Design Elements of a Mandatory Market-Based Greenhouse Gas Regulatory System

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February 2006

Purpose

The purpose of this document is to lay out some of the key questions and design elements of a national greenhouse gas program in order to facilitate discussion and the development of consensus around a specific bill. We recognize that there are many ways to structure such a regulatory program and that there are entirely different approaches that might include a carbon tax, technology incentives and voluntary programs, but we have limited our consideration here to "mandatory market-based systems" contemplated by the Sense of the Senate Resolution.

Introduction

"Congress finds that—

"(1) greenhouse gases accumulating in the atmosphere are causing average temperatures to rise at a rate outside the range of natural variability and are posing a substantial risk of rising sea-levels, altered patterns of atmospheric and oceanic circulation, and increased frequency and severity of floods and droughts;

"(2) there is a growing scientific consensus that human activity is a substantial cause of greenhouse gas accumulation in the atmosphere; and

"(3) mandatory steps will be required to slow or stop the growth of greenhouse gas emissions into the atmosphere.

"It is the sense of the Senate that Congress should enact a comprehensive and effective national program of mandatory, market-based limits and incentives on emissions of greenhouse gases that slow, stop, and reverse the growth of such emissions at a rate and in a manner that—

"(1) will not significantly harm the United States economy; and

"(2) will encourage comparable action by other nations that are major trading partners and key contributors to global emissions."

The United States Senate adopted this statement of overall national greenhouse gas policy as an amendment to its version of the Energy Policy Act of 2005 on June 22, 2005. We believe it provides the basic framework for the further Senate action on global warming that is necessary to move our energy system into a sustainable and predictable

future, to avoid destructive interference with the world climate system, and to maintain long-term U.S. competitiveness and economic prosperity.

The resolution was not included in the EPACT 2005 Conference Report. Nevertheless, we are committed to move the process of Senate action forward in this session of Congress by formulating and advancing proposals that would embody the principles of the Senate Resolution on national climate change policy.

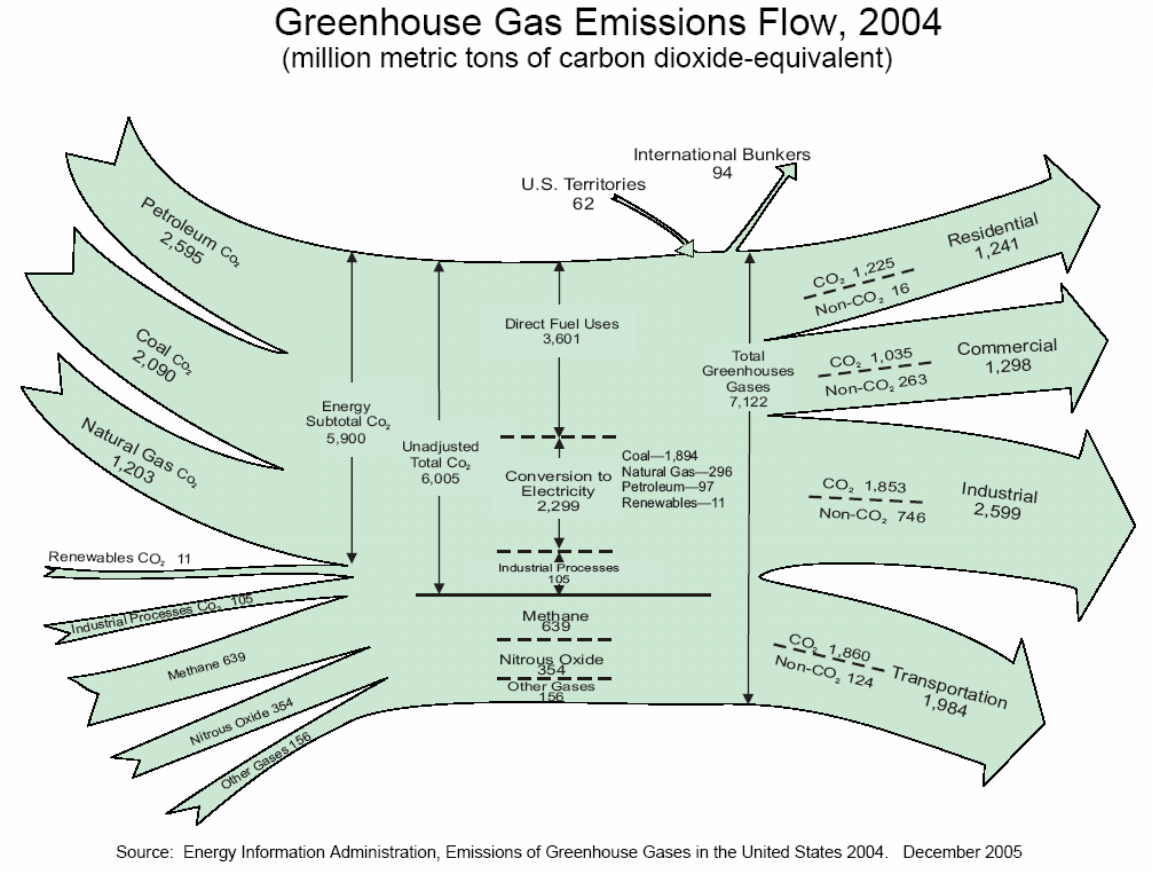
As the Chairman and Ranking Member of the Committee on Energy and Natural Resources, we have already taken action since the June 22 resolution to lay the ground for a national program that would achieve the above objectives. The Committee has held two hearings on scientific and economic considerations relevant to developing such a national program. The committee will also hold a climate change conference this spring to identify the challenges to implementing an effective national program and explore possible solutions to those challenges.

Key Elements of Proposals for a National Program

1. Who is regulated and where?

Two important decisions with respect to who is being regulated in any greenhouse gas program need to be made at the outset. The first decision is whether to build a program that addresses greenhouse gases on an economy-wide basis or whether to build a program that focuses on just the greenhouse gas emissions of one or more industrial sectors. The second decision is where in the "industrial life-cycle" of carbon dioxide and other greenhouse gases should the government choose to implement its regulatory program.

Sectoral versus economy-wide approaches. As the Energy Information Administration chart below shows, there is no single sector of the U.S. economy that makes an overwhelming contribution to overall U.S. greenhouse gas emissions. If a key design feature is fairness, then no one sector should be singled out. An economy-wide approach also allows for ease in seeking the least-cost path to reductions through trading systems. A sector-specific approach might be easier to set up, but leaves open the question of whether it would ever be expanded to include more emitters, or whether further action to address climate change would be unfairly targeted to the sector already under regulation.



Source: Energy Information Administration, Emissions of Greenhouse Gases in the United States 2004. December 2005

"Upstream" versus "downstream" regulatory approaches. Direct emitters of greenhouse gases in the United States number in the hundreds of millions, if one includes sources such as automobiles and residential furnaces. This fact makes it difficult to cover all direct emitters in an economy-wide regulatory program should such an approach be chosen. However, there are various points within the chain of energy production, distribution, and end use where a regulatory requirement to obtain and turn in greenhouse gas permits might be implemented. These include fuel extraction (oil and gas wells and coal mines), processing (oil refineries, natural gas processing facilities, coal blending/cleaning facilities), fuel transportation (pipelines, shippers) or further down the energy chain, such as electric generation, distribution utilities, and large industrial energy users.

In an "upstream" regulatory approach, the point of regulation is placed closer to energy producers and suppliers than to end-use consumers. Specifically, a requirement to acquire permits or allowances for emissions associated with fossil fuel use would apply to coal mining companies, petroleum refiners, and natural gas shippers or pipelines rather than to the "smokestack" entities (e.g., electric utilities, large industrial plants) that, along with households and small businesses, buy and consume these fuels.

There are several arguments that favor this so-called "upstream" approach. First, placing the point-of-regulation relatively high up in the progression from energy production to consumption reduces the number of sources that must be regulated and simplifies program administration. Second, this approach more efficiently captures all sources of emissions and all emissions reduction opportunities throughout the economy. For the same reason, it may stimulate a wider range of emissions reduction responses throughout the economy assuming permit costs are passed on to end users. In addition, an upstream approach may reduce overall administrative costs.

The other basic regulatory option is a "downstream" approach, which targets the regulatory program at the point of emissions. Such an approach likely would be quickly limited to major emitters only, in order to keep the number of covered sources manageable. A program of this type would be best suited to a scenario in which the decision was made to regulate only specific sectors of the economy, large emitters (e.g.,electric generators and energy-intensive industries in the manufacturing sector). Comparable systems include the U.S. acid rain trading program. A chief advantage of this system is that the United States already has significant experience with this approach.

It is hard to see how greenhouse gas emissions from the transportation sector could be addressed in a downstream permitting system. Failing to address transportation would leave out one-third of total U.S. carbon emissions. Most of the ways of addressing transportation that have been proposed are variants of an upstream approach. For example, some have proposed that petroleum refiners be required to hold and turn in permits for the greenhouse gas emission equivalent of all transportation fuels sold. Another option would be to require automobile and truck manufacturers to hold permits covering the carbon emissions from the vehicles they sell, with the emissions estimated

based on annual average vehicle miles traveled (VMT) and average vehicle lifetime. Another proposal has been to allow limited trading of increases in fuel economy performance of new cars and trucks, since increased fuel economy requirements could also reduce carbon emissions from the transportation sector. Such a system would have to exclude from the carbon trading program emissions from vehicles currently on the road. This approach would also have to address the problem that improved vehicle efficiency combined with low gasoline prices could lead to an increase in VMT that would offset the carbon dioxide reduction achieved through fuel economy gains.

Key questions:

- Is the objective of building a fair, simple, and rational greenhouse gas program best served by an economy-wide approach, or by limiting the program to a few sectors of the economy?

- What is the most effective place in the chain of activities to regulate greenhouse gas emissions, both from the perspective of administrative simplicity and program effectiveness?

2. Should the costs of regulation be mitigated for any sector of the economy, through the allocation of allowances without cost? Or, should allowances be distributed by means of an auction? If allowances are allocated, what is the criteria for and method of such allocation?

Free allowances are not strictly necessary for the operation of a greenhouse gas control program. In fact, free allowances might result in greater cost and complexity for the program. To minimize the costs of a trading program to the U.S. economy as a whole, the government could simply auction all greenhouse gas emission allowances. If all allowances were allocated solely through an auction, then there would be no need to develop and administer allocation rules, and no prospect that such rules might result in unintended competitive advantages, including windfall profits, for certain market participants.

While the allocation of allowances won't reduce the overall cost of the program, it can shift compliance cost among participants. For example, even though in an upstream system, downstream users of carbon or energy, such as electric utilities and energy-intensive manufacturers would <u>not</u> have to buy, sell, or turn in allowances, there might be a rationale for these non-regulated entities to receive allowances that they could then sell to regulated entities. In particular, these entities might face higher energy costs based on greenhouse gas emissions that they are unable to pass through to purchasers of their products. An allowance allocation would thereby allow them to be compensated for these costs.

In addition to the price signal created by the cap and trade program, greater economic incentive could be provided for the development of low-carbon energy technologies by subsidizing those technologies with the revenue from the auction of allowances. Those receipts could also be used to help fund adaptation measures to unavoidable climate change impacts or mitigate costs of the policy to consumers, especially if such additional costs are having a regressive impact on low-income households.

These potential rationales for allowance allocation are explored in more detail below.

a. Technology R&D and Incentives

Virtually all experts agree that significant technology advancements will be needed to adequately and affordably address climate change over the next century. Unfortunately, investments in energy R&D and incentives for the early deployment of advanced technologies currently fall short of what is likely to be needed to tackle this global problem. In its December 2004 report, the National Commission on Energy Policy (NCEP) called for approximately doubling public sector investments in energy R&D, from $1.7 billion annually (FY 2004) to $3.3 billion per year, and for increasing early deployment incentives from $600 million (FY 2004) to $2 billion annually. Reserving 5 percent to 10 percent of total permit or allowance pool

annually for free distribution to technology development and deployment could provide approximately the revenue needed to support the funding increases recommended by NCEP.

Key questions:

- What level of resources should be devoted to stimulating technology innovation and early deployment?
- What portion, if any, of the revenues from permits or the auction of allowances should be reserved for technology development? If some portion is reserved for this purpose, should that set-aside flow to the federal government with funds spent through the traditional appropriation process? Or should the funds be allocated directly to a non-profit research consortium, chartered by the federal government, which would then administer technology development and deployment projects? Or should there be some combination of these two options?
- What criteria should be used to determine how such funds are spent and which projects are chosen?
- What other mechanisms should be used to promote technology deployment? Options include tax credits, cost-sharing for demonstration projects, assistance to state energy programs, etc.

b. Adaptation Assistance

Even very aggressive emission reduction policies undertaken today are unlikely to fully mitigate the impacts of future warming, some of which is almost certain to occur given historic and current levels of global greenhouse gas emissions. Actions to moderate the consequences of climate change — which may include rising sea levels, melting permafrost, altered precipitation patterns, more intense and frequent extreme weather events, and changes to the geographic distribution of important disease vectors — must therefore complement actions aimed at mitigating its causes. Adaptation measures can substantially reduce the potential for damage by improving the ability of human and natural systems to respond to the consequences of climate change. In light of highly varied potential vulnerabilities, a multitude of adaptive policy options exist. Policies like improved flood plain and coastal development zoning could help minimize future property damages, while vigorous agriculture and coastal research programs could better prepare susceptible economic sectors for likely shocks. Adaptation strategies are important components of an integrated approach to the risks posed by climate change, and should be grounded to the extent possible in the best current understanding of likely regional and local effects of climate change. As such, both adaptation research and adaptive policies deserve serious consideration in the near term.

Key Questions:

- What portion of the overall allowance pool should be dedicated to adaptation research or adaptation-related activities?
- How should these allowances or funds be administered?
- What is the appropriate division between federal vs. regional, state, and local initiatives?

c. Consumer Protections

While the energy price impacts of any climate change proposal we are currently considering will be quite modest, even small increases in energy prices can disproportionately affect low-income and fixed-income households. Allowances could be used to help offset the cost of higher fossil fuel prices for these consumers. For example, reserving 1 percent of the annual allowance pool for low-income energy assistance could increase annual LIHEAP funding by an average of 20 percent during the first decade of the program. Allowances could also be used to fund additional incentives for consumers to purchase more energy-efficient products that would help consumers reduce their exposure to energy price increases.

Key Questions:

- What portion of the overall allocation pool should be reserved to assist consumers?
- Should funds from the sale of permits or allowances be targeted primarily to low-income consumers, or should they be more widely distributed to benefit all consumers?

d. Set-Aside Programs

A portion of permits or allowances could be set aside for an early reduction credit program and an offset pilot program. The early reduction credit program would award permits or allowances to companies or other organizations that reduced emissions prior to the implementation of a mandatory program. These include reductions reported through DOE's 1605b program, and reductions made through other government-sponsored and private programs identified by the Secretary of Energy.

The offset pilot program would reserve a limited number of permits or allowances from the total allocation to be awarded to entities that achieve greenhouse gas reductions from sources that are not covered under the cap. Example projects might include biological carbon sequestration through forestry and agriculture or capturing methane from landfills. While offset projects can provide a very low-cost and efficient means of achieving reductions, many projects of this type also present

significant challenges in terms of measuring, monitoring, and verifying emission reductions. By dedicating a percentage of permits or allowances *from within the program's overall emissions budget* to offset activities, the nation can undertake a large scale demonstration program aimed at resolving some of these issues while still ensuring that the program achieves its intended environmental goals.

Key Questions:

- What portion of the allocation pool should be reserved for the early reduction credit program and the offset pilot program?
- Are other set-aside programs needed?

e. Special considerations for fossil-fuel producers?

Under an upstream emissions trading program, carbon dioxide emissions would be regulated at the point of fossil fuel production. Regulated firms would be required to submit allowances both for their own emissions and for the carbon dioxide contained in the total amount of fuel each firm sells. The most likely points of regulation in an upstream system are the fossil-fuel producers -- petroleum refiners, natural gas shippers or pipelines, and coal mining companies.

In a downstream regulatory program, fossil-fuel producers are not regulated entities and have no compliance costs.

The compliance costs for fossil fuel producers in an upstream regulatory system, where they are the regulated firms, represent only a small portion of the overall costs of any trading program. Most upstream producers can and will simply pass the value of any allowances they require through to fuel prices, regardless of whether they receive the allowances for free or are required to pay for them. EIA's analysis of the NCEP proposal confirms our expectation that petroleum refiners and natural gas shippers in an upstream system should be able to pass almost all compliance costs through to consumer prices. Coal companies are able to pass a substantial portion of their costs through in prices, although not the full amount.

The ultimate cost borne by fossil fuel producers is therefore far less than the cost of purchasing allowances. Instead, the real cost to producers is a function of three factors: (1) any permit or allowance costs they cannot pass on in fuel prices; (2) any costs associated with their own emissions they cannot pass on in fuel prices; and (3) any loss of revenues due to reductions in demand for fossil fuels. Regarding the first factor, EIA's analysis indicates that permit or allowance prices are likely to be largely passed on to purchasers, with little change in the prices received by producers. Regarding the second factor, EIA estimates that refineries constitute about 20 percent of total manufacturing emissions, with gas and coal production accounting for much less. Finally, to the third point, petroleum consumption falls only slightly as a result of the emissions trading program (1 percent in 2020), while natural gas demand increases slightly. The largest impact is on coal, where demand and coal sales

continue to grow, but more slowly than would be projected in the absence of a regulatory program – to a level that is 5 percent lower by 2020 than the projected increased levels, and to a level that is 9 percent lower by 2025. All told, these costs would be offset completely by an allocation of roughly 5 to 10 percent of the total permit or allowance pool to fossil fuel producers.

Key Questions:

- Would some upstream fossil fuel producers be unable to pass the cost of purchasing permits or allowances through in fuel prices if they are the regulated entity?
- Is there a sufficient policy rationale for addressing these costs to justify the complexity of setting up and administering an allocation system for these entities?
- What other options exist to address the inability of fossil fuel producers to pass through these costs?

f. Allocations for downstream electric generators?

Although electric generators would not be regulated under an upstream regulatory program, they will face higher production costs as fossil fuel prices rise. A portion, though not all, of these additional fuel costs will be passed through in higher electricity prices. To the extent that generators receive allocations of free allowances, they can sell those allowances and use the revenue to offset higher fuel costs.

Would there be a reasonable policy rationale for such an allocation? There certainly would not appear to be one for existing non-fossil electric generation facilities. These generators do not face higher costs as a result of the program, and as prices for fossil-generated electricity rise in response to the trading program, they will receive more revenue for their generation. Moving forward, however, new non-fossil units could be included in the allocation as one means of overcoming current barriers to new investment in non-emitting generation.

The economic analysis undertaken of the NCEP proposal by the EIA suggests that a 10 percent share of the total allocation would fully offset adverse impacts on electric generators. (Since the electric sector is responsible for 40 percent of national carbon emissions, 10 percent of the total allowance pool equates to 25 percent of the carbon content of fuel consumed by electric generators). The 10 percent figure assumes that the allocation system perfectly targets allowances to the companies that bear non-recoverable costs. Recognizing that a perfectly targeted allocation is not possible and that some "passed through" costs will revert to fossil-based electric generators, a higher fraction must be allocated to fossil generators to fairly offset the impacts of increased fuel prices. If, in the extreme, fossil generators were to bear all program costs passing nothing along to rate payers, they would need 40 percent of the total allocation pool to offset their costs. Therefore, 10-40 percent of the total allocation reflects the theoretical range of allowances needed to offset the financial impact of increased fuel prices in the electric sector.

Key Questions:

- Should electricity generators be included in the allocation if they are not regulated?
- What portion of the total allocation should be granted to the electric power sector? Should it be based on the industry's share of greenhouse gas emissions or some other factor?
- Should generators in competitive and cost-of-service markets be treated differently under an allocation scheme?
- How should permits or allowances be distributed within the electric sector? Should it be based on historic emissions? Electricity output? Heat input?

g. Allocations for energy-intensive industries?

Energy-intensive industries, such as steel, aluminum, chemicals, pulp and paper, and cement, would not be directly regulated in an upstream trading system. Like electric generators, these industries would, however, face higher prices for fossil fuels under a greenhouse gas trading system. While price increases would be modest, these industries consume significant amounts of fossil fuels and often face stiff competition from foreign competitors, most of whom would not be subject to mandatory greenhouse gas regulation. Including these industries in the allocation would not affect their incentive to improve efficiency and reduce fuel use, but it would offset increased energy costs and help to address competitiveness concerns associated with a domestic greenhouse gas trading program.

Without identifying exactly what businesses might be entitled to free permits or allowances, it is difficult to estimate a share of the overall allocation for this sector. If one provided allocations of free allowances only to the large, energy-intensive industries noted above—steel, aluminum, chemicals, and pulp and paper—close to 10 percent of the overall allocation would be required.

Key Questions:

- Is there a sufficient policy rationale to have an allocation to selected energy-intensive industries? What industries should be included in the allocation?
- What portion of the overall allocation framework should be reserved for these industries?
- What are the appropriate metrics for determining allocations across different industries?

h. Allocations to other industries/entities?

Key Questions:

- What other industries/entities (e.g. agriculture, small businesses, etc.) should be considered in the allocation pool?
- What should be the basis for their share of the total allocation as well as for the distribution among such industries/entities?

3. Should a U.S. system be designed to eventually allow for trading with other greenhouse gas cap-and-trade systems being put in place around the world, such as the Canadian Large Final Emitter system or the European Union emissions trading system?

A greenhouse gas program in the U.S. could be designed to leave open the possibility of trading with greenhouse gas systems in other countries. There are both potential opportunities and challenges that arise with this type of linkage. On the positive side, numerous studies have shown that a trading system that includes emission reductions in key developing countries such as China and India will have significantly lower costs than a system that excludes these low cost reductions. Although links to trading programs in Europe and other developed countries are less beneficial from a cost standpoint, these links could nevertheless reduce costs and could facilitate efficient emission reductions within and between companies with operations in multiple countries

On the other hand, linkage to programs in Europe and other developed countries also raises several difficulties. Differences in design could complicate implementation and could lead to inconsistencies in allocation methods, monitoring and verification, or other design elements. In addition, disparities in the stringency of targets and in allowance prices could make linkage politically difficult.

Key Questions:

- Do the potential benefits of leaving the door open to linkage outweigh the potential difficulties?
- If linkage is desirable, what would be the process for deciding whether and how to link to systems in other countries?
- What sort of institutions or coordination would be required between linked systems?

4. If a key element of the proposed U.S. system is to "encourage comparable action by other nations that are major trading partners and key contributors to global emissions," should the design concepts in the NCEP plan (i.e., to take some action and then make further steps contingent on a review of what these other nations do) be part of a mandatory market-based program? If so, how?

Climate change is a global environmental problem that requires action by all major emitting countries. Participation by all key emitters is critical for two reasons. First, only with a global effort will it be possible to make sufficient progress to address the potential effects of climate change. Second, without greenhouse gas mitigation efforts by all major emitters, including our largest trading partners, the U.S. economy could be placed at a competitive disadvantage. Thus, an important component of a U.S. program could be to encourage major trading partners and large emitters of greenhouse gases to take actions that are comparable to those in the U.S. As noted above, some key developed countries, such as those in the European Union, are already implementing emissions trading programs. Other countries have developed efficiency standards and additional policies that reduce energy use and greenhouse gas emissions.

Key Questions:

- What metrics are most valuable for comparison of developed and developing country mitigation efforts to U.S. efforts?

- What process should be used to evaluate the efforts of other nations and how frequently should such an evaluation take place?

- Are there additional incentives that can be adopted to encourage developing country emission reductions?