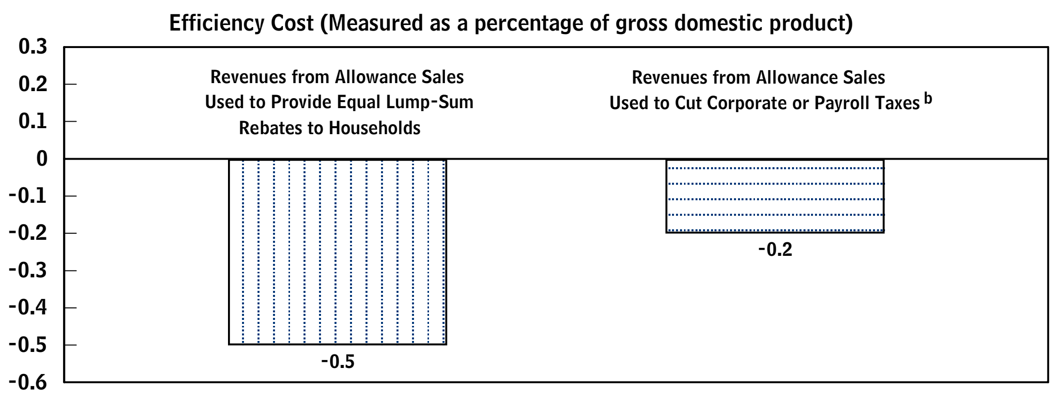
8. One researcher has suggested that an environmental tax credit based on earnings could offer another means of reducing the regressive effects of the price increases that would result from a tax or cap on $CO_2$ emissions. See Gilbert E. Metcalf, *A Proposal for a U.S. Carbon Tax Swap* (Washington, D.C.: Brookings Institution, October 2007).

**Figure 1.**

## Effects of a 15 Percent Cut in $CO_2$ Emissions, with Allowances Sold and the Revenues Used in Various Ways

(Percentage change)




Sources: Congressional Budget Office (top panel); Terry M. Dinan and Diane Lim Rogers (bottom panel), "Distributional Effects of Carbon Allowance Trading: How Government Decisions Determine Winners and Losers," *National Tax Journal,* vol. 55, no. 2 (June 2002).

Notes: These figures do not reflect any of the benefits from reducing climate change.

The policy examined here is a cap-and-trade program designed to reduce carbon dioxide ($CO_2$) emissions by 15 percent from 1998 levels. (CBO performed the analysis in 2000 and used 1998 emission levels so the distributional effects could be based on actual, rather than projected, data on consumer spending and taxes.) In the top panel, the costs of the cap-and-trade policy are shown as decreases in real household income, measured as a percentage of after-tax income before the policy change. Those numbers reflect data on each quintile's cash consumption and estimates of cash income. (A quintile contains one-fifth of U.S. households arrayed by income.) Because of data limitations, those numbers should be viewed as illustrative and broadly supportive of the conclusions in this analysis rather than as precise estimates.

a. Indicates the net effect of households' increased expenditures because of cap-induced price increases and the income that households would receive as a result of the allowance-allocation strategy.

b. This estimate by Dinan and Rogers does not distinguish between the gains in economic efficiency associated with reducing corporate taxes and the gains associated with reducing payroll taxes. It implicitly assumes that capital and labor respond similarly to changes in the taxes on them and that increases in marginal tax rates on capital and labor have similar effects on economic efficiency. That assumption differs from the assumptions that CBO typically uses in analyzing the effects of policy changes on the economy.

compared with projected values in the absence of a cap.[9] If emissions were instead reduced by 15 percent, as in the scenario discussed above, profits in those sectors would rise several fold. For example, in 2000, CBO examined the effects of reducing emissions from 1998 levels and estimated that under a 15 percent cut, the value of allowances would be 10 times as large as coal, oil, and natural gas producers' combined profits in 1998 and more than double their profits in 2006.[10] Because the additional profits would not depend on how much a company produced, they would be unlikely to prevent the declines in production and resulting job losses that would stem from the price increases.

In addition, those profits would accrue to shareholders, who are primarily from higher-income households, and would more than offset those households' increased spending on energy and energy-intensive goods and services. Low-income households, by contrast, would benefit little if allowances were given to energy producers for free, and they would still bear a disproportionate burden from price increases. Thus, giving away allowances would be significantly regressive, making higher-income households better off as a result of the cap-and-trade policy while making lower-income households worse off (see the top panel of Figure 2, which, like Table 1 and Figure 1, does not incorporate the benefits of reducing climate change). That regressive outcome could occur even if the government used its share of the allowance value—received through corporate income taxes on the windfall profits—to provide lump-sum rebates to households.

Giving away all of the allowances and using the government's regained share of their value to reduce corporate tax rates would be particularly regressive. In that scenario (once again not including any benefits from reducing climate change), average household income would fall by 3.0 percent in the lowest quintile and rise by 1.9 percent in the highest quintile. However, that approach would help lessen the macroeconomic cost of the cap on $CO_2$ emissions.

## Reducing the Overall Economic Impact of a $CO_2$ Cap

The ways in which lawmakers could allocate the revenue from selling emission allowances would affect not only the distributional consequences but also the total economic cost of a cap-and-trade policy. For instance, the government could use the revenue from auctioning allowances to reduce existing taxes that tend to dampen economic activity—primarily, taxes on labor, capital, or personal income. Research indicates that a $CO_2$ cap would exacerbate the economic effects of such

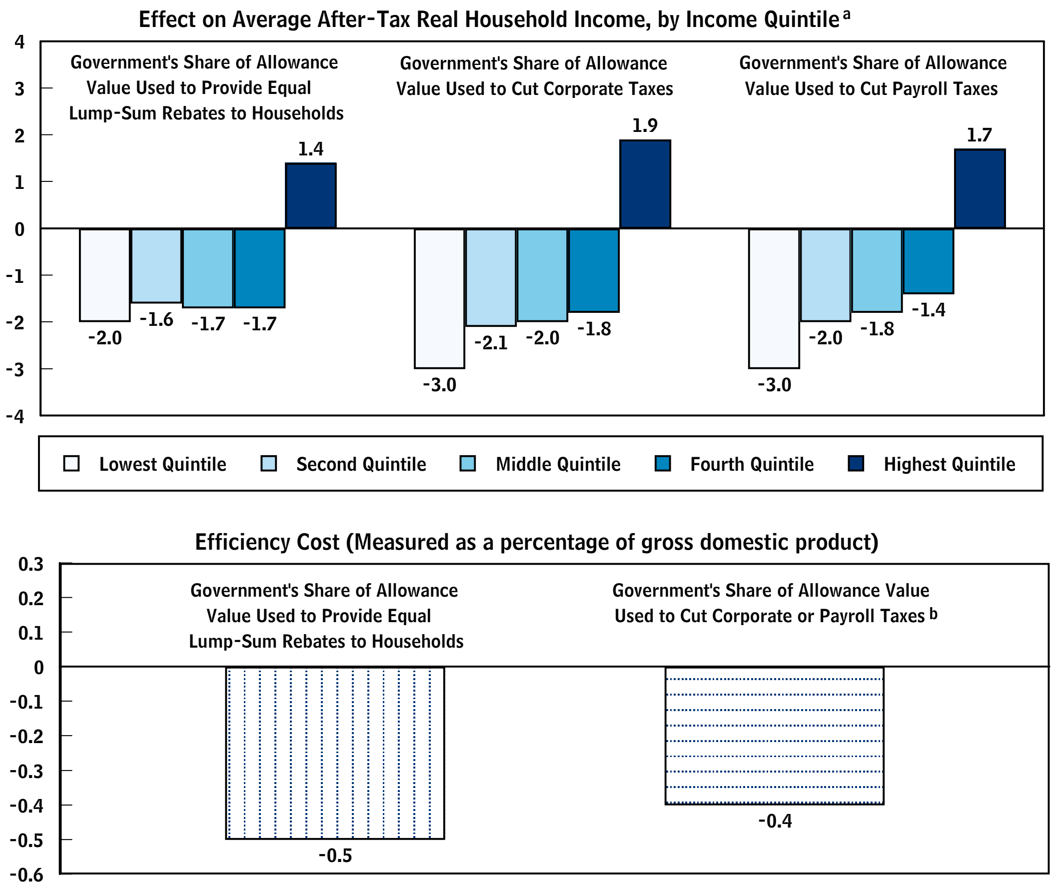
9. Lawrence H. Goulder, *Mitigating the Adverse Impacts of $CO_2$ Abatement Policies on Energy-Intensive Industries,* Discussion Paper 02-22 (Washington, D.C.: Resources for the Future, March 2002), Table 3.

10. Specifically, CBO estimated that the value of those allowances would total $155 billion (in 2006 dollars). By comparison, profits for U.S. producers of oil, natural gas, and coal totaled $13.5 billion in 1998 (in 2006 dollars). Those companies' total profits were substantially higher in 2006: $174 billion.

**Figure 2.**

# Effects of a 15 Percent Cut in $CO_2$ Emissions, with Allowances Given Away and the Government's Share of Their Value Used in Various Ways

(Percentage change)




Sources: Congressional Budget Office (top panel); Terry M. Dinan and Diane Lim Rogers (bottom panel), "Distributional Effects of Carbon Allowance Trading: How Government Decisions Determine Winners and Losers," *National Tax Journal,* vol. 55, no. 2 (June 2002).

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The policy examined here is a cap-and-trade program designed to reduce carbon dioxide ($CO_2$) emissions by 15 percent from 1998 levels. (CBO performed the analysis in 2000 and used 1998 emission levels so the distributional effects could be based on actual, rather than projected, data on consumer spending and taxes.) The government is assumed to distribute emission allowances for free but to regain some of their value by taxing the additional corporate profits resulting from free distribution. In the top panel, the costs of the cap-and-trade policy are shown as decreases in real household income, measured as a percentage of after-tax income before the policy change. Those numbers reflect data on each quintile's cash consumption and estimates of cash income. (A quintile contains one-fifth of U.S. households arrayed by income.) Because of data limitations, those numbers should be viewed as illustrative and broadly supportive of the conclusions in this analysis rather than as precise estimates.

a. Indicates the net effect of households' increased expenditures because of cap-induced price increases and the income that households would receive as a result of the allowance-allocation strategy.

b. This estimate by Dinan and Rogers does not distinguish between the gains in economic efficiency associated with reducing corporate taxes and the gains associated with reducing payroll taxes. It implicitly assumes that capital and labor respond similarly to changes in the taxes on them and that increases in marginal tax rates on capital and labor have similar effects on economic efficiency. That assumption differs from the assumptions that CBO typically uses in analyzing the effects of policy changes on the economy.

taxes: The higher prices caused by the cap would lower real (inflation-adjusted) wages and real returns on capital, which would be equivalent to raising marginal tax rates on those sources of income. Using the allowance value to reduce such taxes could help mitigate that adverse effect of the cap. Alternatively, policy-makers could choose to use the revenue from auctioning allowances to reduce the federal deficit. If that reduction lessened the need for future tax increases, the end result could be similar to dedicating the revenue to cutting existing taxes.

The decision about whether or not to sell the allowances and use the proceeds in ways that would benefit the economy could have a significant impact. For example, researchers estimate that the efficiency cost of a 15 percent cut in emissions could be reduced by more than half if the government sold allowances and used the revenue to lower corporate income taxes, rather than devoting it to providing lump-sum rebates to households (see the bottom panel of Figure 1). The efficiency cost of a policy reflects the economic losses that occur because prices in the economy are distorted in ways that do not reflect the (nonenvironmental) resources used in their production. That cost includes decreases in the productive use of labor and capital as well as costs (both monetary and nonmonetary) associated with reducing emissions. To provide perspective on the magnitude of such efficiency costs, they are depicted as a share of gross domestic product.

Giving the allowances away to producers, by contrast, would largely prevent the government from using the allowance value in ways that would lower the cap's total cost to the economy. For example, as indicated in the bottom panels of Figures 1 and 2, selling the allowances and using the revenue to reduce existing taxes that discourage economic activity would entail only about half the efficiency cost of giving the allowances away and devoting any revenue that the government regained (through the corporate income tax) to reducing those types of taxes.

## The Federal Budgetary Treatment of a Cap-and-Trade Program

The budgetary treatment of a federal cap-and-trade program for carbon dioxide is an important topic, although it has received little attention. Auctioning off allowances would clearly generate receipts for the federal government, and those amounts would be recorded as revenues or as offsetting receipts (reductions in outlays) in the federal budget. For example, if the government conducted an auction of cap-and-trade allowances and received $100 for them, the $100 would be recorded in the federal budget as a receipt.

The appropriate treatment of allowances issued at no charge is less clear, however. A solid case can be made that even allowances that are given away by the government should be reflected in the federal budgetary scoring process—specifically, the scoring should show, as both revenues and outlays, the value of any allowances distributed at no cost to the recipients. If the allowances given away by the government were worth $100, the budgetary scoring process would record the $100 as both a revenue and an outlay.[11] The net effect on the budget deficit or surplus would be zero, since the value of such allowances would increase revenues and outlays by the same amount.

Several considerations motivate that type of approach to scoring $CO_2$ allowances. The government is essential to the existence of the allowances and is responsible for their readily realizable monetary value through its enforcement of the cap on emissions. (The allowances would trade in a liquid secondary market, since firms or households could buy and sell them, and thus they would be similar to cash.) In addition, that type of scoring approach best illuminates the trade-offs between different policy choices. Distributing allowances at no charge to specific firms or individuals is, in effect, equivalent to collecting revenue from an auction of the allowances and then distributing the auction proceeds to those firms or individuals. In other words, the government could either raise $100 by selling allowances and then give that amount in cash to particular businesses and individuals, or it could simply give $100 worth of allowances to those businesses and individuals, who could immediately and easily transform the allowances into cash through the secondary market. Treating allowances that were issued at no charge as both a revenue and an outlay would mean that those two equivalent transactions were reflected in parallel ways in the scoring process.

A different perspective would suggest that issuing allowances at no charge should be viewed as a straightforward regulatory act, with no direct budgetary consequences. That perspective stresses that the federal budget is primarily a cash-based concept, and granting allowances at no cost involves no cash transaction between the government and the private sector. That approach would be the same as the one now applied to the Environmental Protection Agency's issuance of emission allowances for sulfur dioxide.

As legislative proposals to create a cap-and-trade system for $CO_2$ emissions are introduced in coming months, CBO will evaluate those approaches to scoring such proposals.

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11. The value of allowances that were given away could be estimated either from the prices of any allowances that were auctioned or from the prices at which allowances were subsequently bought and sold by firms.