Addressing Competitiveness in U.S. Climate Change Policy

This brief examines policy options for addressing competitiveness concerns arising from the establishment of a mandatory domestic program to limit greenhouse gas emissions. These concerns center on energy-intensive industries that compete globally and could face higher costs under a domestic climate program while key competitors do not. Studies find little evidence of significant competitiveness impacts on U.S. firms from past environmental regulation, and forecast relatively modest impacts on a narrow set of industries under a U.S. cap-and-trade program with modest emission allowance prices. In the long run, international agreements offer the best recourse against competitiveness concerns. As an interim measure, a domestic climate program could mitigate competitiveness impacts through options such as: excluding trade-exposed firms from regulation; compensating firms for regulatory costs through free allocation of emission allowances; compensating firms, while providing incentive for production and emission reduction, through output-based allocations; and placing taxes or other requirements on goods imported from countries with weaker emission controls. These approaches vary in their effectiveness in reducing competitiveness impacts, in their impact on the environmental integrity and economic efficiency of a domestic climate program, and in their influence on international relations and prospects for an effective international climate framework.

Climate change is a global phenomenon, and the long-term response must include an effective international framework ensuring that all major emitters contribute equitably to the global effort.

Establishing a mandatory program to reduce U.S. greenhouse gas (GHG) emissions in advance of a comprehensive international agreement presents both risks and opportunities. On the one hand, domestic GHG limits could lead to a shift of some energy-intensive production to countries without climate constraints, resulting in "emissions leakage" and posing competitiveness concerns for some domestic industries. On the other hand, a mandatory domestic program in the United States is an essential step towards the development of a binding multilateral framework, which in the long run is the most effective means of addressing these environmental and economic concerns.

It is important that these international dimensions be taken into account in the design of a domestic U.S. climate change policy, with two overriding policy objectives: 1) maximizing incentives for the development of an effective international climate framework, and, in particular, for action by the major emerging economies; and 2) prior to establishment of this international framework, minimizing potential adverse competitiveness impacts on U.S. firms and workers. While these two objectives are closely related, each might be most effectively addressed through a different set of policy responses. This Congressional Policy Brief outlines policy options addressing the second objective: minimizing competitiveness impacts. A future brief will address incentives for an international policy framework.

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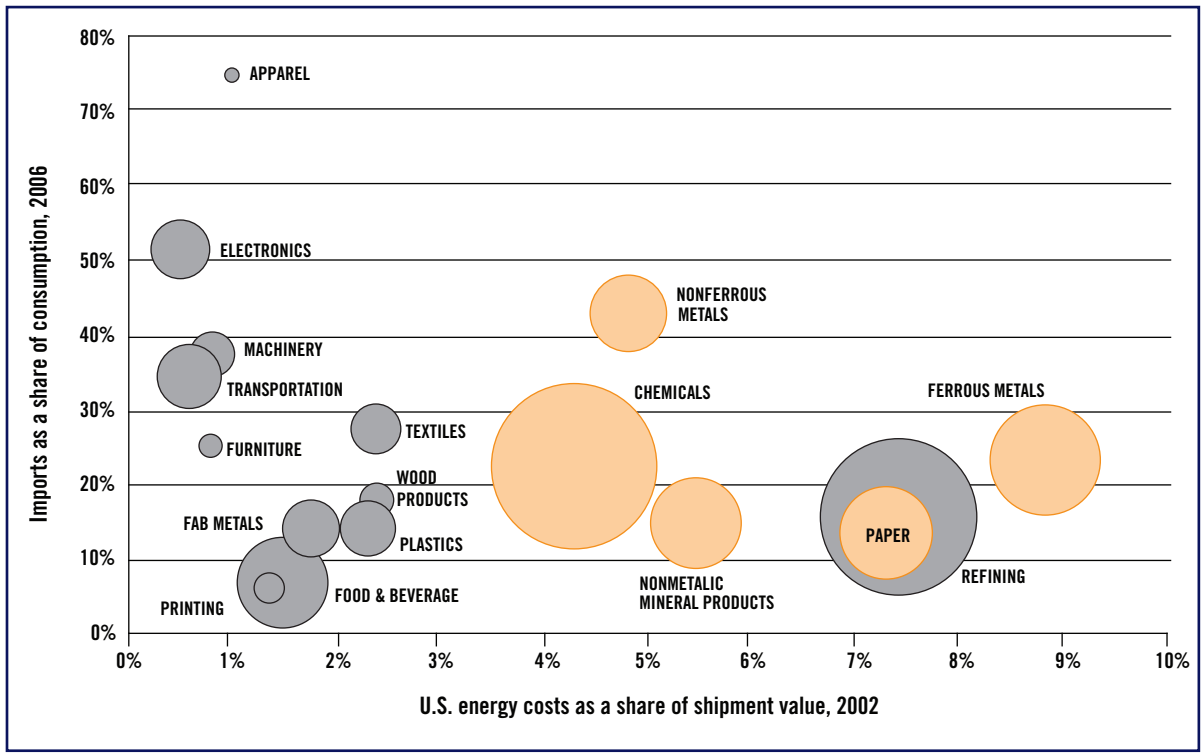
Understanding Competitiveness Concerns

A first step in considering options to address competitiveness is assessing the potential scope and magnitude of potential competitiveness impacts. It is not the competitiveness of the U.S. economy as a whole that is at issue. (According to a recent MIT analysis, for instance, meeting the emission reduction targets of Lieberman-Warner Climate Security Act of 2007 (S. 2191) would reduce GDP by less than 1 percent in 2050, when the U.S. economy will have more than tripled in size.[1]) Rather, the concern centers on a relatively narrow segment of the U.S. economy: energy-intensive industries whose goods are traded globally, such as steel, aluminum, cement, paper, and glass. As heavy users of energy, these industries will face higher costs as a result of domestic GHG constraints; however, as the prices of their goods are set globally, their ability to pass along these price increases is limited.

Energy-intensive industries (those whose energy costs are 4 percent or more of shipped value)

Figure 1 *U.S. Industry Exposure to Climate-Related Costs*



This figure indicates the potential exposure of some U.S. industries to climate-related costs on the basis of their energy intensity (energy costs as share of shipment value) and their trade exposure (imports as share of consumption). The size of the bubbles indicates the industries' total CO_2 emissions in 2002. The industries represented by colored bubbles are those generally regarded as vulnerable to potential competitiveness impacts. (Refining, although energy-intensive, has not figured prominently in the competitiveness debate; trade-related impacts, if any, would likely be far outweighed by the effects of reduced consumption.)

Source: Houser, Trevor et al., *Leveling the Carbon Playing Field: International Competition and US Climate Policy Design*, Peterson Institute for International Economics and World Resources Institute, May 2008.

consume more than half of the energy used in U.S. manufacturing, while generating only 16 percent of manufacturing production and 20 percent of manufacturing employment (less than 1 percent of total U.S. employment).[2] In recent decades, through technological change and competitive pressures, many of the energy-intensive sectors have experienced significant declines in employment even as production has held steady or grown sharply. In iron and steel, for example, production has risen about 40 percent since 1983 while employment has fallen nearly 40 percent.[3] Projections of manufacturing activity through 2016 indicate flat or modest output growth and declining employment in most of the energy-intensive sectors.[4]

Competitiveness impacts can be experienced as a loss in market share to foreign producers, a shift in new investment, or, in extreme cases, the relocation of manufacturing facilities overseas. In assessing the economic consequences of past environmental regulation in the United States, most analyses find little evidence of significant competitive harm to U.S. firms. Many studies conclude that other factors—such as labor costs, the availability of capital, and proximity to raw materials and markets—weigh far more heavily in firms' location decisions. One comprehensive review—synthesizing dozens of studies of the impact of U.S. environmental regulation on a range of sectors—concluded that while new environmental rules imposed significant costs on regulated industries, they did not appreciably affect patterns of trade.[5]

In the case of GHG regulation, the additional cost to firms could include the compliance cost of purchasing allowances to cover direct emissions; indirect compliance costs embedded in higher fuel or electricity prices; further demand-driven price increases for lower-GHG fuels such as natural gas; and the costs of equipment and process changes to abate emissions or reduce energy use.

In gauging the potential impacts of GHG regulation, it is important to distinguish the "competitiveness" effect from the broader economic impact on a given industry or firm.

In gauging the potential impacts of GHG regulation, it is important to distinguish the "competitiveness" effect from the broader economic impact on a given industry or firm. A mandatory climate policy will present costs for U.S. firms regardless of what action is taken by other countries. In the case of energy-intensive industries, one likely impact of pricing carbon will be a decline in demand for their products as consumers substitute less GHG-intensive products. This is distinct, however, from the "competitiveness" impact of GHG regulation, which is only that portion of the total impact on a firm resulting from an imbalance between stronger GHG constraints within, and weaker GHG constraints outside, the United States.

A forthcoming Pew Center report analyzes the historical relationship between electricity prices

and production, consumption, and employment in order to project the potential competitiveness impacts of a $15/ton CO_2 price in the United States (assuming no comparable action in other countries).[6] Looking at chemicals, paper, iron and steel, aluminum, cement, and bulk glass, the analysis concludes that most of the anticipated decline in production within those sectors (-1.6 percent to -3.4 percent) reflects a decline in consumption (-0.9 percent to -2.7 percent). The gap made up by imports, or the "competitiveness" effect, ranges from -0.6 percent to -0.9 percent (see Figure 2). Within some sub-sectors (the analysis examines more than 400 individual manufacturing industries), the "competitiveness" impact ranges up to 1.8 percent.

Figure 2 *Predicted Impacts of a $15/ton CO_2 Price on Energy-Intensive U.S. Manufacturing Sectors*

Industry	Domestic Production	Domestic Consumption	"Competitiveness Effect"
Industrial Chemicals	-2.7%	-1.8%	-0.9%
Paper	-3.3%	-2.4%	-0.9%
Iron & Steel	-2.7%	-1.9%	-0.8%
Aluminum	-2.0%	-1.4%	-0.7%
Cement	-1.6%	-0.9%	-0.7%
Bulk Glass	-3.4%	-2.7%	-0.6%

Impacts are based on 2001 industry energy intensity, weighted by 2001 employment among constituent 4-digit SIC industries.

This table shows the projected impacts of a $15/ton CO_2 price on energy-intensive manufacturing industries based on an analysis of the historical relationship between energy prices and production, consumption, and employment within those sectors. The "competitiveness effect," the difference between the projected declines in domestic production and domestic consumption, represents that portion of the production decline attributable to increased (net) imports.

Source: Aldy, Joseph E. and William A. Pizer, *The Competitiveness Impacts of Climate Change Mitigation Policies*, Resources for the Future for the Pew Center on Global Climate Change (forthcoming).

Policy Options

In the design of a domestic cap-and-trade system, competitiveness concerns can be addressed in part through a variety of cost-containment measures that help reduce the costs to all firms, including energy-intensive, trade-exposed industries. These broader cost-containment policies, such as banking and borrowing, use of offsets, and price caps are the subject of other briefs in this series. Here the focus is on targeted transitional policies to directly address competitiveness concerns in the period preceding the establishment of an effective international framework.

These policy options include: exempting potentially vulnerable firms from the cap-and-trade system; compensating firms for the costs of GHG regulation through allowance allocation or tax rebates; transition assistance to help firms adopt lower-GHG technologies, and to help communities and workers adjust to changing labor markets; and border measures such as taxes on energy-intensive imports from countries without GHG controls. In addition, a domestic policy could be designed to encourage and anticipate international sectoral agreements establishing the respective obligations of major producing companies within given sectors.

Criteria useful in assessing these approaches include: their effectiveness in avoiding or mitigating competitiveness impacts, environmental integrity, economic efficiency, consistency with international trade rules, their influence on the actions of other countries, and their impact on international climate negotiations.

Exclusion from Coverage

One option is to exclude vulnerable sectors or industries from coverage under the cap-and-trade program. For instance, the direct "process" emissions of many energy-intensive industries would not be subject to GHG limits under the Lieberman-Warner Climate Security Act of 2008 (S. 3036).[7] Exclusions would relieve trade-exposed industries of any direct regulatory costs, shielding them not only from competitiveness impacts but also from the broader economic effects of pricing carbon. However, by limiting the scope of the cap-and-trade system, exclusions would undermine the goal of reducing GHG emissions economy-wide, and would reduce the economic efficiency of a national GHG reduction program. They also would give exempted industries an economic advantage over non-exempt domestic firms and sectors, including competitors.[8] However, exempted firms would still face the indirect costs of higher energy prices.

Transitional policies can address competetiveness concerns while a stronger international framework is built.

Compensation for the Costs of GHG Regulation: Allowances and Tax Rebates

Another option is to include these sectors in the cap-and-trade system but compensate them for the costs of GHG regulation. Key design considerations include the scope, form, and means of calculating such compensation, and whether and how it should phase out.

As noted, firms covered by the cap-and-trade system face both direct and indirect costs of regulation. The direct, or compliance, cost is the cost of purchasing any allowances needed to cover direct emissions regulated under the cap. Indirect costs include higher prices for electricity and natural gas (reflecting an embedded carbon price and, in the case of natural gas, rising demand for this less GHG-intensive fuel), and the costs of equipment and process changes to abate emissions or reduce energy use. For most energy-intensive industries, the largest potential cost is higher energy prices.

One form of compensation is providing free emission allowances. In the case of direct emissions, allowances could be granted on the basis of historic emissions ("grandfathering") and energy-intensive sectors could receive a more generous allocation than other emitters. For instance, energy-intensive industries could receive a full free allocation while others receive allocations for 80 percent of their historic emissions. Over time, the energy-intensive sectors could continue to be treated more generously—for instance, continuing to receive a higher proportion of free allowances as the allocation system transitions to fuller auctioning. By keeping energy-intensive sectors under the cap, free allowances can provide for greater environmental effectiveness and economic efficiency.

Additional allowances could be provided to compensate for indirect costs. Under the Lieberman-Warner bill, for instance, carbon-intensive manufacturers would be allocated 11 percent of total allowances through 2021 (as the shares allocated to most other emitters are declining); from 2021 to 2030, their share of

allocations would decline by about 1 percent a year. As these firms' direct emissions would be largely exempt under the bill, this allocation would serve primarily to compensate them for higher energy prices. However, as future energy prices cannot be predicted, there is no way of determining in advance whether this allocation matches the firms' actual costs.

Another form of compensation for direct and/or indirect costs could be tax credits or rebates. One potential source of revenue for such measures is proceeds from the auction of emission allowances. A tax rebate would be a direct payment to compensate a firm for GHG regulatory costs; a tax credit could alternatively offset those costs by reducing a non-GHG burden such as corporate or payroll taxes, or healthcare or retirement costs.[9]

Firms can be compensated for direct or indirect costs through emission allowances or tax rebates.

Whatever form the compensation takes, one critical issue is the basis for calculating the appropriate level. In the case of direct compliance costs, granting allowances on the basis of historical emissions can in effect penalize early action and reward relatively heavier emitters within an industry. In addition, it does not necessarily guard against emissions leakage or a loss of jobs, as a firm could choose to maximize profits by selling its free allowances and reducing production. There is also the risk that firms will be over-compensated and realize windfall profits. (The Pew Center Congressional Policy Brief *Greenhouse Gas Emissions Allowance Allocations* addresses in more detail the issues surrounding allowance allocation, including the selection of a basis.)

Alternatively, compensation could be "output-based," pegged to actual production levels and/or energy consumption. Firms could be compensated in full for direct or indirect costs; or an output-based approach could apply a performance standard (i.e., emissions or energy use per unit of production) rewarding and encouraging lower GHG-intensity production. The Inslee-Doyle Carbon Leakage Prevention Act (H.R. 7146) would allocate allowances to compensate for both direct and indirect costs based on a facility's level of output, adjusted by an "efficiency factor" set at 85 percent of emissions/energy use per unit of production within the sector. (Facilities whose GHG performance is at the sector average would be reimbursed for 85 percent of their costs, while those performing above or below average would be compensated for a greater or lesser portion of their costs, respectively.) This "efficiency factor," which could be adjusted over time, would provide firms an ongoing incentive to switch to lower-GHG processes and energy sources, while the compensation would shield them from regulatory costs, lowering the risk of emissions leakage and competitiveness impacts.

One weakness of these compensation approaches, as with the exclusion of trade-exposed sectors from the cap, is that the remedy extends beyond any actual competitiveness effect. Whether based

on output or historic emissions, most of the proposals offered aim to compensate firms largely or fully for all of the increased costs associated with GHG regulation, not just for the impacts they may face due to the asymmetry between GHG constraints within and outside the United States. To limit compensation to such impacts alone, however, would require complex calculations that could be reliably performed only once the impacts have occurred, arguably too late to avoid job losses or other harm. Another drawback of a compensation approach is that the resources required—whether drawn from auction revenue or other sources—are not available for other climate- or non-climate-related purposes.

If compensation is provided, one important consideration is how long it should be maintained and at what level.

If compensation is provided, one important consideration is how long it should be maintained and at what level. Phasing out the compensation would give firms additional incentive to improve their GHG performance but would also make them more vulnerable to competitiveness impacts. A mandatory program could provide for periodic review of any allowances or other compensation to vulnerable sectors to consider adjusting them on the basis of new information. For instance, if the legislation establishes a specific timetable for moving from free allocation to auctioning, this transition might be slowed for specific industries if there are clear indications of competitiveness impacts. Alternatively, compensation could be phased out or ended if other countries take stronger action or new international agreements are reached. The review could focus narrowly on the issue of trade-related impacts or it could be a broad-based review also looking at new science, technology, and economic data.

Transition Assistance

Another option is to provide transition assistance to vulnerable firms to help them adopt lower-GHG technologies, and to communities and workers affected by competitiveness impacts. In the case of firms, measures could include tax incentives such as accelerated depreciation to encourage the retirement of inefficient technologies, or tax credits for the development or adoption of lower-GHG alternatives. Firms could also be incentivized to switch to low carbon energy sources, for example through subsidies for purchasing or generating clean energy to drive production processes.

Where competitiveness impacts are unavoidable, assistance can be provided to both workers and communities. Previous government efforts to help communities adjust to economic changes resulting from national policies provide lessons for shaping similar efforts as part of climate change policy.[10] At the level of individual workers, policies such as the Workforce Investment Act providing income support and retraining to help move workers into new jobs can provide a blueprint for transition programs to assist workers adversely affected by competitiveness imbalances under a climate policy.[11]

Border Adjustment Measures

Another strategy is to try to equalize GHG-related costs for U.S. and foreign producers by imposing a cost or other requirement on energy-intensive imports from countries with weaker or no GHG constraints. One option is a border tax based on an import's "embedded" emissions (equal to the compliance costs for a domestic producer of an equivalent good). An alternative approach, described by proponents as more likely to withstand challenge under international trade rules, would instead require that imports be accompanied by allowances for their associated emissions. The Lieberman-Warner bill would require allowances for energy-intensive imports from countries not determined by an appointed commission to be undertaking "comparable" action to reduce emissions. To avoid driving up allowance prices for U.S. firms, importers would buy from an unallocated pool of "reserve allowances" at a price set by the government.

Border measures would equalize costs for foreign producers but pose legal and political risks.

One issue in this approach is its effectiveness in reducing competitiveness impacts. As the border adjustment measures would apply only to imports to the United States, they would not help "level the playing field" in the larger global market where U.S. producers may facer greater competition from foreign producers.

Among the other issues raised by unilateral border measures is their consistency with World Trade Organization (WTO) rules. The legality of a given measure would depend in part on its specific design and on the types of climate policies in place domestically. As such approaches have not been previously employed, there are no definitive rulings, and experts differ in their interpretation of relevant WTO precedents.[12] The legal uncertainties ultimately would be resolved only through the adjudication of a WTO challenge, a likely prospect if unilateral border measures were to be applied by the United States or another country.

Trade measures also present significant administrative challenges—in particular, calculating the GHG intensity of imported goods. In addition, criteria must be established as basis for determining whether a country is meeting a "comparability" or other standard. Under Lieberman-Warner, "comparable action" is defined as either a) a percentage reduction in GHGs equivalent to that achieved by the United States, or b) as determined by the commission, "tak[ing] into consideration… the extent to which" a country has implemented measures and deployed state-of-the-art technologies to reduce emissions. A literal application of a "comparability" standard to developing countries—particularly if border requirements are imposed upon or very soon after mandatory domestic limits are put in place—would likely be viewed internationally as inconsistent with the principle of "common but differentiated responsibilities" agreed to by the United States in the UN Framework Convention on Climate Change.

Another important consideration is the potential impact on international relations. If the United States were to impose border requirements, there may be a greater likelihood that it would become the target of similar measures. European policymakers also are weighing the use of border measures and have argued that the emission targets under consideration in the United States are not comparable to those adopted by the European Union. U.S. trade officials and others also have voiced concern about the potential for retaliatory measures by targeted countries, leading to escalating trade conflicts.[13] Proponents argue that the threat of unilateral trade measures would give the United States greater leverage in international climate negotiations. However, there is also a risk that they would engender more conflict than cooperation, making it more difficult to reach agreements that could more effectively address competitiveness concerns.

International agreements in energy-intensive sectors can help reduce emissions while addressing competetiveness.

International Sectoral Agreements

All of the preceding options are measures that would be implemented domestically. Another approach that would help reduce emissions within and outside the United States, while addressing competitiveness concerns, is to negotiate international agreements setting GHG standards or other measures within energy-intensive globally-traded sectors. For example, major steel-producing countries could agree on standards limiting GHGs per ton of steel, which could initially be differentiated according to national circumstances and converge over time. Sectoral agreements could take a number of forms, depending on the specific sectors, and could be negotiated as stand-alone agreements or as part of a comprehensive climate framework.[14]

Within the domestic context, a sector-by-sector approach would sacrifice the broad coverage and economic efficiency of an economy-wide cap-and-trade program. Sectoral agreements could exist alongside a cap-and-trade program, however, and the system could be designed to encourage U.S. producers to work toward their establishment. One option would be to provide for a sector's exclusion from the cap once an international agreement of comparable stringency is in place (although, as noted, diminishing the scope of the cap-and-trade system by exempting one or more sectors would limit its economic efficiency). An alternative is to keep the sectors under the cap but align their obligations under the domestic program and the international agreement. For instance, a firm's emissions allowance could be based on the GHG standard that is agreed internationally.

In keeping with the principle of "common but differentiated responsibilities," an international sectoral agreement may not set fully equivalent requirements for all countries, particularly at the outset. In that event, compensation for energy-intensive industries could be maintained at some level and phased out as the requirements for other countries rise to those borne by the United States.

Key Design Questions

In assessing options, policymakers must seek to balance the goal of preserving U.S. competitiveness against other objectives such as the environmental effectiveness and economic efficiency of a domestic climate program and enhancing international relations and agreements. The best response may entail a mix of policy approaches. (For instance, some form of transition assistance could be coupled with output-based compensation to vulnerable firms—rising over time if significant competitiveness impacts emerge, and phasing out if international agreements are reached—with border adjustments kept in reserve as a measure of last resort.)

Policymakers considering whether and how to address potential impacts on competitiveness may consider some of the following questions in crafting their policy:

- Are adverse impacts likely at the projected costs of a given policy?
- Can the remedy be targeted to specific sectors or subsectors likely to face competition?
- Is the compensation being considered (e.g., through allocation or direct payment) likely to offset trade impacts?
- Should firms in vulnerable sectors be compensated for all GHG regulatory costs or for trade impacts only?
- Can worker and community transition assistance play a role?
- Are border adjustments contemplated and have the potential drawbacks been fully considered and addressed?
- Does the policy allow for a phase-out of compensation or other policy adjustments once an international agreement is reached?

Figure 3 *Legislative Proposals to Address Competitiveness*

Selected provisions of the Lieberman-Warner Climate Security Act of 2008 (S. 3036)	Inslee-Doyle Carbon Leakage Prevention Act (H.R. 7146)
• Process emissions of many energy-intensive industries exempt from cap; only process and combustion emissions from use of coal (more than 5,000 tons/year per facility) covered • Energy-intensive industries (iron, steel, aluminum, pulp, paper, cement and chemicals) initially receive 11% of total allowances for any covered process emissions and to compensate for higher energy costs, declining to 1% of total allowances in 2030. Allowances allocated based on sectors' relative energy intensity and facilities' level of employment • Starting in 2014, energy-intensive imports from countries not determined to be undertaking "comparable action" to be accompanied by emission allowances purchased from an "international reserve allowance" pool • "Comparable action" defined as a) a percentage reduction in GHGs equivalent to that achieved by the United States, or b) as determined by an appointed commission, "tak[ing] into consideration… the extent to which" a country has implemented measures and deployed state-of-the-art technologies to reduce emissions	• Eligible energy-intensive industries covered by the cap receive allowances for direct emissions based on a facility's level of production in the previous two years multiplied by 85% of the average GHG emissions per unit of output for all facilities in the sector or subsector • Covered and non-covered facilities receive allowances for indirect emissions based on their level of production multiplied by 85% of the average amount of electricity per unit of production for all facilities in the sector or subsector (adjusted by the average GHG emissions per kilowatt hour of electricity purchased by the facility) • Total allowances to eligible facilities in any year not to exceed 15% of total allowances available in the first year • Allowances for eligible facilities are to be reduced if the President determines that "international governmental activities" have "substantially mitigated" the risk of competitive disadvantage and carbon leakage; and terminated if the President determines that the competitive disadvantage has been "rendered insignificant"

End Notes

[1] Paltsev, Sergey, et al., *Assessment of U.S. Cap-and-Trade Proposals*, MIT Joint Program on the Science and Policy of Global Change Report 146, Appendix D, February 2008.

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[6] Aldy and Pizer, forthcoming. The analysis focuses on energy-intensive manufacturing industries, not mining or refining.

[7] For energy-intensive industries, only process and combustion emissions from use of coal (more than 5,000 tons/year per facility) are subject to the cap.

[8] The Pew Center Brief "Scope of a Greenhouse Gas Cap-and-Trade Program" has an in-depth discussion of the issues surrounding coverage and point-of-regulation, including many advantages of broader program scope.

[9] Houser, Trevor et al., *Leveling the Carbon Playing Field: International Competition and US Climate Policy Design*, Peterson Institute for International Economics and World Resources Institute, May 2008.

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[12] For a discussion of WTO-related issues, see Bordoff, Jason E., *International Trade Law and the Economics of Climate Policy: Evaluating the Legality and Effectiveness of Proposals to Address Competitiveness and Leakage Concerns*, Bookings Institution, June 2008.

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