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[Annual Estimates of the Loss in Households' Purchasing Power Under H.R. 2454](#)

Tuesday, April 20th, 2010 by Douglas Elmendorf

This morning CBO released a [letter](#) responding to a request from Representative Christopher Smith for additional information on the costs that H.R. 2454, the American Clean Energy and Security Act of 2009 (as passed by the House of Representatives), would impose on households as a result of the legislation's primary cap-and-trade program, which would regulate greenhouse gas emissions. The legislation would set annual limits, or caps, on total emissions between 2012 and 2050 and would require regulated entities—including producers and importers of petroleum-based liquids, natural gas distributors, and large electricity generators—to hold rights, or allowances, to emit greenhouse gases. After allowances were initially distributed, entities would be free to buy and sell them (the trade part of the program). Regulated entities could comply with the policy by reducing their emissions, holding allowances for greenhouse gases that they emitted, and/or acquiring "[offset credits](#)" (referred to here as offsets) for greenhouse gases that they emitted.

This letter supplements CBO's [previous work](#) by providing estimates of the loss in purchasing power that households would experience in each year between 2012 and 2050. Previously, CBO [estimated](#) the average loss in purchasing power that households would experience between 2012 and 2050; CBO also examined how that loss would vary across households with different levels of income in 2020 and 2050.

A rough indication of the direct effect on households of the primary cap-and-trade program is the resulting loss in their purchasing power. That loss equals the costs of complying with the policy minus the compensation that would be received as a result of the policy. Households would bear compliance costs and receive compensation in their various roles as consumers, workers, shareholders, taxpayers, and recipients of government services, so accounting for the net effect of the act on purchasing power is not straightforward.

Compliance costs include the cost of purchasing allowances and offsets and the cost of reducing emissions. Although those costs would initially be borne by businesses, they would generally pass them along to households in the form of higher prices for goods and services. Compensation comprises the receipt of allowances at no cost, the receipt of proceeds from the sale of allowances (including the benefits received from government programs funded by the sale of allowances), and the profits earned from producing offsets. Much of that compensation would initially be received by businesses or governments but would be passed along to households.

The loss in a household's purchasing power would be modest as a share of gross domestic product (GDP) in all years between 2012 and 2050, but it would rise over that period as the cap became more stringent and more resources were dedicated to cutting emissions. The loss would equal about 0.1

percent of GDP in 2012, about 0.5 percent in 2030, and about 0.8 percent in 2050, CBO estimates; the average loss per year over the entire 2012–2050 period would be about 0.4 percent. Measured in terms of 2010 income, the average loss per household would be \$90 in 2012, \$550 in 2030, and \$930 in 2050; it would average about \$460 per year over the 2012–2050 period.

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Federal Climate Change Programs

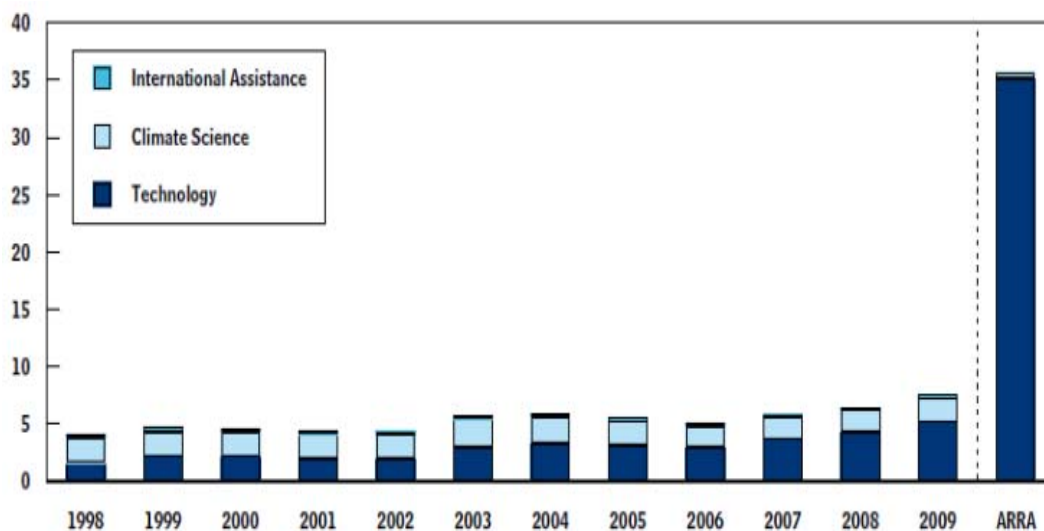
Friday, March 26th, 2010 by Douglas Elmendorf

As awareness of global climate change has expanded over past decades, Congresses and Administrations have committed several billion dollars annually to studying climate change and reducing emissions of greenhouse gases, most notably carbon dioxide. Most of that spending is done by the Department of Energy (DOE) and by the National Aeronautics and Space Administration, although a dozen other federal agencies also participate. The effort has included funding science and technology, creating tax preferences, and assisting other countries in their attempts to curtail greenhouse-gas emissions. In a [study](#) released this afternoon, CBO examines the government's commitment of resources to those purposes. The study presents information on current spending and analyzes recent patterns and trends in spending.

From 1998 through 2009, appropriations for agencies' work related to climate change totaled about \$99 billion (in 2009 dollars); more than a third of that sum—\$35.7 billion by CBO's estimation—was provided in the American Recovery and Reinvestment Act of 2009 (see the figure below). During that period, the nation's commitment to climate-related technology development increased significantly, as has the forgone revenue attributable to tax preferences. Funding for climate science and international assistance, by contrast, stayed roughly constant.

Federal Climate Change Funding, by Category

(Budget authority in billions of 2009 dollars)



Growth in reported funding for climate programs occurred in three ways over the past decade. First, funding increased for some programs whose basic mission was maintained throughout the period.

Second, as different Administrations reconsidered what constituted a climate change program, some programs, most notably those in DOE for the development of nuclear power, were included in the tabulation without a change in mission. Third, the focus of some programs has shifted to emphasize climate change. DOE's program for research and development (R&D) on energy supplied from fossil fuels, for example, evolved from research on converting coal into liquid fuels to finding ways to cut emissions from coal-fired power plants.

There are several rationales for these federal activities. A leading argument in favor of federal support for climate science and technology R&D holds that because private developers of scientific and technical innovations do not capture all of the benefits from their discoveries and inventions, private investment is lower than would be justified by the magnitude of its benefit to society. A different rationale arises from the fact that the prices for fossil fuels and for carbon emission do not fully reflect environmental and social costs. Some activities in the climate change budget can be viewed as compensating for the lower energy prices. Although some or all of the conceptual justifications could apply to many types of policies, they do not indicate that any particular federal program should be undertaken.

CBO assessed the effect of technology programs for R&D, technology demonstration, energy efficiency, infrastructure investment, and tax preferences—areas in which there has been a significant recent commitment of resources. Previous analyses have shown that some programs in the climate change budget, although not all, have provided economic benefits to society that exceed the federal government's investment.

This study was prepared by Philip Webre of CBO's Microeconomic Studies Division.

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[Cost Estimate for S. 1733, the Clean Energy Jobs and American Power Act](#)

Thursday, December 17th, 2009 by Douglas Elmendorf

Yesterday CBO released a [cost estimate](#) for S. 1733, the Clean Energy Jobs and American Power Act, which was ordered reported by the Senate Committee on Environment and Public Works on November 5, 2009. This legislation would make a number of changes in energy and environmental policies largely aimed at reducing emissions of gases that contribute to global warming. The bill would limit or cap the quantity of certain greenhouse gases (GHGs) emitted from facilities that generate electricity and from other industrial activities beginning in 2012.

Under the bill, the Environmental Protection Agency (EPA) would establish two separate regulatory initiatives known as cap-and-trade programs—one covering emissions of most types of GHGs and one covering hydrofluorocarbons (HFCs). EPA would issue allowances to emit those gases under the cap-and-trade programs. Some of those allowances would be auctioned by the federal government, and the remainder would be distributed at no charge. The legislation also would authorize the establishment of a Carbon Storage Research Corporation to support research and development of carbon capture and sequestration (CCS) technology. Funding for the corporation would largely be derived from assessments on utilities enforced by the federal government.

CBO and the staff of the Joint Committee on Taxation estimate that over the 2010-2019 period enacting this legislation would:

- Increase federal revenues by about \$854 billion; and
- Increase direct spending by about \$833 billion.

In total, those changes would reduce budget deficits (or increase future surpluses) by about \$21 billion over the 2010-2019 period. In years after 2019, direct spending would be less than the net revenues attributable to the legislation in each of the 10 year periods following 2019. Therefore, CBO estimates that enacting S. 1733 would not increase the deficit in any of the four 10-year periods following 2019.

The legislation also would authorize appropriations for various programs to be operated by EPA, the Department of Energy (DOE), and other agencies. If those funds were appropriated, CBO estimates that implementing S. 1733 would increase discretionary spending by about \$29 billion over the 2010-2019 period. Most of that funding would stem from spending auction proceeds associated with the HFC cap-and-trade program.

Differences Between S. 1733 and H.R. 2454, the American Clean Energy and Security Act of 2009

S. 1733 is similar to H.R. 2454, which was passed by the House, but there are some significant differences that result in lower estimates of revenues and direct spending under S. 1733. Specifically, several energy-related provisions in H.R. 2454 that CBO estimated would increase direct spending (such as the renewable-electricity standard and the establishment of a Clean Energy Deployment Administration) are not included in S. 1733. Also contributing to lower spending under the Senate bill are the different amounts of proceeds from allowance auctions that are not spent. (See CBO's [cost estimate for H.R. 2454 as passed by the House](#) on June 26. CBO and JCT estimate that over the 2010-2019 period, the House bill would increase federal revenues by about \$873 billion and increase direct spending by about \$864 billion, reducing budget deficits over that period by about \$9 billion.)

In addition, differences between the two versions of the legislation would result in higher allowance prices under S. 1733. CBO estimates that prices for emission allowances would be about 15 percent higher under S. 1733 than under H.R. 2454, as passed by the House, because S. 1733:

- Contains a more stringent emissions cap in 2014 and between 2017 and 2029;
- Contains different allocations for distributing emission allowances and auction revenues; and
- Places greater restrictions on the amount of international offsets that can be used towards an entity's compliance obligation.

CBO's Work on Climate Change

CBO has done extensive work on issues surrounding climate change. Earlier this month, CBO's Assistant Director for Microeconomic Studies, Joseph Kile, [testified](#) on the use of agricultural offsets as part of a cap-and-trade program for reducing greenhouse gases. Last month, CBO released a [brief](#) about the economic costs of reducing greenhouse-gas emissions in the United States. That brief highlighted more than a dozen of [CBO's cost estimates and publications](#) related to the issues of climate change and legislative proposals to reduce greenhouse gases.

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[The Use of Agricultural Offsets to Reduce Greenhouse Gases](#)

Thursday, December 3rd, 2009 by Douglas Elmendorf

Today CBO's Assistant Director for Microeconomic Studies, Joseph Kile, [testified](#) before the House Agriculture Committee's Subcommittee on Conservation, Credit, Energy, and Research on the use of agricultural offsets as part of a cap-and-trade program for reducing greenhouse gases. Discussions about reducing greenhouse gases often focus on limiting the use of fossil fuels to generate electricity or power cars and trucks, yet a variety of other actions—including changing methods of farming and lessening deforestation—could also reduce the concentration of greenhouse gases in the atmosphere. Those activities, which would not be subject to limits on emissions under a cap-and-trade program, would have the potential to “offset” the burden of reducing emissions and reduce the net cost of achieving the environmental objective. This testimony draws upon CBO's August 2009 [brief](#) on the use of offsets as well as our [analysis of H.R. 2454](#), the American Clean Energy and Security Act of 2009, which was passed by the House of Representatives.

H.R. 2454 would set an annual limit, or cap, on greenhouse-gas emissions for each year between 2012 and 2050 and would distribute “allowances,” or rights to produce those emissions. After the allowances were distributed, regulated entities—those that generate electricity or refine petroleum products, for example—would be free to trade them, so entities that could reduce their emissions at lower costs would sell allowances to others facing higher costs.

The provisions of H.R. 2454 reflect the fact that a variety of other actions such as changing agricultural practices can also reduce the concentration of greenhouse gases in the atmosphere. Those actions have the potential to lessen the extent to which more costly actions would have to be undertaken to meet a chosen target for total greenhouse-gas emissions. Under the bill, regulated entities would be allowed to use offsets in lieu of reducing their emissions or purchasing allowances. Yet the difficulty of verifying offsets raises concerns about whether the specified overall limit on emissions would actually be met. Such concerns may be especially acute when, as under H.R. 2454, allowable offsets include actions taken outside the United States.

The testimony makes the following key points:

- Researchers have concluded that a cap-and-trade program that allowed for offsets—such as those that might be generated by changes in agricultural practices and forestry—could reduce greenhouse gases more cheaply than a cap-and-trade program that did not include offsets, but instead relied on reducing the consumption of fossil fuels.
- Because of concerns that the use of offsets could undermine the environmental goals of a cap-and-trade program, four challenges would have to be addressed if offsets are to play a meaningful role in reducing the concentration of greenhouse gases in the atmosphere. In particular, offsets would have to bring about reductions in greenhouse gases that (1) would not have otherwise occurred; (2) could be quantified; (3) were permanent rather than merely a delay in the release of greenhouse gases into the atmosphere; and (4) accounted for “leakage,” that is, higher emissions elsewhere or in different sectors of the economy as a result of the activities producing the offsets.
- On the basis of data from the Environmental Protection Agency, CBO expects that, under the provisions of H.R. 2454, most offsets would be generated by changes in forestry and agricultural practices. Of the offsets from those sectors, fewer than half would be produced domestically in most years, and only about 10 percent of the domestically produced offsets would be from changes in agricultural practices. The remaining offsets from those sectors would come from international sources and would be more evenly split between agriculture and forestry.
- CBO estimates that the savings generated by offsets under H.R. 2454 would be substantial—reducing the price of allowances and the net cost of the program to the economy by about 70 percent. By CBO's estimates, regulated entities would use offsets for about 45 percent of the total emission reductions that they would be required to make over the 2012-2050 period covered by the policy.

- Any assessment of the use of offsets is subject to many uncertainties, which are inherent in the models used, about such things as the types of activities that would be eligible to generate offsets and the amount of offsets supplied by those activities, the prospects for concluding agreements with other nations to allow the use of international offsets, and the cost of ensuring that activities generating offsets actually reduce greenhouse gases.

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[The Costs of Reducing Greenhouse Gas Emissions](#)

Monday, November 23rd, 2009 by Douglas Elmendorf

The consumption of fossil fuels and deforestation are producing increasingly large quantities of greenhouse gases, particularly carbon dioxide (CO₂). Most experts expect that the accumulation of such gases in the atmosphere will result in a variety of environmental changes over time. Although the magnitude and consequences of such developments are highly uncertain, researchers generally conclude that a continued increase in atmospheric concentrations of greenhouse gases would have serious and costly effects.

Reducing emissions, through a cap-and-trade program or regulations for example, would impose a burden on the economy by lessening the use of fossil fuels and altering patterns of land use. Today CBO released a [brief](#) discussing the economic costs of reducing greenhouse-gas emissions in the United States, describing the main determinants of costs, how analysts estimate those costs, and the magnitude of estimated costs. The brief also illustrates the uncertainty surrounding such estimates using studies of a recent legislative proposal, H.R. 2454, the American Clean Energy and Security Act of 2009.

What Determines the Costs of Reducing Emissions?

The costs of reducing emissions would depend on several factors: the growth of emissions in the absence of policy changes; the types of policies used to restrict emissions and the magnitude of the reductions achieved by those policies; the extent to which producers and consumers could moderate emission-intensive activities without reducing their material well-being; and the policies pursued by other countries.

Emissions in the Absence of Policy Changes. Experts generally expect that, in the absence of policy changes to reduce them, domestic greenhouse-gas emissions will grow substantially in the next few decades. (See CBO's 2009 publication, [Potential Impacts of Climate Change in the United States](#).) However, long-term trends in emissions are notoriously difficult to project because they will be influenced by population and income growth, by advances in technology, and by the availability and price of fossil fuels. The more rapidly that emissions are projected to grow without policy changes, the greater the changes that would be required and the greater the mitigation costs that would be incurred to keep emissions below any specific level.

Types of Policies Adopted. A basic choice facing policymakers is whether to adopt conventional regulatory approaches, such as setting standards for machinery, equipment, and appliances, or to employ market-based approaches, such as imposing taxes on emissions or establishing cap-and-trade programs (which, over a period of time, restrict the quantity of emissions that can be produced through the allocation of allowances to emit CO₂). Experts generally conclude that market-based approaches would reduce emissions to a specified level at significantly lower cost than conventional regulations. Whereas conventional regulatory approaches impose specific requirements that may not be the least costly means

of reducing emissions, market-based approaches would provide much more latitude for firms and households to determine the most cost-effective means of accomplishing that goal.

Policymakers face many other critical decisions. Specifically, they must choose which types of emissions to control, and when and how much to reduce them. Further, if policymakers decided to adopt market mechanisms to control emissions, they would face decisions about which type of mechanism to use (a carbon tax vs. a cap-and-trade system, for example), as well as how to allocate allowances in a cap-and-trade program or how to use the revenues generated by taxes on emissions. For a more detailed discussion of the issues facing policymakers in designing a plan to reduce CO₂ emissions, see the following CBO publications:

- [Policy Options for Reducing CO₂ Emissions \(February 2008\)](#)
- [How Regulatory Standards Can Affect a Cap-and-Trade Program for Greenhouse Gases \(September 2009\)](#)
- [Uncertainty in Analyzing Climate Change: Policy Implication \(January 2005\)](#)
- [The Use of Offsets to Reduce Greenhouse Gases \(August 2009\)](#)
- [Trade-Offs in Allocating Allowances for CO₂ Emissions \(April 2007\)](#)
- [Limiting Carbon Dioxide Emissions: Prices Versus Caps \(March 2005\)](#)
- [Flexibility in the Timing of Emission Reductions Under a Cap-and-Trade Program \(March 2009\)](#)

The Response of the Economy. By gradually increasing the prices of fossil fuels and other goods and services associated with greenhouse-gas emissions, market-based policies would induce firms and households to change their practices-in the short run, by driving slightly less, adjusting thermostats, and switching fuels in the power sector; and in the long run, by buying more-efficient vehicles and equipment, for example. Rising costs of emission-intensive activities would tend to dampen overall economic activity by reducing the productive capacity of existing capital and labor, by reducing households' income (which, in turn, would tend to reduce consumption and saving), and by reducing real (inflation-adjusted) wages. The more easily that producers and consumers can respond to price changes by altering their production techniques and behavior and by bringing low-emission fuels and technologies to market, the lower the costs of reducing emissions would be. (See CBO's 2003 study, [Economics of Climate Change: A Primer](#).)

Efforts by Other Countries. The stringency of other nations' efforts to reduce emissions could strongly influence the costs of reducing them in the United States. As long as a significant percentage of the world's economy did not restrict greenhouse-gas emissions, a portion of any reductions achieved in the United States would probably be offset by increases in emissions elsewhere. Such "leakage" could be avoided if most countries restricted emissions at the same time. Even so, the policies used in other countries would influence costs in the United States.

How Large Are Estimated Costs?

In recent years, a few legislative proposals for long-term emission reductions have been analyzed using several different models, providing an opportunity to compare cost estimates and to understand the sources of differences in estimates. Most recently, several groups have released estimates of the economic impact of H.R. 2454, the American Clean Energy and Security Act of 2009. That bill would create two cap-and-trade programs for greenhouse-gas emissions-a large one applying to CO₂ and most other greenhouse gases, and a much smaller one applying to hydrofluorocarbons-and would make further significant changes in climate and energy policy.

Some of the findings of the leading models are similar. In nearly all of the reported scenarios, changes in the demand for energy and reductions in overall energy use are modest through 2025. However, the projected allowance prices vary substantially.

The aggregate employment effects of H.R. 2454 are likely to be modest over the long term. However, the legislation would cause a significant, although gradual, shift in the composition of employment over time, with potentially substantial adverse effects for some workers, families, and communities. Production and employment would shift away from industries related to the production of carbon-based energy and energy-intensive goods and services and toward the production of alternative and lower-emission energy sources.

All of the models reporting macroeconomic impacts project that the emission reductions required by H.R. 2454 would slightly dampen the growth of GDP over the long term. Quantitative estimates of the losses in GDP and consumption vary among studies, depending in large part on differences in assumptions about the availability of offsets (reduced availability of offsets increases the emission reductions required in the energy sector and thus increases economic costs) and differences in assumptions about the sensitivity of energy use to changes in prices (reduced sensitivity increases the price hikes required to reach emission targets and thus increases economic costs).

For a more detailed discussion, see CBO's analysis of H.R. 2454 in the following cost estimates and publications:

- [Cost estimate for H.R. 2454, as ordered reported by the House Committee on Energy and Commerce \(June 2009\)](#)
- [Cost estimate for H.R. 2454, as amended and reported by the House Committee on Rules \(June 2009\)](#)
- [The Estimated Costs to Households from the Cap-and-Trade Provisions of H.R. 2454 \(June 2009\)](#)
- [The Economic Effects of Legislation to Reduce Greenhouse-Gas Emissions \(September 2009\)](#)

This issue brief was prepared by Robert Shackleton of CBO's Macroeconomic Analysis Division.

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[The Economic Effects of Policies to Reduce Greenhouse-Gas Emissions](#)

Wednesday, October 14th, 2009 by Douglas Elmendorf

Today I testified about the economic effects of legislation aimed at reducing emissions of greenhouse gases, drawing on a [report](#) that CBO released a few weeks ago.

Global climate change poses one of the nation's most significant long-term policy challenges. A strong consensus has developed in the expert community that, if allowed to continue unabated, the accumulation of greenhouse gases in the atmosphere will have extensive, highly uncertain, but potentially serious and costly impacts on regional climates throughout the world. Moreover, the risk of abrupt and even catastrophic changes in climate cannot be ruled out.

Reducing the extent of climate change would entail substantial reductions in U.S. emissions and in emissions from other countries over the coming decades. Achieving such reductions in this country would probably involve some combination of three broad changes: transforming the U.S. economy from one that runs on carbon-dioxide-emitting fossil fuels to one that increasingly relies on nuclear and

renewable fuels; accomplishing substantial improvements in energy efficiency; and implementing the large-scale capture and storage of carbon dioxide emissions.

My testimony emphasized several points:

- The economic impact would depend importantly on the design of the policy. Decisions about whether to reduce greenhouse gases primarily through market-based systems (such as taxes or a cap-and-trade program) or primarily through traditional regulatory approaches that specify performance or technology standards would influence the total costs of reducing emissions and the distribution of those costs. The costs would also depend on the stringency of the policy; whether other countries imposed similar policies; the amount of flexibility about when, where, and how emissions would be reduced; and the allocation of allowances if a cap-and-trade system was used.
- Reducing the risk of climate change would come at some cost to the economy. For example, CBO concludes that the cap-and-trade provisions of H.R. 2454, the American Clean Energy and Security Act of 2009, would reduce GDP below what it would otherwise have been—by roughly ¼ to ¾ percent in 2020 and by between 1 and 3½ percent in 2050. By way of comparison, CBO projects that real (that is, inflation-adjusted) GDP will be roughly two and a half times as large in 2050 as it is today, so those changes would be comparatively modest. In the models that CBO reviewed, the long-run cost to households would be smaller than the changes in GDP because consumption falls by less than GDP and because households benefit from more time spent in nonmarket activities. Moreover, these measures of potential costs do not include any benefits of averting climate change.
- Climate legislation would cause permanent shifts in production and employment away from industries that produce carbon-based energy and energy-intensive goods and services and toward industries that produce alternative energy sources and less-energy-intensive goods and services. While those shifts were occurring, total employment would probably be reduced a little compared with what it would have been without such a policy, because labor markets would most likely not adjust as quickly as would the composition of demand for different outputs.
- CBO has estimated the loss in purchasing power that would result from the primary cap-and-trade program in H.R. 2454, incorporating both the higher prices that households would face and the compensation they would receive (primarily through the allocation of allowances or the proceeds from their sale). CBO's measure omits some channels of influence on households' well-being that cannot be readily quantified, and it appears that the measure probably understates the true burden to a small degree. As estimated, the loss in purchasing power would be modest and would rise over time as the cap became more stringent, accounting for 0.2 percent of after-tax income in 2020 and 1.2 percent in 2050. Households in the lowest fifth of households when arrayed by income would see gains in purchasing power in both 2020 and 2050, because the compensation they would receive would exceed the costs they would bear. However, households in the middle fifth would see net losses in purchasing power amounting to 0.6 percent of after-tax income in 2020 and 1.1 percent in 2050.

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[The Economic Effects of Legislation to Reduce Greenhouse-Gas Emissions](#)

Thursday, September 17th, 2009 by Douglas Elmendorf

Today CBO released [a report](#) that summarizes its analyses of the economic effects of proposed policy changes aimed at reducing emissions of greenhouse gases.

Global climate change poses one of the nation's most significant long-term policy challenges. A strong consensus has developed in the expert community that, if allowed to continue unabated, the accumulation of greenhouse gases in the atmosphere will have extensive, highly uncertain, but potentially serious and costly impacts on regional climates throughout the world. Moreover, the risk of abrupt and even catastrophic changes in climate cannot be ruled out.

Those expected and possible harms may motivate policy actions to reduce the extent of climate change. However, the cost of doing so could be significant because it would entail substantial reductions in U.S. emissions and in emissions from other countries over the coming decades. Achieving such reductions in this country would probably involve some combination of three broad changes:

- Transforming the U.S. economy from one that runs on carbon-dioxide-emitting fossil fuels to one that increasingly relies on nuclear and renewable fuels;
- Accomplishing substantial improvements in energy efficiency; and
- Implementing the large-scale capture and storage of carbon dioxide emissions.

CBO's report makes several points regarding the economic implications of policies that might be chosen to address climate change:

- The economic impact would depend importantly on the design of the policy. Decisions about whether to reduce greenhouse gases primarily through market-based systems (such as taxes or a cap-and-trade program) or primarily through traditional regulatory approaches that specify performance or technology standards would influence the total costs of reducing emissions and the distribution of those costs. The costs would also depend on the stringency of the policy; whether other countries imposed similar policies; the amount of flexibility about when, where, and how emissions would be reduced; and the allocation of allowances if a cap-and-trade system was used.
- Reducing the risk of climate change would come at some cost to the economy. A cap-and-trade system, for example, would lead to higher prices for energy from fossil fuels and for energy-intensive goods, which would in turn provide incentives for households and businesses to use less carbon-based energy and to develop energy sources that emit smaller amounts of carbon dioxide. Changes in the relative prices for energy and energy-intensive goods would also shift income among households at different points in the income distribution and across industries and regions of the country. Policymakers could counteract some of those income losses and shifts by having the government sell emission allowances and use the revenues to compensate certain households or businesses, or by having the government give allowances away to some households or businesses. Even so, some income losses and shifts would occur.

For example, CBO concludes that the cap-and-trade provisions of H.R. 2454, the American Clean Energy and Security Act of 2009, would reduce GDP below what it would otherwise have been—by roughly $\frac{1}{4}$ to $\frac{3}{4}$ percent in 2020 and by between 1 and $3\frac{1}{2}$ percent in 2050. By way of comparison, CBO projects that real (that is, inflation-adjusted) GDP will be roughly two and a half times as large in 2050 as it is today, so those changes would be comparatively modest. In the models that CBO reviewed, the long-run cost to households would be smaller than the changes in GDP because consumption falls by less than GDP and because households benefit from more time spent in nonmarket activities. Moreover, these measures of potential costs do not include any benefits of averting climate change.

- Climate legislation would cause permanent shifts in production and employment away from industries that produce carbon-based energy and energy-intensive goods and services and toward industries that produce alternative energy sources and less-energy-intensive goods and services. While those shifts

were occurring, total employment would probably be reduced a little compared with what it would have been without such a policy, because labor markets would most likely not adjust as quickly as would the composition of demand for different outputs.

- CBO has estimated the loss in purchasing power that would result from the primary cap-and-trade program in H.R. 2454. CBO's measure reflects the higher prices that households would face and the compensation they would receive, primarily through the allocation of allowances or the proceeds from their sale. However, the measure omits some channels of influence on households' well-being that cannot be readily quantified. It appears that CBO's measure probably understates the true burden to a small degree. As estimated, the loss in purchasing power would be modest and would rise over time as the cap became more stringent, accounting for 0.2 percent of after-tax income in 2020 and 1.2 percent in 2050.
- The distribution of the loss in purchasing power across households depends importantly on policymakers' decisions about how to allocate the allowances. According to CBO's calculation, households in the lowest fifth of households when arrayed by income would see gains in purchasing power in both 2020 and 2050, because the compensation they would receive would exceed the costs they would bear. However, households in the middle fifth would see net losses in purchasing power amounting to 0.6 percent of after-tax income in 2020 and 1.1 percent in 2050.

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[How Regulatory Standards Can Affect a Cap-and-Trade Program for Greenhouse Gases](#)

Thursday, September 17th, 2009 by Douglas Elmendorf

Some legislation considered by the current and previous Congresses has proposed combining cap-and-trade programs with various regulatory standards to reduce greenhouse-gas emissions. Yesterday CBO released an [issue brief](#) that describes how regulatory standards can interact with a cap-and-trade program, using examples related to H.R. 2454, the American Clean Energy and Security Act of 2009, which passed the House of Representatives on June 26, 2009.

In some cases, regulatory standards would require producers of greenhouse gases to use specific technologies, such as renewable sources for generating electricity; in others, manufacturers would have to modify the performance of their products, such as commercial furnaces, to use energy more efficiently. Such regulatory standards have been used in the past to meet various environmental goals.

Over the past two decades, however, policymakers have established cap-and-trade and other market-based programs because such programs often provide a more efficient way to reduce pollution than is possible through the imposition of regulatory standards alone. Market-based approaches rely on the interaction between producers and consumers to determine how to meet specific targets for emissions. Because policymakers do not always have enough information to tailor national regulatory standards to local circumstances, for example, or to adjust standards rapidly as market conditions change, regulatory standards do not always ensure that the least expensive solution is brought to bear on an environmental problem. Market-based approaches, in contrast, allow flexibility in the approach to meeting an environmental goal and often can achieve the same result at a lower cost.

As a result, regulatory standards combined with market-based approaches often will increase the cost of meeting an environmental goal. In particular, if standards forced large reductions in emissions in a

specific industry or for a particular product that would not result from a cap-and-trade program alone, the standards would reduce the demand for allowances and depress market prices for them. Some lower-cost strategies would then not be pursued because producers would have no incentive to adopt them. The target for emission reductions might be met, but the technology or performance standard might have substituted higher-cost for lower-cost reductions that would have occurred as a result of the cap-and-trade program without the additional standards.

Market-based approaches are effective only to the extent that markets deliver accurate and timely price information and only so long as producers and consumers respond to that information. When the price mechanism falls short and appropriate price signals are not sent or received, the imposition of regulatory standards can be a more cost-effective way than a cap-and-trade program or a tax to change behavior. For example, builders and owners of rental properties might see little need to insulate buildings or install energy-efficient appliances if utility bills are paid by tenants and if the differences in tenants' costs are not reflected in the rent that could be charged. (Standards also might be desirable if they addressed other national priorities more effectively than market mechanisms could, even if their economic costs were higher.)

This issue brief was prepared by Rob Johansson of CBO's Microeconomic Analysis Unit.

Posted in [Climate Change](#) | Comments Off

[The Use of Offsets to Reduce Greenhouse Gases](#)

Monday, August 3rd, 2009 by Douglas Elmendorf

Today CBO released a [brief](#) that discusses how activities with emissions that are not subject to limits in a cap-and-trade program might lower the burden of reducing the concentration of greenhouse gases (GHGs) in the atmosphere. Both existing climate policies, such as the European Union's Emission Trading System, and policies under consideration, such as the American Clean Energy and Security Act (ACESA) of 2009, which was recently passed by the House of Representatives, have recognized the potential for actions— such as disposing of waste in different ways, changing methods of farming, and reducing deforestation— to “offset” the extent to which the use of fossil fuels must be reduced to meet a chosen target for total GHG emissions.

If such offsets—which can be defined as reductions in GHGs from activities not subject to limits on emissions—are less expensive than reductions from limiting the use of fossil fuels, they can reduce the overall economic cost of meeting a target for emissions. But the difficulty of ensuring that offset activities result in verifiable, permanent and incremental reductions in global emissions raises concerns about whether the specified emissions target will actually be met. Those concerns may be especially acute when, as under ACESA, allowable offsets include actions taken outside of the country setting the target for emissions.

Although experience with offsets is not extensive, preliminary evidence suggests that they can significantly lower the economic cost of a cap-and-trade program, even after accounting for the costs of steps taken to increase confidence that the use of offsets represents true incremental reductions in GHGs. CBO estimates that the average annual savings from offsets could be about 70 percent under ACESA. Of course the intended environmental benefit would be fully realized only if the offsets provided the full reduction in global emissions of GHGs for which they are credited.

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[Effect of the American Clean Energy and Security Act of 2009 on Different Regions of the Country](#)

Thursday, July 9th, 2009 by Douglas Elmendorf

Today CBO released a [letter](#) describing studies by two teams of experts—one affiliated with the National Bureau of Economic Research (NBER) and one affiliated with Resources for the Future (RFF)—that estimated regional differences in the effects of policies that would increase the prices of fossil fuels in rough proportion to the carbon dioxide emitted when they are combusted, as would occur under a cap-and-trade program.

CBO recently [analyzed the effects that the cap-and-trade program for greenhouse-gas emissions specified by the American Clean Energy and Security Act of 2009](#) (as reported by the House Committee on Energy and Commerce) would have on households at various income levels. That analysis accounts for the effects on households in different income groups of both the increases in prices of goods and services that would result from the cap-and-trade program (the gross cost of the program) and the distribution of the value of emission allowances (which would partly offset the gross cost). However, CBO did not analyze regional differences in these costs and benefits.

Like CBO's analysis of the American Clean Energy and Security Act of 2009 (ACESA), the analyses by NBER and RFF both assume that prices imposed on emissions ultimately would be borne by households in the form of higher prices for the goods and services that they consume, even if suppliers or intermediate users of fossil fuels initially pay the amounts involved. NBER's and RFF's analyses focus on the costs incurred once emissions are priced, and (like CBO's analysis) they do not address the transition costs of imposing such a price. Although the analyses by CBO, NBER, and RFF consider different carbon dioxide emission prices and examine policies in different years, the qualitative effects on households with different levels of income are similar in the studies; each finds that, measured as a share of annual income, the price increases would impose a larger burden on low-income households than on high-income households.

In contrast to CBO's analysis, the NBER's and RFF's analyses are not specific to ACESA: Most important, they examine methods of returning the allowance value (or tax revenues) to households that differ from the provisions in the legislation. This letter, therefore, addresses only the results concerning the price increases for households at various income levels (that is, the regional analysis of the gross annual cost per household, which CBO estimated to be \$890 in its analysis):

- The NBER study finds only small regional differences. In particular, the increase in households' spending would range from 1.9 percent of annual income in the East South Central region to 1.5 percent in the West North Central region.
- The RFF study also finds only small regional differences, although the differences are somewhat larger for low-income households. Specifically, the increase in households' spending would range from 1.6 percent of annual income in the Ohio Valley to 1.3 percent in California, New York, and the Northwest. Effects on households in the bottom decile of the income distribution would range from 5.5 percent in the Ohio Valley to 4.0 percent in California.

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