

**GAO**

Testimony  
Before the Committee on Finance,  
U.S. Senate

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For Release on Delivery  
Expected at 10:00 a.m. EDT  
Tuesday, August 4, 2009

# CLIMATE CHANGE POLICY

## Preliminary Observations on Options for Distributing Emissions Allowances and Revenue under a Cap-and- Trade Program

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Highlights of [GAO-09-950T](#), a testimony before the Committee on Finance, U.S. Senate

## Why GAO Did This Study

Congress is considering proposals to establish a price on greenhouse gas emissions through a cap-and-trade program that would limit overall emissions and require covered entities to hold tradable emissions permits, or allowances, for their emissions. The purpose of such a program is to raise the cost of activities that produce emissions and thereby provide an economic incentive to decrease emissions.

Carbon dioxide, which results from burning fossil fuels, is the primary greenhouse gas and accounts for about 80 percent of U.S. emissions. A cap-and-trade program would increase the cost of burning fossil fuels and other activities that generate emissions and potentially raise costs for consumers. A key decision is the extent to which the government offsets these costs. For example, the government could sell the allowances and then return the revenues to covered entities or households. The government could also give away some or all of the allowances. According to the Congressional Budget Office, the value of the allowances could total \$300 billion annually by 2020.

Today's testimony provides preliminary results of ongoing work assessing the potential effects of (1) allowance allocation methods, and (2) options for distributing program revenues or the economic value of allowances.

GAO reviewed economic literature and interviewed experts in climate policy, including those involved in existing cap-and-trade programs.

View [GAO-09-950T](#) or key components. For more information, contact John Stephenson, (202) 512-3841, [stephensonj@gao.gov](mailto:stephensonj@gao.gov)

## CLIMATE CHANGE POLICY

### Preliminary Observations on Options for Distributing Emissions Allowances and Revenue under a Cap-and-Trade Program

#### What GAO Found

The method for allocating allowances in a cap-and-trade program can have significant economic implications for the government, regulated entities, and households. Most importantly, a cap-and-trade system would create a market for a valuable new commodity: emissions allowances. The government could allocate these allowances to regulated entities in three main ways. First, it could auction all of the allowances and collect a significant amount of revenue that it could use, for example, to compensate households affected by the cap-and-trade program. Second, it could give away the allowances to entities affected by the program and thereby transfer the value of the allowances to those entities. This could enhance the program's appeal to covered entities but could also increase the program's overall cost to the economy if it reduced incentives for those entities to decrease their emissions. Third, the government could give away some allowances and auction the rest. For example, studies have suggested that freely allocating 6 to 21 percent of the allowances created by a cap-and-trade program would be sufficient to compensate entities in energy-intensive industries for any profit losses incurred as a result of the cap-and-trade program. According to the economic literature and economists we interviewed, regardless of the mechanism for distributing allowances, consumers will bear most of the costs of a cap-and-trade system because most regulated entities will pass along their increased costs in the form of increased prices; however, these costs could be largely offset depending on how revenues are used.

Available literature and economists we interviewed point to five main options for distributing a program's allowance revenues, although numerous other options exist. First, the government could lower the overall cost of the cap-and-trade program to the economy through accompanying reductions in taxes on income, labor, or investment. Second, auction revenues could be distributed to households through lump-sum payments, which could offset the higher consumer prices resulting from a cap-and-trade program and mitigate any disproportionate impacts on low-income households. Third, the government could expand the scope of the Earned Income Tax Credit to further benefit low-income working families. Fourth, the government could compensate regulated entities and their shareholders for lost profits by allocating them free allowances. Finally, revenues might be used to fund climate-related programs, such as research on low-carbon technologies, or used to support climate change mitigation activities in developing nations. Each potential use of revenues has trade-offs. For example, decreasing tax rates could lower the overall economic cost of the program; however, this approach may do little to compensate low-income consumers, who would receive greater benefit from a direct rebate. In addition, using revenues to dampen increases in energy prices may benefit ratepayers but reduce their incentives to conserve energy, potentially increasing the program's overall cost.

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Mr. Chairman and Members of the Committee:

I am pleased to be here today to discuss our preliminary observations on different options for distributing allowances and revenue under a potential cap-and-trade program intended to address climate change. Elevated concentrations of greenhouse gases in the atmosphere as a result of the combustion of fossil fuels and other sources may cause significant changes in the earth's climate.<sup>1</sup> Potential impacts from climate change include rising sea levels and shifts in weather patterns, both of which pose threats to coastal and other infrastructure. Concerns about the potential effects of climate change have led Congress to consider legislation that would limit greenhouse gas emissions nationwide. Because the harm caused by U.S. emissions of greenhouse gases is not generally incorporated into the underlying costs of goods and services, many proposals to limit greenhouse gas emissions involve placing a price on greenhouse gases emitted by businesses and other entities covered under the program (hereafter referred to as "covered entities"). In this way, the price on emissions would provide covered entities with an economic incentive to emit less. It could also provide consumers with incentives to reduce their consumption of carbon-intensive goods and services. The impact of these incentives depends on the program's stringency.

One option for pricing emissions is a cap-and-trade program, in which the government would limit the overall quantity of emissions and issue permits to covered entities. These permits—also known as allowances—would each represent a set quantity of greenhouse gas emissions, such as one metric ton. Allowances could be purchased and sold, creating a market in which the price of emissions fluctuated with supply and demand. The government could also generate substantial revenue through this program by selling allowances to covered entities, as opposed to giving them away for free. Recently, the House of Representatives passed H.R. 2454, the American Clean Energy and Security Act, which would, among other things, create a cap-and-trade program covering about 85 percent of U.S. emissions.

In addition to potentially providing the benefits of emissions reductions, a cap-and-trade program could also impose costs on covered entities and

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<sup>1</sup>The six primary greenhouse gases are carbon dioxide, methane, and nitrous oxide, as well as three synthetic gases including hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

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consumers. The most obvious cost would be a likely increase in the cost of energy derived from fossil fuels, the main source of man-made greenhouse gas emissions. Covered entities could see their production costs increase as a result and could either accept lower profits or, more likely, pass costs on to consumers.<sup>2</sup> In the absence of compensatory measures by the government, a cap-and-trade program could have a disproportionate impact on low-income households, since they generally spend a higher percentage of their income on energy and energy-intensive goods and services than do higher-income households.

Congress is considering various mechanisms for distributing allowances in a cap-and-trade system, including auctions, free allocation to certain covered entities, or a combination of both. The choice of mechanism could have significant effects on the distribution of costs and benefits throughout the economy. At the request of this committee, we have work under way on the collection and distribution of revenues in programs intended to address climate change and will release a report on these topics later this year. My testimony today focuses on (1) the effects of various methods of allocating allowances on government, consumers, and covered entities; and (2) options for distributing the program's revenue or economic value of emissions allowances.

To address these objectives, we drew on ongoing work for this committee, which will result in a final report later this year. Specifically, we reviewed and analyzed academic and professional literature produced by industry associations, research organizations, academic institutions, and environmental groups, including international research. We also analyzed literature from government agencies, including the Congressional Budget Office (CBO), the Congressional Research Service, and the Environmental Protection Agency (EPA). We did not independently assess the validity of data, assumptions, or methodologies underlying the economic studies we reviewed. We also reviewed documents from international and state-level organizations that operate cap-and-trade programs to address climate change—including the U.S.-based Regional Greenhouse Gas Initiative (RGGI), a coalition of 10 Northeast states that has implemented a cap-and-trade program for electricity generators, and the European Union's Emissions Trading Scheme—and interviewed individuals familiar with

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<sup>2</sup>Profits could also decrease if costs were passed on to consumers, who would likely reduce their consumption in response to higher prices.

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these programs.<sup>3</sup> In addition, we conducted semi-structured interviews with leading economists and researchers selected on the basis of their expertise in climate or tax policy. Finally, we drew on previous GAO reports and testimonies.<sup>4</sup> We conducted our work from December 2008 to August 2009 in accordance with all sections of GAO's Quality Assurance Framework that are relevant to our objectives. The framework requires that we plan and perform the engagement to obtain sufficient and appropriate evidence to meet our stated objectives and to discuss any limitations in our work. We believe that the information and data obtained, and the analysis conducted, provide a reasonable basis for any findings and conclusions in this product.

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## Background

According to the Intergovernmental Panel on Climate Change—a United Nations organization that assesses scientific, technical, and economic information on the effects of climate change—global atmospheric concentrations of greenhouse gases have increased markedly as a result of human activities over the past 200 years. These gases trap heat that would otherwise escape the earth's atmosphere, contributing to climate change. Climate change is a long-term and global issue because greenhouse gases disperse widely in the atmosphere once emitted and can remain there for an extended period of time. Among other potential impacts, climate change could threaten coastal areas with rising sea levels, alter agricultural productivity, and increase the intensity and frequency of floods and tropical storms. Carbon dioxide is emitted in by far the largest volume of any greenhouse gas, and most emissions are caused by fossil fuel combustion. According to the EPA, carbon dioxide emissions from fossil fuel combustion accounted for approximately 80 percent of all greenhouse gas emissions in 2007.

Placing a price on emissions is likely to raise the cost of production of many goods and services. The size of the impact will depend on the price of allowances, as well as the ability of producers to substitute less emission-intensive processes and inputs. While some studies suggest that

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<sup>3</sup>The European Union Emission Trading scheme, which commenced operation in January 2005, is the world's largest greenhouse gas cap-and-trade system.

<sup>4</sup>See GAO, *Climate Change Trade Measures: Considerations for U.S. Policy Makers*, [GAO-09-724R](#) (Washington, D.C.: July 8, 2009) and *International Climate Change Programs: Lessons Learned from the European Union's Emissions Trading Scheme and the Kyoto Protocol's Clean Development Mechanism*, [GAO-09-151](#) (Washington, D.C.: Nov 18, 2008).

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the overall impact would be modest, a cap-and-trade program could have a disproportionate effect on covered entities that rely heavily on fossil fuels, such as electricity generators. According to the Energy Information Administration (EIA), electricity generators derived about 49 percent of their electrical power from coal in 2007. The combustion of coal generates about twice as much carbon dioxide per unit of energy as the combustion of natural gas, the next most common fuel source for U.S. electricity generation, according to EIA.

Due to changes in the regulation of electricity markets, certain companies may be limited in their ability to pass on emissions reduction costs to their customers. Historically, electricity was generated, transmitted, and distributed by local monopolies. These companies were overseen by regulators who restricted the entry of new companies, approved investments and retail prices, and determined profits. Since the 1970s, efforts have been made to “restructure” electricity markets by introducing more competitive conditions. At the wholesale level, federal regulators have introduced market-based pricing, although these markets can take a variety of forms. About half the states have made efforts since the 1990s to restructure how retail prices are set, generally seeking to increase competition in electricity sales. According to EIA, 14 of these states—located in New England and the upper Midwest, plus Texas—currently operate retail markets in which customers may choose among competing power suppliers. The other states where restructuring was introduced have either suspended or repealed these efforts. In the remaining states, regulators still approve utility costs and prices. In addition to covered utilities, which are mostly investor-owned, most states also have utilities that are owned either by the public (such as through a municipality) or cooperatively by customers themselves. Such utilities—which currently account for about one-quarter of electricity sales—generally set prices at cost instead of maximizing profits.

In markets where regulation and international competition are not major factors, it is likely that consumers will ultimately bear most of the costs associated with pricing emissions. These costs are expected to disproportionately affect low-income consumers, who tend to spend a higher proportion of their incomes on energy products like electricity, heating, and gasoline. EPA has estimated that the cap-and-trade program in the American Clean Energy and Security Act would cost the average household \$80 to \$111 per year. A similar study by CBO estimated average household costs to be \$175 per year, with some lower-income households receiving a net benefit. On the other hand, research suggests that policy makers could mitigate or eliminate these effects by selling allowances to

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covered entities through auctions and returning the revenue back to consumers in the form of lump-sum rebates or tax adjustments.

If the government were to ‘recycle’ revenue through tax reductions, it could also realize benefits to the overall economy in the form of “economic efficiency.” Many economists view certain taxes as inefficient or “distortionary,” because they shift resources away from their most highly valued use. For example, efficiency costs may arise because taxes on labor income may affect job choices or hours worked. Most economists agree that minimizing the efficiency cost of the revenue raised to fund government services is an important objective of tax policy, among other objectives such as distributing the burden of taxation equitably.

The effects of emissions pricing on consumers and industry will also vary by region. While some recent studies suggest that this variation would be minimal, it may be more substantial for low-income households.<sup>5</sup> Areas that get most of their electricity from coal, the most emissions-intensive source, may see a greater electricity cost increase than areas that rely heavily on natural gas, nuclear energy, or hydropower. One study has estimated that the cost burden as a percentage of household income would range from about 1.9 percent in the East South Central region to about 1.5 percent in the West North Central region.

A cap-and-trade program would also affect federal, state, and local governments, which purchase energy intensive goods and would be responsible for the program’s implementation. According to one study, governments produce approximately 13 percent of U.S. carbon dioxide emissions, and the allowance consumption associated with these emissions could cost governments an additional \$16.6 billion.<sup>6</sup> Furthermore, price increases could increase government payments—such as Social Security benefits and federal pensions, which are indexed to prices—and reduce personal income tax collections. Finally, depending on

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<sup>5</sup>See Kevin Hassett, Aparna Mathur, and Gilbert Metcalf, *The Incidence of a U.S. Carbon Tax: A Lifetime and Regional Analysis*, Working Paper 14023 (Cambridge, Mass.: National Bureau of Economic Research, January 31, 2008); and Dallas Burtraw, Richard Sweeney and Margaret Walls, *The Incidence of U.S. Climate Policy: Alternative Uses of the Revenue from a Cap-and-Trade Program*, Discussion Paper 09-17 (Washington, D.C.: Resources for the Future, June 2009).

<sup>6</sup>Dinan, Terry M. and Rogers, Diane Lim. Distributional Effects of Carbon Allowance Trading: How Government Decisions Determine Winners and Losers. *National Tax Journal*, 55(2), 199-221.

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the details of the program, a cap-and-trade program could increase the administrative burden on the government relative to a business-as-usual situation. For example, markets for emissions allowances would require oversight, and the distribution of auction revenues could require additional personnel or a new entity to administer payments.

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## Different Methods of Allocating Emissions Allowances Will Affect Government, Covered Entities, and Consumers

The design of a cap-and-trade program's allowance allocation plan—the ways in which tradable allowances are allotted to covered entities at the outset of the program—will help determine how costs and benefits are distributed across the economy, according to available literature. The method of allowance allocation will generally not affect the level of emissions reductions achieved by the program, because allocation is independent of the overall cap. Therefore, the principal consideration in designing an allowance allocation plan is how to distribute the allowances in a way that helps to achieve certain goals: for example, to offset the program's economic impact on disproportionately affected industries or to generate revenue that could be redistributed to consumers or used for other purposes. To accomplish these goals, three basic design choices are available: allowances may be sold through an auction or other means, distributed for free, or dispensed using a combination of these methods.

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## Auctioning Allowances Could Generate Substantial Revenue and Provide Other Key Benefits

Selling allowances to regulated entities could provide several benefits. First, it would generate a source of revenue that the government could use to defray the economic costs associated with emissions reductions or direct toward other purposes. These revenues could be substantial: in June 2009, CBO reported that the American Clean Energy and Security Act would generate annual revenues of \$45 billion by the year 2019 by auctioning of a percentage of the allowances. Earlier CBO estimates indicated that annual allowance revenues could range between \$30 billion and \$300 billion by roughly the same time period if all allowances were auctioned, although this proposal is not part of the bill.<sup>7</sup>

Some existing cap-and-trade programs have already sold allowances through auctions or commodity exchanges. For example, several member states participating in the European Union's Emissions Trading Scheme (ETS)—including Ireland, Hungary, Lithuania, the United Kingdom, and

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<sup>7</sup>*Auctioning under Cap and Trade: Design, Participation and Distribution of Revenues Before the Senate Comm. on Finance*, 111th Cong. (2009) (statement of Douglas Elmendorf, Director, Congressional Budget Office). CBO notes that the actual value of the allowances would depend on the design of the cap-and-trade program.

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Germany—have generated revenues from allowance sales; in Germany, these totaled approximately \$1.2 billion in 2008. The level of auctioning is expected to increase as the program moves toward its third phase, which is to begin in 2013. In the United States, the Regional Greenhouse Gas Initiative—a regional cap-and-trade program involving 10 northeastern states—has conducted four auctions since it began auctioning allowances in 2008. These auctions, held quarterly, have each raised between \$38 million and \$118 million for programs to promote energy efficiency and assist low-income households with energy costs, among other things.<sup>8</sup> Given the revenue generation potential of auctions, many experts we consulted as part of a prior study suggested that a cap-and-trade program should maximize the level of auctioning.<sup>9</sup>

Auctioning may confer other additional benefits, according to available literature and researchers we spoke with. For example, many economists favor auctioning because of its transparency and because it discourages behaviors motivated by a desire to gain free allowances, such as “baseline inflation.” This occurs when a firm attempts to boost the number of allowances it receives by increasing its emissions prior to the outset of a cap-and-trade program. Auctioning can also help ensure that new entrants to an industry face the same emissions reduction costs as existing firms. Finally, auctioning could decrease the possibility that covered entities earn windfall profits as a result of the cap-and-trade program, particularly in restructured regions where prices are determined largely by market factors. Covered entities could earn windfall profits if they pass along the “opportunity costs” of free allowances—that is, the revenue foregone by not selling them—in the form of increased electricity prices. For example, in the first phase of the European Union’s ETS, electric utilities that received free allowances reaped substantial profits by charging ratepayers for the opportunity cost of those allowances.<sup>10</sup>

On the other hand, auctioning does not offer compensation to covered entities, particularly those that face disproportionate costs due to a cap-

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<sup>8</sup>Data provided by Environment Northeast, a non-profit environmental research and advocacy organization.

<sup>9</sup>See [GAO-09-151](#).

<sup>10</sup>As one economist whose work we reviewed has noted, opportunity costs can more easily be passed on to consumers in deregulated energy markets, as is common in the European Union, where the market price of electricity reflects costs associated with buying and selling allowances.

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and-trade program. The government will also incur certain administrative costs associated with designing and administering the auctions, although these activities could be funded using part of the auction revenues. Moreover, the effectiveness of allowance auctions will depend partly on their design.<sup>11</sup>

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### Free Allocation of Allowances May Ease Entry Into Emissions Regulation but Can Increase the Overall Cost of the Program

Free allocation could help establish political support at the outset of a cap-and-trade program and compensate covered entities for any decrease in profits they might experience as a result the program, but it could also have some disadvantages. Two principal options are available when allocating allowances for free: “grandfathering” or “output-based updating allocation.” Grandfathering involves allocating allowances based on historic (pre-regulation) emissions measures, while output-based updating allocation involves adjusting the number of allowances provided to an entity based on its recent production levels. Available literature indicates that since past emissions measures do not change, grandfathering may be less susceptible to manipulation than output-based updating allocation. However, research suggests that grandfathering is unlikely to prevent the “leakage” of economic activity—including production, jobs, and emissions—to countries where greenhouse gases are not regulated.<sup>12</sup> As we have previously reported, leakage may be of particular concern to firms in certain energy-intensive industries that face international competition—such as primary metals, paper, and chemicals—as these firms could find it more difficult than other covered entities to pass on costs to consumers by raising prices.<sup>13</sup> Grandfathering could also provide an advantage to existing facilities, which are more likely to have outdated, inefficient technologies in place.

Output-based updating allocation could also present trade-offs. As we have previously reported, output-based updating allocation could provide

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<sup>11</sup>A large body of literature exists on the design of allowance auctions, including aspects such as timing, frequency, size, requirements for participation, and existence of a reserve price. We did not evaluate auction design features as part of this testimony.

<sup>12</sup>Specifically, as allowance prices rise, production may shift to abroad to existing competitors or new firms; in addition, regulated entities may shift some of their production to facilities that exist in countries without binding emissions limits. If leakage were to occur, the resulting increase in emissions in those countries may largely offset some of the environmental benefits of the cap-and-trade program.

<sup>13</sup>For further information, see GAO, *Climate Change Trade Measures: Considerations for U.S. Policy Makers*, [GAO-09-724R](#) (Washington, D.C.: July 8, 2009).

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incentives for covered entities to maintain or increase production, potentially reducing the likelihood that these entities would move production to countries that are not subject to emissions regulations. However, output-based updating allocation could also decrease incentives for covered entities to engage in conservation and reduce their energy intensity, depending on how the program is designed. Moreover, some research indicates that an output-based approach would subsidize entities in certain industries, forcing entities in other sectors to make deeper cuts in their emissions in order to meet the overall cap. Since these cuts may be more expensive than the reductions that would have otherwise taken place, the overall cost of the cap-and-trade program would increase. In addition, some research suggests that maintaining output may not always be a worthwhile goal: for example, the contraction of output from a high-emissions sector may be one of the most cost-effective means by which to reach the overall emissions target.

Furthermore, attempts to keep energy prices low could increase the cost of the program to the economy. Rising prices for energy and energy-intensive goods are critical to the success of the program, because these “price signals” create incentives for both covered entities and consumers to conserve energy, and thereby reduce emissions of greenhouse gases. To the extent that price signals are not preserved, fewer households and businesses will change their behavior in response to these signals. This could reduce the economic efficiency of a cap-and-trade program, since some of the less costly emissions reduction opportunities would be forgone.

The structure of the U.S. electricity generation sector—which represents roughly 40 percent of domestic carbon dioxide emissions—could affect whether price signals reach energy users. Since the price of electricity is regulated in certain regions, generators that receive free allowances in these regions may not be able to pass along the costs associated with an emissions price to residential and commercial electricity users. If costs are not passed through, incentives for conservation decrease. A diminished price signal could also have indirect effects—for example, if the price of energy intensive goods does not rise in relation to other goods, consumers have less of an incentive to purchase fewer of these goods.

Considering the limitations of free allocation, some analyses have advocated limiting the use of free allowances to specific subsets of carbon intensive industries. Several studies suggest that freely allocating between 6 and 21 percent of all allowances would be enough to compensate these industries—which include coal-fired power plants, fossil fuel suppliers,

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and energy intensive manufacturers—for profit losses related to emissions regulation.<sup>14</sup> In 2007, CBO reported that less than 15 percent of allowances would be sufficient to offset net losses in stock value as a result of the program.

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## The Effects of a Cap-and-Trade Program Depend on the Use of Revenues or Allowance Value

The establishment of a cap-and-trade program creates opportunities for the government to direct the value of allowances in a variety of ways. For the purposes of this testimony, we assessed five options that are frequently discussed in the economic literature, although numerous other options exist. First, the government could reduce the overall cost of the program by reducing taxes on capital or income that currently make the economy less efficient. Second, the government could distribute lump-sum rebates to consumers, who would likely pay the bulk of the economic costs associated with a cap-and-trade program. Third, revenues could be used to expand the Earned Income Tax Credit to assist low-income working families. Fourth, policymakers could compensate covered entities for their increased costs through free allocation—an approach equivalent to selling allowances on the market and transferring all the revenue to covered entities. Finally, revenues could help fund climate-related programs or activities, including research and development, energy-efficiency programs, or international aid to developing countries that face challenges in mitigating and adapting to climate change.

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## Reducing Existing Taxes

Using program revenues to reduce marginal tax rates—whether from individual income or payroll or taxes, corporate income taxes, or taxes on capital gains or investments—can reduce economic distortions in the tax code and lower the overall cost of the program. The benefits of tax reduction depend on the extent to which these taxes currently distort economic activity, according to literature and economists we spoke with. For example, existing taxes on labor or capital can discourage individuals from participating in the labor force or investing money. The structure of the tax code can also create distortions by directing spending toward certain areas where the buyer has a tax advantage, such as homeownership or employer-provided medical insurance.

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<sup>14</sup>See Jonathan L. Ramseur, “*Emission Allowance Allocation in a Cap-and-Trade Program: Options and Considerations.*” Congressional Research Service, June 2, 2008.

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A cap-and-trade program could further exacerbate these tax distortions, according to economic literature. This so-called “tax interaction effect” could occur because a cap-and-trade program may have some of the same effects as a tax. Specifically, covered entities that face additional costs due to an emissions price will generally pass on their increased costs to consumers in the form of higher prices, thereby reducing the amount of goods that consumers can purchase. Because a loss of purchasing power effectively represents a decrease in real wages, incentives to work may also decrease. These effects could ultimately raise the cost of the program to the economy, according to economic literature we reviewed.

However, ‘recycling’ auction revenues through the tax code could partially or wholly offset costs that result from inefficiencies in the tax code, as well as potential costs imposed by the cap-and-trade program, according to a review of economic literature and interviews conducted with economists.<sup>15</sup> For example, because an emissions cap could cause prices to rise—and real wages to fall—a reduction in labor, income, or capital taxes could provide efficiency gains and help reduce the overall cost of the program.

These efficiency gains may present trade-offs. Economic analyses suggest that reducing tax rates would do little to compensate low-income individuals that may be disproportionately affected by the cap-and-trade program. According to these analyses, most benefits from reduced taxes would accrue to higher income households, regardless of the tax targeted for reduction. Moreover, in the absence of supplemental policies, the benefits of reducing labor taxes will not reach individuals who do not file tax returns. To close this gap in coverage, the government could supplement a tax reduction with payments issued through existing systems, such as the Electronic Benefit Transfer system or state-based food stamp programs.<sup>16</sup> However, using a combination of systems could increase the administrative burden and complexity of the program, and may require additional governmental coordination. In addition, adjusting

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<sup>15</sup>A significant body of economic research indicates that ultimately the costly tax-interaction effect will be larger in magnitude than the beneficial effects of recycling revenue through the tax code, implying that the overall cost of an emissions price is somewhat larger than the costs of carbon reductions. However, the magnitude of the recycling effect is dependent on the details of the program that is implemented.

<sup>16</sup>The Electronic Benefit Transfer (EBT) is an electronic system that allows a recipient of government benefits like food stamps to use these benefits at a retailer.

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the payroll tax rate may be complicated since these taxes represent social security and Medicare financing contributions.

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## Lump-Sum Rebates for Consumers

Another way to distribute revenues to consumers would be to distribute lump-sum rebates to consumers. Such a program could take many forms, but the underlying goal would be to compensate consumers or households through rebates of a specific amount. The amount of the rebate could be based on a simple per-capita formula with checks of equal size—also known as “cap-and-dividend”—or could account for household size, region, or other factors.

An important advantage of lump-sum rebates, according to many economists, is that they help offset the costs of a cap-and-trade program on consumers, particularly on low-income households. Depending on the design of the program, certain consumers may even experience a net benefit. However, research indicates that distributing lump-sum rebates would forgo the efficiency gains that could be achieved through tax reductions, making the program comparatively more expensive to the economy overall.

The ultimate cost of lump-sum rebates and the resulting effects on consumers would depend in part on the program’s administration. The funds could be distributed, for example, using existing government programs, such as the income tax system or other benefit transfer programs. For example, one economist has proposed that the government could provide rebates for taxes paid on the first \$3,660 of each worker’s earnings, leading to a maximum rebate of \$560 per worker. Alternatively, the government could develop a new distribution mechanism, although this approach would carry additional administrative costs. While using a single existing mechanism for rebate delivery would be the simplest and most transparent option, it would exclude individuals that did not participate in that program—for example, rebates that use the tax system would exclude individuals that do not file tax returns. The government could encourage these individuals to file through outreach campaigns, a strategy used when stimulus checks were distributed under the Economic Stimulus Act of 2008. Evidence suggests that such efforts could encourage more individuals to file—for example, of the 150 million individual income tax returns processed for tax year 2008, approximately 9 million claimed only the economic stimulus payment. However, any outreach effort would entail additional costs and administrative requirements.

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Policymakers could also design a rebating system that uses a combination of mechanisms to maximize coverage, although this strategy would increase the program's complexity, given the need for program coordination, as well as the risk of fraud or duplicate rebates.

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## Expanding Earned Income Tax Credit

Several proposals for distributing revenue involve expanding the Earned Income Tax Credit (EITC) program. The EITC was enacted in 1975 and was originally intended to offset the burden of Social Security taxes and provide a work incentive for low-income taxpayers. It is a refundable federal income tax credit, meaning that qualifying working taxpayers may receive a refund greater than the amount of income tax they paid for the year. According to one study, approximately half of all households would benefit from this approach, with lowest-income households with children reaping the highest gains.<sup>17</sup> However, this study suggests this option would affect low-income households differently depending on their location. Low-income households in the Northeast, for example, could see about a 2 percent gain in income, compared to a 7.4 percent gain in Texas.<sup>18</sup> Some research also indicates that the EITC may encourage labor activity for low-income workers.

Using the EITC to distribute revenue, however, may involve trade-offs. For example, as the Treasury Inspector General for Tax Administration has reported, the EITC has been vulnerable to taxpayer error in the past, due in part to changes in eligibility and the tax code. Prior reviews by the IRS and GAO also suggest that errors are common—for example, an IRS study has reported that the EITC program has an erroneous payment rate estimated to be between 23 and 28 percent.<sup>19</sup>

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<sup>17</sup>The 2009 EITC thresholds require that earned income and adjusted gross income must each be less than \$43,279 (\$48,279 if married filing jointly) with three or more qualifying children. The threshold drops to \$13,440 (\$18,440 if married filing jointly) with no qualifying children.

<sup>18</sup>Burtraw, Dallas, Richard Sweeney, and Margaret Walls, “*The Incidence of U.S. Climate Policy*,” Resources for the Future discussion paper 09-17.

<sup>19</sup>Department of the Treasury, *IRS Earned Income Tax Credit (EITC) Initiatives* (2008) and see also GAO, *IRS's 2008 Filing Season Generally Successful Despite Challenges, although IRS Could Expand Enforcement during Returns Processing*, [GAO-09-146](#) (Washington, D.C.: 2009).

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## Free Allocation of Allowances

Allocating free allowances to covered entities can help establish political support at the outset of a cap-and-trade program and compensate covered entities for any increased costs they incur as a result. However, as noted earlier, free allocation can raise the cost of the program if such allocation decreases incentives to conserve energy and reduce emissions in one sector and forces other sectors to make less efficient reductions. In addition, economic literature suggests that a grandfathering approach to free allocation would do little to discourage the leakage of economic activity, jobs, and emissions, since covered entities' variable costs of production would remain unchanged. An output-based approach to free allocation, on the other hand, could reduce the likelihood that covered entities would relocate or decrease production, although it could also reduce their incentives to decrease emissions.

Most of the benefits of freely allocated allowances will accrue to the shareholders of entities that receive them by compensating shareholders for any declines in stock value they might experience as a result of the cap. However, consumers are unlikely to see these benefits in the form of lower prices, since most covered entities will pass on costs associated with a cap-and-trade program, even when they receive allowances for free. Free allocation is therefore likely to benefit those with higher incomes more than those with lower incomes.

The administrative burden associated with free allocation of allowances depends primarily on how policymakers determine the relative allocations to each industry. A grandfathering approach, for example, would require the government to select a set of years with which to determine a baseline. An output-based approach would require the government to define a baseline, which could prove challenging. As one economist we interviewed pointed out, "output" could be subject to numerous interpretations, each with its own implications for equity.

The government could also direct the recipients of free allowances to use these allowances for the benefit of consumers. For example, HR 2454, as passed by the House on June 26, allocates some allowances to electric and natural gas local distribution companies (LDC) for the benefit of retail ratepayers.<sup>20</sup> Distributing free allowances through LDCs may go some way

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<sup>20</sup>The bill defines 'electricity local distribution company' as an electric utility that, among other things, has a legal, regulatory, or contractual obligation to deliver electricity directly to retail consumers in the United States, and whose retail rates are regulated.

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toward mitigating regional differences in cost impacts, according to some researchers. However, the overall effects of this approach would depend largely on the extent to which it creates incentives to reduce energy use, according to economists we spoke with. Importantly, if benefits to electricity customers were conferred in the form of decreased energy rates, the incentives for energy conservation may diminish and the overall cost of the program could increase. This may be particularly true for residential customers, according to economists we interviewed, since industrial customer may have other reasons to pursue efficient practices. To help preserve incentives, LDCs could allow electricity rates to rise and rebate consumers through the fixed portion of their utility bills—that is, the portion not based on energy use. However, this approach assumes that electricity customers will differentiate between the fixed and variable portions of their utility bill when assessing their costs, as opposed to simply looking at the bottom line amount, which could remain largely unchanged. Several economists and researchers we spoke with expressed skepticism that customers would react to the price signal if their total energy costs did not change, although some said that distributing rebate checks separately from the utility bill could address this concern.

The effect of this approach on consumers will depend on other factors. If both residential and business customers receive benefits, for example, the benefits conveyed to businesses may not get passed along to their customers. According to a CBO analysis of H.R. 2454, most of the allowance value given to local distribution companies would benefit business customers. The analysis also estimates that 63 of percent allowance values conferred to businesses would ultimately benefit the highest earning 20 percent of households, since these households are more likely to be shareholders.<sup>21</sup> In addition, the way in which benefits are conveyed to customers—for example, through lower prices, investments in energy efficiency, or other means—will depend on the state public utility commissions that regulate the LDCs. While some organizations have expressed concern that past regulation has been uneven, several economists and state officials we spoke with expressed confidence that the existing regulatory structure could effectively ensure that customers received the benefits.

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<sup>21</sup>Congressional Budget Office, *The Estimated Costs to Households From the Cap-and-Trade Provisions of H.R. 2454* (June 19, 2009).

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## Funding Climate-Related Programs or Activities

Revenues generated through allowance auctions could also be directed toward climate-related programs or activities, including the research and development of low-carbon technologies, programs to promote energy-efficiency, or mitigation and adaptation activities abroad. Beyond their environmental benefits, such programs could also convey efficiency gains, if they lowered the cost of emissions reductions. The development of renewable energy sources, for example, could ultimately lower covered entities' total expenditures on emissions allowances. Funding for efficiency programs could also offset costs for households through reduced energy demand. Some research organizations have also suggested that funding in these areas could create job opportunities, and in the long run could help ensure greater economic stability due to energy security.

Economic research suggests that an emissions price, on its own, will go some way toward promoting low-carbon technologies and the efficient use of energy. However, economists we spoke to said that there are certain instances—known as “market failures”—where opportunities for reduction may not be captured. For example, builders and owners of rental properties may not have incentives to consider energy efficiency in the construction and renovation of these properties, since they may not be responsible for paying electricity and heating costs. In these cases, subsidies for efficient construction or renovation may be appropriate. In addition, certain technologies—such as carbon capture and storage—may face cost barriers that could be mitigated through grants or subsidies.<sup>22</sup> Other technologies may need nationwide infrastructure that could require additional funding at the federal level—for example, an enhanced transmission grid to transmit renewable energy. While many economists we spoke with said funding such activities could be beneficial, several also cautioned that selecting, implementing and evaluating these programs could pose challenges.

## Technology Research and Development

Developing and promoting low-carbon technologies could provide important benefits and significantly reduce the cost of emissions reductions in the long run, according to available information. However, firms may be dissuaded from conducting research if they are prevented from appropriating all of the associated benefits—for example, if other firms are able to copy and profit the new technology without penalty. As a

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<sup>22</sup>Carbon capture and storage involves capturing CO<sub>2</sub> from a power plant's emissions, transporting it to an underground storage location, and then injecting it into a geologic formation for long-term storage.

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result, several economists we spoke with recommended allocating part of the allowance revenues for research and development to help overcome these cost barriers. However, several also noted that it is difficult to determine how to allocate such funds effectively. For example, selecting which technologies receive funding places the government in the position of attempting to choose the best technologies rather than allowing the market to make that determination. Overall, research suggests that funding technologies in the early stages of development may be more cost-effective than using revenues to commercialize existing technologies.

### Energy Efficiency Programs

Investments in energy efficiency have the potential to alleviate some of the effects of the cap-and-trade program on households. For example, using auction revenue to support weatherization improvements for homes or the purchase of energy-efficient appliances could lower these households' energy consumption and expenditures. Some research suggests that tax credits, for example, can have a significant impact on efficiency investments by homeowners and businesses. However, several researchers have noted that the implementation of such programs has been unpredictable in the past, in part because it is difficult to determine whether these activities would have occurred anyway.

### Aid to Developing Countries

Allowance revenues could also be used as aid to developing countries, either in the form of grants, loans, or other means of assistance. Such aid could target activities that reduce greenhouse gas emissions in these countries—for example, programs that aim to deploy low-carbon technologies in areas where they would not normally be financially feasible. Revenue could also support adaptation activities that could help these countries prepare for and adjust to the project effects of climate change.

Several economists and researchers we spoke with supported directing some portion of auction revenue for international aid efforts. Some highlighted an obligation on the part of developed countries, which represent the bulk of greenhouse gas emissions to date, to help less developed nations deal with potential problems associated with climate change, such as food shortages, water quality problems, and the increased risk of malnutrition or disease. In addition, research indicates that the developing world presents low-cost opportunities for emissions reduction—for example, avoiding landfill waste through composting—as well as opportunities to prevent future emissions in those countries that are rapidly developing their energy, industrial, and transportation infrastructures. Furthermore, some researchers noted that the provision of mitigation or adaptation aid to developing countries may essentially be a

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prerequisite to these countries' participation in an international agreement to limit emissions.

Mr. Chairman, this concludes my prepared statement. I would be happy to respond to any questions that you or other Members of the Committee might have.

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## Contacts and Staff Acknowledgments

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