

DESIGNING A MANDATORY GREENHOUSE GAS REDUCTION PROGRAM FOR THE U.S.*

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Executive Summary

This report identifies issues that must be addressed in the design of a mandatory, domestic greenhouse gas (GHG) reduction program. Three options are specifically evaluated: (1) cap-and-trade programs, (2) GHG taxes, and (3) a “sectoral hybrid” program that combines efficiency standards for automobiles and consumer products with a cap-and-trade program applicable to large GHG emission sources.

Criteria for Evaluating Options

In order to compare various approaches to GHG reductions, each option is evaluated using the following criteria:

- ***Environmental Effectiveness:*** How effective is the program in meeting its emissions reduction target?
- ***Cost-Effectiveness:*** Will the program design permit cost-effective compliance?
- ***Administrative Feasibility:*** Can the program be administered effectively and does it minimize administrative and transaction costs?

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- **Distributional Equity:** Are the burdens of compliance fairly apportioned?
- **Political Acceptability:** Are there elements of the program's design that affect its political acceptability?

Analysis of Options

1. Cap-and-Trade Programs

A conventional cap-and-trade program establishes an economy-wide or sectoral "cap" on emissions (in terms of tons per year or other compliance period), and allocates or auctions tradable "allowances" (the right to emit a ton of greenhouse gases) to GHG emission sources or fuel distributors. The total number of allowances is equal to the cap. A "downstream" cap-and-trade program applies to sources of GHG emissions and requires them to surrender allowances equal to their emissions. An "upstream" program applies to fuel suppliers and requires them to surrender allowances equivalent to the carbon content of fossil fuels they distribute. The primary focus of a cap-and-trade program would be on sources of emissions that can be readily measured and monitored; these include almost all sources of carbon dioxide (CO₂) emissions from fossil-fuel combustion as well as many sources of other GHG emissions. Sources not amenable to regulation through a cap-and-trade program can be covered on an "opt in" or project basis or addressed through supplemental regulation. Four major issues should be considered in the design of such a cap-and-trade program:

- **Flexibility:** To what extent can firms satisfy their obligations by purchasing allowances (either from within or outside the United States), by sequestering carbon, by controlling greenhouse gases other than CO₂, or by banking or borrowing allowances?
- **Downstream vs. Upstream:** Does the program regulate firms that emit greenhouse gases ("downstream") or does it regulate their fuel suppliers ("upstream")?
- **Allowance Allocation:** Does the program distribute free allowances to firms affected by GHG regulation, does it auction them to the highest bidder, or is some combination of approaches involved? If free allowances are distributed, what allocation formula is used? If allowances are auctioned, how are the revenues used? How might the allocation process change over time?
- **Cost Cap:** Does the program incorporate a "safety valve" in which additional allowances are made available at a pre-set price?

Evaluation of the Cap-and-Trade Approach

Upstream cap-and-trade. An economy-wide upstream cap-and-trade program would be environmentally effective, could attain cost-effective compliance if it incorporates flexibility measures, and would be administratively feasible. Its distributional consequences would depend on how allowances were allocated and, if auctioned, how the auction revenues were recycled back into the economy. These allocation and recycling decisions can also affect overall compliance costs, because some methods of allocating allowances may be less economically efficient than an auction, and according to some economists, using auction revenues to reduce “distortionary” taxes on capital or labor can reduce the net costs of the program. Finally, because an economy-wide upstream cap-and-trade program will drive up the cost of gasoline and home heating fuels, it is likely to present a political challenge.

All-source downstream cap-and-trade. An economy-wide downstream cap-and-trade program – because it implies the regulation of literally millions of individual GHG sources, including cars and homes – would be difficult and costly to administer, and therefore is not a viable prospect for a domestic GHG regulatory program.

Large-source downstream cap-and-trade. A large-source downstream program (i.e., one applicable only to electricity generators and large industrial sources of greenhouse gases) is administratively feasible and could be environmentally effective with respect to the sectors it covered. To be fully effective, however, such an approach would have to be coupled with a program to cover other sectors. A large-source downstream program might be more acceptable politically than an upstream economy-wide program because it would not result in price increases for gasoline and home heating fuels (though it still would result in price increases for electricity).

2. GHG Tax

A GHG tax is a tax on emissions of greenhouse gases or on the carbon content of fossil fuel. Many of the design issues discussed in connection with cap-and-trade programs are also present – though in somewhat different form – in the design of a GHG tax.

Evaluation of the GHG Tax Approach

An upstream GHG tax program could be environmentally effective, but would not provide certainty in meeting a particular emissions target. It would allow for adoption of least-cost mitigation strategies, would offer cost certainty, and would be administratively feasible. The ultimate distributional consequences of a GHG tax would depend on how policy-makers distributed revenues from the tax. Again, according to some economists, using revenues from allowance auctions or emissions taxes to reduce “distortionary” taxes can reduce the net costs of the program. However, political acceptability is likely to be a major obstacle, since the GHG tax combines both new taxes and fuel price increases. A GHG tax could have better prospects as a part of a larger tax reform effort.

3. Sectoral Hybrid Programs (Product Efficiency Standards Plus Large Source Cap-and-Trade)

One way to increase the environmental effectiveness and cost-effectiveness of a domestic program that relies on a large-source downstream cap-and-trade policy is to regulate uncapped sectors through product efficiency standards. Such a “sectoral hybrid” program would combine a large source cap-and-trade program with product efficiency standards. The product efficiency standard component would be similar to current automobile and appliance efficiency standards, and would be designed to limit GHG emissions from new automobiles and consumer products.

Issues in designing the product efficiency standards component of the sectoral hybrid include: the scope of the program (which products are regulated); the extent to which standards are made “tradable” (i.e., whether manufacturers can trade between product lines within the firm, with other manufacturers, or with facilities regulated under the cap-and-trade program); and whether the program “caps” projected lifetime emissions from use of the product (“capped tradable standards”).

Evaluation of the Sectoral Hybrid Approach

A sectoral hybrid program consisting of a large-source downstream program coupled with product efficiency standards would be more environmentally effective than a downstream program alone (or standards alone), because standards could address emissions from sources (such as automobiles and appliances) that could not feasibly be covered by the downstream cap-and-trade program. Building on existing standards programs, such a hybrid program could attain coverage of about 80 percent of U.S. energy-related CO₂ emissions. However, product efficiency standards would not address the intensity of product use or the replacement rate of new products for old, less-efficient products. A hybrid program would be a more costly means of achieving any particular emissions target than an economy-wide upstream cap-and-trade or tax program, though making the standards “tradable” would reduce the disparity. Incorporating tradable standards would present significant administrative challenges, however, because of the need to prevent double-counting of emission reductions and the technical issues in setting and revising standards. Finally, a sectoral hybrid program may score better on political acceptability because it constrains domestic GHG emissions while largely shielding consumers from fuel price increases.

Summary of Analysis

The paper’s analysis would argue against an economy-wide downstream cap-and-trade program (as unadministrable), a stand-alone large-source cap-and-trade program (as incomplete), and a GHG tax program (as unviable politically, unless coupled with structured tax reform). The paper’s analysis indicates that at least two major alternatives appear to be feasible: (1) an economy-wide upstream cap-and-trade program, or (2) a sectoral hybrid program under which product efficiency standards complement a large-source downstream cap-and-trade program.

The first alternative (a comprehensive upstream cap-and-trade program) may be the best one if it can be put in place. However, U.S. energy policy experience over the past three decades suggests that putting it in place may be extraordinarily difficult. Even in times of most compelling national circumstances, such as the 1973 Arab oil embargo, Congress was unwilling to use energy price increases

to rein in consumer demand. The second alternative – a sectoral hybrid program – may be all that can be implemented in the near term. If policy-makers take that course, careful attention will have to be given to minimizing economic costs and administrative complexity, and assuring that the program can be effectively enforced.