The Hybrid Options: What is the Role of Product Efficiency Standards Under a Cap-and-Trade Program?*

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Background

Current federal law includes two major mandatory product efficiency standard programs: one for automobiles, the other for consumer products other than automobiles. Both were established in 1975 under the Energy Policy and Conservation Act (EPCA).[1] Were Congress to enact a cap-and-trade program or other mandatory GHG controls, these product efficiency standards could be retained, modified or eliminated once the mandatory program is implemented. This paper lays out options for integrating these standards with a cap-and-trade program or eliminating them (the "structural options"), describes several mechanisms for accommodating allowance trading between the cap-and-trade sectors and the standards sectors ("intersectoral trading"), and summarizes the cost-effectiveness considerations that may be relevant to choosing different options.

Cap-and-Trade Proposals: As more fully described in the background paper (*Designing a Mandatory Greenhouse Gas Program for the U.S.*[2]) a cap-and-trade program applies either to GHG emitters (in the case of a downstream program) or to sellers of carbon-based fuels (in the case of an upstream program). Tradable allowances would either be allocated to entities impacted by the program or auctioned. The regulated entity would be required to surrender allowances at the end

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of each compliance period equal to its GHG emissions (in the downstream program) or its fuel sales (in the upstream program). A cap-and-trade could apply to the entire economy or to particular sectors.

Existing Product Efficiency Standards: The product efficiency standard program for motor vehicles – known as Corporate Average Fuel Economy or "CAFE" – requires each automobile manufacturer or importer to meet average fuel economy standards for the fleet of new vehicles it manufactures or imports in each model year. These standards are expressed in miles per gallon ("mpg"). Separate, less stringent standards apply for "light-duty trucks" (including sport utility vehicles and minivans) than those that apply to passenger automobiles. The statute applies only to new vehicles and does not regulate in-use consumption of fuel.[3]

The product efficiency program for consumer products other than autos – usually referred to as the "appliance standards program"[4] – includes mandatory energy labeling and energy efficiency standards for a wide range of consumer products, including air conditioners, washers, dryers, kitchen ranges and furnaces. Standards also cover some equipment used in industrial applications, such as industrial motors.[5] The program aims at requiring for each type of consumer product the maximum energy efficiency that is technologically feasible and economically justified. In general, the standards are formulated in terms of either electricity use or fossil fuel use.

An important design issue in any program using product efficiency standards is the inflexibility of conventional product efficiency standards. Conventional product efficiency standards prescribe a uniform emissions limit or technology without regard to the varying circumstances of the regulated firms. Accordingly, reliance on conventional standards would mean forgoing the flexibility benefits of emissions trading. The description of structural options below includes a discussion of means by which "intersectoral trading" (that is, trading between the sectors subject to a cap-and-trade and sectors subject to product standards) can be used to incorporate some of these flexibility benefits into a program that retains product standards.

Also included in the discussion below is a calculation of the CO_2 emissions covered by each option. It is important to note that in these calculations, coverage calculated for certain hybrid options (i.e., those that combine a partial cap-

and-trade with standards) is not necessarily equivalent to coverage calculated for an economy-wide cap, because product efficiency standards provide no direct control over in-use emissions. Because of the uncertainty of projections of vehicles miles traveled (VMT) or other measures of intensity of use, actual reductions attributable to product standards may diverge from estimates.

Finally, there are questions of administrative feasibility and political acceptability. These are described in some detail in the background paper, but are not addressed here.[6]

II. Structural Options

Option A: Downstream Sectoral Hybrid

Program design: A downstream sectoral hybrid program would combine a downstream cap-and-trade program for large sources in the electricity and industrial sectors with enhanced product efficiency standards to cover small GHG sources (mainly consumer products and equipment) in the transportation, residential, and building sectors.[7] These standards would regulate energy efficiency or CO_2 emissions of newly-manufactured products used in the transportation sector and in the residential and commercial buildings sector. The key elements of a downstream hybrid program are described in the background paper. (See Box 4 at page 35.)

Coverage: The downstream sectoral hybrid using existing product efficiency standards would cover about 80 percent of CO_2 emissions. It could feasibly cover 95 percent of CO_2 emissions if coverage were expanded to cover commercial building equipment and transportation modes beyond light duty motor vehicles.

Intersectoral Trading: If Option A is chosen, the following alternative approaches can be taken on intersectoral trading:

(i) **Tradable standards** – Tradable standards restore some of the economic benefit that would otherwise be lost by reason of the inflexibility of product efficiency standards. A tradable standards program would use estimates of the average life and use of a product to translate over-compliance with a standard into a stream of emission allowances assigned to particular years.

Conversely, the program would translate a failure to achieve the standard into an annualized deficit of allowances.[8] A tradable standards approach could provide for at least three levels of trading: (1) intra-firm trading, in which a firm could achieve an average level of efficiency across its product lines, instead of being required to meet the standard for each product line; (2) trading among firms subject to standards; and (3) trading between firms subject to standards and firms subject to the cap-and-trade program. However, this last level of trading would be available only to manufacturers of CO_2 emitting products; manufacturers of electric appliances and equipment probably would not be permitted to trade into the cap-and-trade system because of double-counting concerns.

(ii) **Capped tradable standards** – A potential drawback of a tradable standards approach is that it does not ensure that emissions will be limited at any particular level. One way to address this drawback is a capped tradable standards program.[9] Under such an approach, policy-makers would set a cap on the total emissions associated with particular types of newly-manufactured products. To sell products subject to the capped standard, manufacturers would have to obtain and surrender allowances. In other words, it would not be sufficient merely to produce products that met the standard; manufacturers would have to account for the projected emissions associated with each product they sold. A capped tradable standards program would entail resolving a number of design issues, including issues related to allowance allocation, shutdowns, new market entrants, changes in manufacturer market share, and changes in overall level of output.

(iii) **No intersectoral trading** – A hybrid program could also dispense with intersectoral trading entirely. This is the simplest, but most inflexible of the options.

Option B: Upstream Sectoral Hybrid

Program design: Under the upstream sectoral hybrid option, an upstream cap-and-trade program would apply to all distributors of carbon-bearing fuels except to the extent those fuels were used in products subject to efficiency standards. Thus, if product efficiency standards applied to automobiles and consumer products using home heating fuels, then gasoline, home heating oil and residential natural gas would be exempt from upstream allowance requirements. A

broader standards program – one that included large trucks and commercial heating equipment – could be linked to broader exclusions from the upstream cap-and-trade program, thus allowing diesel fuel and fuel delivered for use in commercial buildings to be outside the cap-and-trade program.

A variant of this approach would set up a product efficiency standards program, a downstream cap-and-trade for electricity generators and other large stationary sources, and an upstream program applicable to fuel distributed for all uses other than automobile, residential and commercial use and electricity generators.

Coverage: Option B could cover 100 percent of CO_2 emissions.

Intersectoral Trading: Same as for Option A.

Option C: Full Cap-and-Trade, Plus Supplemental Product Efficiency Standards

This hybrid option would layer product efficiency standards on top of the full upstream program, i.e., firms subject to the upstream program would be required to hold allowances for the carbon content of all fuel they distribute to downstream users, even if some of the fuel they deliver is used in products subject to standards.[10] Under this approach the upstream program would have an economy wide cap; the standards would be there to help ensure that efficient products reach the market when consumers need them.

Coverage: Option C could cover 100 percent of CO_2 emissions.

Intersectoral Trading: Because all use of carbon-bearing fuels is covered by the cap-and-trade program, awarding allowances to "overachieving" product manufacturers would result in doublecounting of emissions reductions and arguably undermine the integrity of the cap, absent an offsetting reduction in the cap. Two alternatives are available:

(i) **No trading** – Manufacturers would not receive allowances for over-compliance, and would not be permitted to remedy under-compliance by purchase of allowances. (This is the approach used in the McCain/Lieberman legislative proposal that the Senate voted on last month.)

(ii) **Trading with cap adjustment** – Manufacturers that over-comply with product efficiency standards are awarded allowances, but an offsetting reduction is made in the allowances allocated to upstream fuel suppliers. (This mechanism was used in the originally introduced version of the McCain/Lieberman legislation in connection with fuel economy standards.)

Option D: Economy-Wide Upstream Cap-and-Trade Program; No Product Efficiency Standards

Program design: Under this option, an economy-wide upstream cap-and-trade program would be implemented and current CAFE and appliance standards programs would be repealed, as no longer necessary or as a political quid pro quo for the imposition of mandatory controls.

Coverage: 100 percent of CO_2 emissions.

Intersectoral Trading: Not applicable.

III. Cost-Effectiveness

Economic studies of the cost-effectiveness or economic efficiency of various GHG regulatory programs have not been at a level of detail that would quantify the differences between the structural options discussed in this paper. However, several observations emerge from these studies: First, the more comprehensive the coverage of a program, the lower the overall economic cost to meet any specific target. Thus, if Option A is limited to existing product efficiency standards, it would cover only 80 percent of U.S. CO_2 emissions, and might be less cost-effective than Options B, C, and D, which could achieve full coverage. Second, a large source cap-and-trade combined with CAFE but without intersectoral trading is a significantly more costly way to attain a particular target than a comprehensive cap-and-trade program alone. However, no analysis has been done of such a program with intersectoral trading. Thus, Option D is likely to be more cost-effective than Option A and B, though intersectoral trading could reduce this cost penalty. Finally, at least one study indicates that a comprehensive cap-and-trade program that retains the current CAFE program is significantly more costly than the cap-and-trade alone. This would indicate that there could be a significant cost penalty associated with Option C as compared to Option D.[11]

Endnotes

1. Energy Policy and Conservation Act of 1975, Pub. L. No. 94-163, 89 Stat. 871 (automobile fuel economy standards are codified as amended at 49 U.S.C. §§ 32,901-32,919 (1994)).

2. Robert R. Nordhaus and Kyle W. Danish, *Designing a Mandatory Greenhouse Gas Program for the U.S.*, Pew Center on Global Climate Change (2003).

3. Compliance with the standard is determined separately for vehicles manufactured in the United States, Canada, or Mexico and those manufactured elsewhere but used in the United States. Special credit is given to electric vehicles and to alternative fuel-capable vehicles.

4. See Energy Policy Conservation Act of 1975, supra note 2, (appliance efficiency standards are codified at 42 U.S.C.A §§6291-6309).

5. For more information on existing energy efficiency standards for commercial and industrial equipment, see *Office of Energy Efficiency and Renewable Technology, U.S. Department of Energy, Building Technolgies Program: Appliances and Commercial Equipment Standards*, available at http://www.eren.doe.gov/buildings/appliance_standards/.

6. See pages 38-41 of the background paper.

7. The Center for Clean Air Policy (CCAP) and the Heinz Center have explored domestic policy designs that would combine a cap-and-trade program with standards for downstream firms. See *CCAP, Options That Include Downstream Sources*, (1998); H. John Heinz Center for Science, Economics, and the Environment, *Designs for Domestic Carbon Emissions Trading* 56-67 (September 1998) (describing "Option III" and "Option IV").

8. For example of tradable standards in the motor vehicle sector, see Box 5, p. 37 of background paper.

9. For descriptions of capped tradable standards approaches, see studies cited in note 8.

10. As used here, the term "consumers subject to standards" encompasses consumers directly subject to standards (e.g., electricity-generators) and consumers using products that are subject to standards (e.g., motorists).

11. A 2002 Congressional Budget Office study assessing options for reducing gasoline consumption concluded that partial coverage of particular sectors would be more expensive than full coverage (under, for example, an upstream cap-and-trade). See *Congressional Budget Office, Reducing Gasoline Consumption. Three Policy Options* (2002), p. 17. Two economists, W. David Montgomery and Anne Smith, have attempted to quantify the costs using various domestic program types to meet a particular national emissions limit. See W. David Montgomery and Anne E. Smith, Charles River Associates, *Interactions Between Domestic Policies and International Permit Trading Regimes* (2000). Montgomery and Smith determined that a pure upstream cap-and-trade program or a carbon tax would result in the lowest social welfare costs. They also found that a program that used standards to limit emissions from certain sectors would result in lower costs than a program that left those sectors entirely unregulated (e.g., a domestic climate policy that relied only on a downstream cap-and-trade program for large sources). They concluded, however, that, a program that relied on conventional standards would be anywhere from 20 to 170 percent more costly than, a pure upstream cap-and-trade program, depending on assumptions about the availability of international trading. While the scenario modeled by Smith and

Montgomery did not involve tradable standards, even a program that relied substantially on tradable standards is likely to be less cost-effective than an upstream cap-and-trade program because of the absence of any incentives to reduce use. A more recent Charles River Associates study reaches similar conclusions. See Smith, Ross & Mongomery, *Implications of Trading Implementation Design for Equity Efficiency Trade-offs in Carbon Permit Allocations* (2002).