Written Testimony of Richard D. Morgenstern

Senior Fellow, Resources for the Future
Washington, DC

Prepared for the U.S. House of Representatives
Committee on Energy and Commerce

Climate Change: Competitiveness Concerns and Prospects for Engaging Developing Countries

February 28, 2008

Summary of Testimony: Due to the diversity of greenhouse gas (GHG) sources, efforts to address climate change will, of necessity, impact nations, industries, and individuals. In general, pursuing a cost-effective approach that minimizes the overall cost to society of achieving a particular emissions-reduction target will minimize the burden imposed on businesses and consumers.

Broad, market-based strategies—such as an emissions tax or cap-and-trade program that effectively attach a price to GHG emissions—offer significant cost and efficiency advantages. In order to limit hardships on selected industries, however, additional flexibility mechanisms will be required: these could include recognizing offset credits from sectors or gases not included under the cap and/or from projects undertaken in other countries. Close attention to cost and efficiency considerations should be considered the first step to addressing competitiveness concerns.

But even with a cost-effective strategy for reducing U.S. GHG emissions, some domestic producers will incur increased production costs and face increased challenges to their ability to remain globally competitive, particularly in trade-sensitive, energy-intensive sectors. In most manufacturing industries, energy costs are less than 2 percent of total costs, a figure that rises to more than 3 percent in energy-intensive industries like refining, primary metals, and paper and printing, and jumps to over 20 percent in more narrowly defined categories, like aluminum and alkalies.

As policymakers consider options to lessen these competitiveness impacts, an important caution is in order. As compelling as the argument for protecting vulnerable firms or industries might be, few provisions or program modifications designed to accomplish this can be implemented without some cost to the environment as well as the overall economy. Nor are trade-related actions costless: they might raise legality concerns under World Trade Organization rules and/or risk provoking countervailing actions by other nations.

Efforts to address competitiveness concerns in the context of a mandatory domestic climate policy typically involve one or more of the following options:

- weaker overall program targets,
- partial or full exemptions from the carbon policy,
- standards instead of market-based policies for some sectors,
- free allowance allocation under a cap-and-trade system, and
- trade-related policies, such as a border adjustment for energy- or carbon-intensive goods.

These options can also be mixed and matched to some extent. One option would be to start out with a generous allowance allocation for the most severely affected industries, which could then be phased out at a future time, either a date certain or once trade-related measures were in place or other key nations adopted comparable climate mitigation policies. In general, the more targeted policies will be difficult to police and many industries will have strong incentives to seek special protection by taking advantage of these various mechanisms without necessarily being at significant competitive risk.

Written Testimony of Richard D. Morgenstern*

Climate Change: Competitiveness Concerns and Prospects for Engaging Developing Countries

Mr. Chairman: I am pleased to appear before this committee to discuss the potential impacts of climate change legislation on American competitiveness and the prospects for engaging developing countries in policies to reduce their greenhouse gas (GHG) emissions.

I speak as an economist who has been involved with the issue of climate change for two decades. I have also had the privilege of serving in senior policy positions under prior Republican and Democratic administrations, including a brief stint as Acting Deputy Administrator at the EPA during the Clinton transition, and participating in the Intergovernmental Panel on Climate Change and several major climate negotiations. Previously a tenured college professor, currently I am a senior fellow at Resources for the Future (RFF), a 56-year-old research institution headquartered here in Washington, DC, that specializes in energy, environmental, and natural resource issues. RFF is both independent and nonpartisan and shares the results of its economic and policy analyses with members of both parties, as well as with environmental and business advocates, academics, members of the press, and interested citizens. The views I present today are mine alone and do not necessarily reflect those of RFF.

Because of the great diversity of GHG sources, efforts to address climate change will—of necessity— have impacts at many different levels and affect nations, industries, and individuals. In general, pursuing a cost-effective approach that minimizes the overall cost to society of achieving a particular emissions reduction target will minimize the burden imposed on businesses and consumers. Broad, market-based strategies that effectively attach a price to GHG emissions, such as an emissions tax or cap-and-trade program in

* Dr. Morgenstern's testimony is drawn from chapters 7 and 8 in *Assessing U.S. Climate Policy Options: A report summarizing work at RFF as part of the inter-industry U.S. Climate Policy Forum,* which he co-authored. (www.rff.org/cpfreport)

particular, offer significant cost and efficiency advantages. As a result, it is widely assumed that some sort of policy that increases the costs of carbon will be part of the core response to climate concerns in the United States. As part of a broad pricing policy, additional flexibility mechanisms to limit hardships on selected industries will be required. These could include recognizing offset credits from sectors or gases not included under the cap and/or from projects undertaken in other countries. Such flexibility can lower overall program costs while ameliorating the potential for adverse impacts on particular sectors or the economy as a whole. Close attention to cost and efficiency considerations as overall policies are designed should be the first step in addressing competitiveness concerns.

American producers incurring significantly increased production costs will also face challenges in the global marketplace, especially if they compete against foreign suppliers operating in countries where emissions do not carry similar costs. These concerns are likely to be most acute in trade-sensitive, energy-intensive sectors. The question will likely be asked: why should U.S. firms be disadvantaged relative to overseas competitors to address a *global* problem? The difficulty, moreover, is not just political: if, in response to a mandatory policy, U.S. production simply shifts abroad to unregulated foreign firms, the resulting emissions "leakage" could wipe out some of the environmental benefits sought by taking domestic action.

My comments today draw on recent research I have conducted with two RFF colleagues, Mun Ho and Jhih-Shyang Shih, on the impacts on domestic manufacturing industries of a unilateral policy that establishes a price on carbon dioxide (CO_2) emissions. I also consider a range of options for offsetting these impacts.

Results of our modeling analysis

Let me begin by summarizing the major results of our research:

- The impact of a CO_2 price on the competitiveness of different industries is fundamentally tied to (a) the energy (and more specifically, carbon) intensity of

those industries and (b) the degree to which firms can pass costs on to the consumers of their products. The second factor hinges on the extent to which consumers can substitute other, lower-carbon products and/or turn to imports.

- Most industry-level studies of competitiveness focus on the energy-price impacts of a specific CO_2 policy. They typically do not consider what level of carbon price would be required to meet a particular emissions reduction target or how overall program stringency is coupled with decisions about offsets and/or a safety valve. Studies of competitiveness impacts typically also ignore the broader economic effects of the policy, such as the possibility that shifting from coal to natural gas for power generation could drive up natural gas prices and have additional effects on the competitiveness of natural gas users.
- Energy costs in most manufacturing industries (broadly defined at the two-digit classification level) are less than 2 percent of total costs. However, energy costs are more than 3 percent of total costs in such energy-intensive manufacturing industries as refining, nonmetal mineral products, primary metals, and paper and printing. For these more energy-intensive industries, total production costs rise by roughly 1 to 2.5 percent for each $10 increment in the per-ton price associated with CO_2 emissions; less is known about the impacts of larger CO_2 prices.
- Considerably larger impacts are seen when more narrowly defined industry categories are considered. For example, although the information is less complete, energy costs for the alumina refining and primary aluminum, and alkalies and chlorine industries represent more than 20 percent of total costs, with electricity costs alone accounting for about three-fourths of that total. For such industries, the CO_2 charge will have a proportionally larger impact on production costs than for the broadly defined category “primary metals.”
- Recent case studies in the European Union (EU) found more substantial impacts in some industries when narrower industry classifications were used. Specifically, a $10 per-ton CO_2 price led to a 6 percent increase in total costs for steel production using basic oxygen furnace (BOF) technology; for cement, when process emissions are included, production costs increased by 13 percent. With free allowance allocation and some ability to increase prices, however,

researchers have found that adverse impacts on industry can be reduced substantially. Using simple demand models, one study found that output in most industries declined less than 1 percent—and by at most 2 percent in the most strongly affected industries—for a $10 per-ton CO_2 price with 95 percent free allocation.

- More generally, cost increases can be translated into impacts on production, profitability, and employment using either an explicit model of domestic demand and international trade behavior or empirical evidence from past cost increases.
- Using an economic model of U.S. industrial production, demand, and international trade, my colleagues and I generally find adverse effects of less than 1 percent when estimating the reduction in industrial production due to a $10 per-ton CO_2 charge. The exceptions are motor vehicle manufacturing (1.0 percent), chemicals and plastics (1.0 percent), and primary metals (1.5 percent). These estimates represent near-term effects—that is, impacts over the first several years after a carbon price is introduced—before producers and users begin adjusting technology and operations to the new policy regime. Longer-term effects could be larger or smaller.
- Various proposals for a mandatory U.S. cap-and-trade program to limit GHG emissions would grant free allowances to different industries to help alleviate economic burdens from a CO_2 pricing policy. Calculations based on results from our research suggest that for most industries where energy is more than 1 percent of total costs, providing allowances equal to around 15 percent of a firm's emissions from fossil fuel and electricity use would be sufficient to address adverse impacts on shareholder value. This number varies widely, however, across industries. For example, in the chemicals and plastics industry we estimate the relevant number to be about 40 percent, while for the petroleum industry allowances equal to about 1 percent of a firm's emissions from fossil fuel and electricity use would be sufficient to cover the adverse impacts. As with earlier calculations, narrower industry classifications can produce much higher estimates of the free allocation necessary to address lost shareholder value.

- Impacts on domestic industries will generally be lower when it is assumed that major trading partners also implement comparable CO_2 prices or that border tax adjustments or other import regulations are used to address the CO_2 content of imported (and exported) goods.

Options for lessening the impacts

As policymakers consider options to lessen the competitiveness impacts, an important caution is in order. As compelling as the argument for protecting vulnerable firms or industries might be, few provisions or program modifications designed to accomplish this can be implemented without some cost to the environment (because emissions will be higher) and/or to the overall economy (because more expensive abatement options must be used to achieve the same emissions result). Nor are trade-related actions costless: they might raise legality concerns under World Trade Organization (WTO) rules and/or risk provoking countervailing actions by other nations.

Efforts to address competitiveness concerns in the context of a mandatory domestic climate policy typically involve one or more of the following options:

- weaker overall program targets;
- partial or full exemptions from the carbon policy;
- performance standards instead of market-based policies for some sectors;
- free allowance allocation under a cap-and-trade system; and
- trade-related policies, including some form of border adjustment for energy- or carbon-intensive goods.

Weaker overall program targets

This option involves adjusting the stringency of the policy as a whole to produce a lower economy-wide emissions price (we assume that this would be done without regard to the obligations of specific industries). Under a cap-and-trade system, a lower price can be achieved by allowing a greater quantity of emissions under the cap or by including a safety valve or other mechanism designed to limit emissions prices to a desired maximum level (the lower the safety-valve price, the weaker the policy, and vice versa). Other

options for making the policy more flexible (such as allowing a larger role for offset credits) can also reduce domestic emissions costs; whether they do so in a way that undermines environmental objectives depends on how they are designed and implemented. Under a tax system, lower prices can be achieved very simply—by reducing the amount of the levy. In both cases, the question of program stringency has a temporal dimension: a policy that is weaker in the short run can be made more aggressive at a later point in time.

Pros: The lower emissions price associated with a less stringent policy will produce smaller economy-wide costs and price impacts and should ameliorate the competitiveness concerns of trade-sensitive firms or industries. The principal advantage of this option is that it does not require the government to identify particularly vulnerable firms or industries, thereby avoiding the need to distinguish truly disadvantaged parties from those that simply seek preferential treatment or regulatory relief. Further, this option does not require additional mechanisms or special provisions, nor does it diminish the cost-effectiveness of the underlying policy.

Cons: The principal disadvantage of a weaker policy is that it also produces weaker results – not only in terms of emissions reductions and technology innovation, but also in terms of the perception that the United States is taking serious action. By its very nature, an overall weakening of the policy does not target cost reductions to the most vulnerable firms or industries. And unless emissions prices and reduction targets are dramatically lowered, competitive issues will remain.

Discussion: The appropriate overall level of stringency for U.S. policy remains a subject of active debate. The Committee is well aware of modeling results by independent analysts assessing the costs of achieving the emissions reduction targets in various legislative proposals. Interestingly, the inclusion of a “safety valve”—a mechanism that directly limits costs under a cap-and-trade program by making an unlimited number of additional allowances available for sale at a fixed, predetermined price—will affect the policy differently, depending on the price level adopted. Set at a high price, the safety

valve will function primarily as an insurance policy, one intended to limit economic impacts only in cases of unexpectedly high mitigation cost. By contrast, a safety valve price set at a relatively low level will tend to determine both environmental and economic outcomes and is generally equivalent to adopting a weaker emissions reduction target. Put another way, if the safety valve price is set sufficiently low, the emissions target becomes irrelevant because the marginal cost of abatement can be expected to exceed the safety valve's cost cap long before emissions targets are reached. At that point, program outcomes are more or less entirely driven by the safety valve price.

In contrast, if competitiveness concerns are primarily motivated by the potential for adverse consequences at the extremes of potential policy cost—extremes that could be induced by bursts of economic growth, unusual weather, or other conditions that lead to a spike in energy use and disruptions in the supply of lower-carbon fuels, or by the failure of new technologies to come online as anticipated—then even a relatively high safety valve price may be adequate to address these concerns without much effect on the emissions reductions expected from the policy.

In sum, weakening the overall policy may address the concerns of the most vulnerable industries, but if the objective is primarily to provide insurance against extreme policy impacts, other mechanisms—for example, a safety valve somewhat above expected prices—can be used to protect industry while largely maintaining the integrity of the environmental objective. Other options, considered below, attempt to deal more directly with vulnerable industries and would presumably be implemented as an alternative to weakening the overall policy.

Partial or full exemptions from the carbon policy

An obvious option for addressing competitiveness concerns is simply to exempt certain industries from the broader GHG-reduction policy. The challenge in implementing this approach—or indeed any of the targeted policies discussed in the remainder of my testimony—is determining which firms or sectors are particularly vulnerable to cost and competitiveness concerns and should, as a result, qualify for special treatment. Applying

a very high threshold for exemption risks excluding vulnerable producers; setting the threshold too low opens the door to unlimited lobbying for more favorable treatment.

The mechanics of actually providing exemptions, by contrast, are relatively easy. In a cap-and-trade system where downstream entities—primarily energy users—are regulated, exempt firms would face reduced requirements (or perhaps none at all) to submit allowances to cover their emissions. In a carbon tax system, eligible firms would face a reduced levy (or possibly none at all). Exemptions could also be provided to downstream firms or sectors in a system that regulated upstream entities (that is, energy suppliers). In that case, a procedure would be needed to credit exempt downstream entities based on their emissions or fuel use. The credit could be payable in allowances (in the case of a cap-and-trade system) or via a tax credit or rebate (in the case of an emissions tax).

Pros: The principal advantage of exemptions is that they can be used to protect vulnerable firms or industries in a convincing and targeted way, potentially making it politically possible to adopt a more stringent economy-wide GHG-reduction target.

Cons: The principal disadvantage of this approach is that it would likely increase the total economy-wide cost of achieving a given emissions target because exempting certain firms or sectors would almost certainly leave at least some inexpensive mitigation options untapped. As a result, the program would be both less efficient and more costly overall. This approach may also raise equity concerns: if the national target stays the same but some industries or firms are exempt from participating, the remaining nonexempt industries must bear a greater burden. Finally, the difficulty of identifying truly vulnerable firms or industries cannot be overemphasized. Politically and technically, it will be extremely challenging to adjudicate requests for exemptions on the basis of vulnerability to competitive harm.

Discussion: Interestingly, two proposals currently under consideration in the Senate already call for significant exemptions but do not limit these exemptions to sectors that would seem most obviously at risk of suffering a business disadvantage under a

mandatory domestic climate policy. For example, a bill introduced by Senators Feinstein and Carper (S.317, 110th) covers only the electricity sector—almost 40 percent of U.S. emissions—and therefore exempts primary (nonelectricity) energy use by households and the industrial sector along with all transportation-related emissions. A bill introduced by Senators Lieberman and Warner (S.2191, 110th), by contrast, covers large facilities downstream at the emitter, transportation fuels at the refinery or importer, plus F-gas producers and importers, for an estimated 75 percent of the total U.S. greenhouse gas emissions. Households, agriculture, and small nontransport emitters are generally exempt. In both these cases, however, the less than full coverage envisioned in the proposals appears to be motivated more by practical and political considerations—for example, that it might be easier to start by focusing on the electric power sector or on larger sources—than by competitiveness concerns per se.

For a cautionary lesson concerning the political hazards of exemption, one could look to the energy (Btu) tax proposed by the Clinton administration in 1993. At that time, many firms and industries made claims of business hardship. As a result, the final House legislation included a long list of exemptions added at the request of members or recommended by the administration. Ultimately, of course, the Btu tax was defeated in the Senate and the policy was never implemented—in part because its effectiveness was undercut by the exemptions.

Performance standards instead of market-based policies for some sectors

Performance standards come in many varieties and may include minimum, average, and tradable standards for emissions or energy use per unit of output. Unlike broad, market-based CO_2 policies, they do not directly increase energy costs and therefore do not create as much pressure for firms to raise product prices. For this reason, performance standards may seem less likely than market-based policies to raise competitiveness concerns for industries that face international competition and seem less likely to create incentives for shifting production abroad.

Pros: Well-crafted performance standards have the potential to encourage efficiency improvements without putting as much upward pressure on domestic production costs. In doing so, they may reduce the potential for domestic production to shift to countries without mandatory GHG-reduction policies (and thus avoid the emissions leakage that would result from such shifts). In general, efficiency and cost considerations argue for corporate average standards rather than facility-level standards. Tradable performance standards—such as those used to effect the phasedown of lead in gasoline in the 1980s and the current proposals for a national renewable energy portfolio standard (RPS)—provide even more flexibility and are even more cost-effective.

Cons: Performance standards are more costly than broad, market-based approaches because they do not encourage end users to reduce their consumption of GHG-intensive goods, and they do not balance the cost of emissions reductions across sectors. Relying on standards instead of market-based instruments to achieve emissions reductions will leave behind some low-cost abatement opportunities, thereby raising the overall cost incurred by society to achieve a particular emissions target. From an implementation standpoint, standard setting can be contentious and may require government to estimate technology costs in a particular sector more precisely than would be required to implement a broad-based cap-and-trade program or emissions tax.

Discussion: The academic literature provides abundant evidence that market-based mechanisms, especially broad-based ones, provide lower-cost emissions reductions than do standards. Some of the most important benefits of market-based instruments are often not realized immediately and become manifest only over a long period of time. Unlike performance standards, market-based instruments provide a continual incentive to reduce emissions. Thus they promote technology innovations that, by their nature, take time to develop and deploy. Market-based instruments also offer maximum flexibility in terms of the means used to achieve reductions, including, for example, the shift to new technologies that occurred in the U.S. sulfur dioxide program. In the case of GHGs, where emissions are not concentrated in a single sector, the flexibility afforded by a

broad, price-based system would be expected to provide even greater cost and efficiency benefits relative to more traditional regulatory mechanisms.

Notwithstanding those observations, it seems that firms and industries, particularly competitive ones, often prefer standards to market-based policies. They may fear that it will be more difficult to pass along increased energy costs under a market-based CO_2 policy; in addition, they may expect to be in a stronger position to negotiate the form and stringency of a regulatory program that is tailored to specific sectors rather than one designed for the economy as a whole.

Free allowance allocation under a cap-and-trade system

Allocation refers to the distribution of permits or allowances under an emissions trading program. Here, two decisions are important at the outset. The first concerns how many allowances (or what share of the overall allowance pool) will be given away, free. The second concerns the methodology—how the free allowances will be allocated to industrial sectors and, within sectors, to individual firms. In most existing emissions trading programs, the great majority of allowances have been given for free to directly regulated entities, primarily on the basis of historical emissions (an approach often called *grandfathering*). More recent climate policy proposals, in addition to providing for a larger auction, have proposed to allocate free allowances in a way that recognizes firm-level changes over time, typically based on an emissions, energy use, or output measure. The latter approach is known as *updating allocation.* Compared with an allocation based on grandfathering, an updating allocation can have important differences in terms of creating incentives to maintain (or even expand) domestic production—thereby reducing the potential for emissions leakage—and in terms of the effect on shareholder value.

Pros: The principal advantage of using a free allocation of allowances to address competitiveness concerns is that it can compensate firms for losses suffered as a result of the new policy without excluding those firms' emissions from the broad-based cap. Thus it avoids the efficiency losses and/or reduction in environmental benefit associated with other options (weakening the overall policy, exempting some industries, or relying on

traditional standards-based forms of regulation in some sectors) for responding to industry concerns.

In terms of the methodology used to distribute free allowances to individual firms, traditional grandfathering—which leaves the allocation fixed over time regardless of whether a business changes operations or even shuts down—can compensate firms' *owners* for losses in value but does not necessarily discourage firms from retiring or moving their emissions-producing operations overseas to avoid the future costs associated with the regulatory program.

The alternative, updating output-based allocations, continually adjusts allowance shares to reflect a firm's changing output. This effectively subsidizes production. That is, firms stand to gain a larger allocation of free allowances if they expand their operations and a smaller allocation if they move offshore, downsize, or shut down. Although incentives of this type are generally regarded as distorting and hence inefficient—because they induce firms to produce above the level that would otherwise make economic sense—they may be attractive in the context of concern about competitiveness impacts precisely because they tend to encourage domestic production and discourage firms from moving operations (and emissions) overseas. The subsidy benefit generated by an updating allowance methodology accrues to domestic consumers as well as to firms that face competition from foreign suppliers, either in markets at home or in export markets abroad (or both).

Cons: The principal case against free allocation is that it misses the opportunity to auction allowances and use the revenue to provide broad, offsetting benefits for the economy as a whole. From the standpoint of maximizing economic efficiency, it would make more sense to auction all allowances and use the proceeds to reduce taxes on income or investment. Compelling arguments can also be made for auctioning allowances and using the revenues to support other public policy objectives, such as funding energy R&D, offsetting the impact of higher energy prices on consumers (especially low-income households), and supporting efforts to adapt to the impacts of climate change.

Another concern is that if too generous, free allocation based on historical emissions (grandfathering) risks conferring windfall gains on some firms, especially if a firm can pass along most of the costs of regulation in the form of higher prices for its products. In that case, giving the firm free allowances would amount to a transfer of wealth from consumers—who pay higher prices for the firm's goods—to business owners or shareholders, who do not really bear a substantial share of the cost burden associated with the policy.

An updating free allocation that subsidizes domestic production gives rise to the same concerns noted in connection with other targeted responses that distort behavior relative to what would happen under a broad CO_2 pricing policy. Namely, allocation decisions in practice may fail to target truly trade-sensitive firms or industries and thus end up subsidizing emissions-intensive industries that are not really at risk of shifting their operations overseas, such as electric utilities. In that case, an updating allocation will create efficiency losses and increase the overall cost of the policy to society while providing only limited benefits in terms of maintaining domestic production, preserving U.S. jobs, and reducing the potential for emissions leakage.

Discussion: Compared with targeted exemptions and performance standards, using free allowances to compensate vulnerable industries as part of a broad cap-and-trade or emissions tax program generally maintains efficiency. Among these three options, an allocation-based approach remains the most cost-effective because it preserves the ability to trade off emissions reductions throughout the economy—without excluding some sectors—so that the environmental objective is achieved by exploiting the least expensive abatement opportunities. Tying free allocation to future production—or even to future employment, as proposed in legislation recently introduced by Senators Bingaman and Specter (S. 1766)—provides a way not only to compensate firms for unrecovered costs under the regulatory program but also to provide inducements for maintaining domestic production. The principal disadvantages are (1) that government will forgo revenues from auctioning allowances that could be used for other purposes, and (2) that it will be

difficult, as with all targeted measures for addressing competitiveness concerns, to identify truly vulnerable sectors. Moreover, free allocation involves difficult and politically contentious decisions about how many allowances should be given away for free and how those allowances should be divvied up, not only across industry sectors but also among individual firms within a sector.

Trade-related policies

The principal aim of trade-related policies is to level the competitive playing field between domestic and foreign suppliers. In this case, efforts to level the playing field would likely involve using a tariff or some other mechanism to impose costs on imports into the United States—presumably based on their embedded carbon or energy content—roughly equivalent to the costs that the climate policy imposes on domestic production. A similar mechanism, perhaps involving some type of export subsidy, could be used to level the playing field for U.S.-produced goods that compete in foreign markets against goods produced in countries without mandatory emissions policies, though this option is not discussed as often. A recent proposal by American Electric Power and the International Brotherhood of Electrical Workers (AEP/IBEW) would require importers from countries that do not have emissions reduction requirements comparable to those of the United States to submit emissions allowances to cover the carbon content of certain products. As incorporated into several Senate bills, this mechanism would engage only after eight years, during which time the United States would encourage its trading partners to undertake emissions reduction efforts; furthermore, it would apply only to bulk, energy-intensive goods, and it would account for free allocation to domestic industry by reducing the import obligation.

Pros: If they can be successfully defended under WTO rules, border adjustments would protect U.S. firms or industries against adverse competitiveness impacts related to the implementation of a mandatory domestic climate policy. The approach would provide the added benefit of creating real incentives for major trading partners to adopt similar policies or otherwise reduce their GHG emissions. Once authorized in U.S. legislation,

even the threat of such adjustments might trigger some favorable policy responses from other nations.

Cons: Even if they can be successfully defended under WTO rules, border adjustments have several disadvantages. To the extent they act as barriers to trade (beyond correctly accounting for the cost of emissions), such adjustments are inherently inefficient and costly to U.S. consumers and industries that depend on imported goods. Moreover, because of the difficulty of accurately measuring embedded energy or carbon content for specific items, implementing such a policy could be both expensive and controversial in practice. More importantly, the system could be abused by firms or industries—or even by other nations if they use it as grounds for instituting their own system of border adjustments—for purely protectionist reasons unrelated to climate policy. These actions, in turn, could work against long-sought free-trade objectives. They could also undermine the trust and good relations necessary to foster international cooperation and agreement on future global efforts to address climate change risks.

Discussion: Since any directly trade-related action risks a challenge by U.S. trading partners before the WTO dispute settlement body, the first issue to consider is what kind of policy would be legal under WTO rules (the consequences of illegality are mentioned below). Even though WTO law is vague on this issue, the United States might be able to address the problem of offshore emissions associated with imported products (so-called process emissions) by applying to imports a carbon tax or emissions permit requirement that is *equivalent* to the requirements imposed on U.S.-produced goods under domestic policy. Arguably, if this equivalent policy does not discriminate against imports versus domestic products or disadvantage some imports relative to others, it could be seen as an extension of U.S. policy. In that case, it would likely pass WTO scrutiny without reference to the environmental exceptions provided for under Article XX in the General Agreement on Tariffs and Trade.

Further complexities arise in developing administrative procedures for assigning process carbon emissions to specific imported products. On the one hand, the border adjustment

policy might be considered more acceptable if it were based on the processes and fuels used in the United States—the so-called U.S. predominant method of production. At the same time, however, it might be necessary to establish procedures that would allow foreign producers to make different claims concerning assumed process emissions based on the submission of technical data. Such determinations would be more defensible—and easier to calculate—if the focus were on basic products, such as steel, aluminum, and cement, rather than on automobiles, appliances, or other finished goods.

The amount of any border adjustment might be diminished to the extent that domestic producers are effectively subsidized by a free allowance allocation. Thus, for example, if 50 percent of available allowances under a domestic cap-and-trade program are allocated for free to affected industries, an importer might have to surrender allowances equal to only half of estimated process emissions associated with the imported product. If a carbon tax were imposed, without exemptions, importers would presumably face an equivalent adjustment at the border and there would be no need to account for offsetting benefits to U.S. producers. A variety of other issues might also complicate the use of border adjustments, including the question of how to treat imports from a country or region with some form of domestic carbon policy versus imports from countries that lack such a policy altogether.

In the best case, the credible threat of border adjustments would create incentives for other nations to adopt mitigation policies of their own. Of course, in the eight years before the border adjustments would kick in, U.S. industry could suffer significantly.

To improve the prospects for a successful WTO defense, any such policy would have to be designed with great sensitivity on a number of issues, including the need to put major trade partners on notice and provide sufficient time for them to develop viable domestic emissions reduction policies of their own. Once legislation was in place, U.S. customs would need a substantial infrastructure to assess the carbon footprint of imported products and apply border adjustments accordingly. Interestingly, even if a U.S. policy of carbon-based border adjustments was ultimately found to violate WTO law—by no

means a certainty—the only available remedy for the United States is to change the law or suffer retaliation. No damages for past harm are due.

In sum, I would close with the following observations:

- Cost-effective policies that allow access to inexpensive mitigation opportunities throughout the United States and potentially around the world will generally minimize the economic costs of achieving any given emissions target and could be viewed as a first response to competitiveness concerns.
- A weaker overall policy—less stringent emissions caps and/or lower emissions prices—represents the least focused approach available for addressing competitive impacts. This approach has the advantage that it does not require policymakers to identify vulnerable sectors or firms and thus avoids the potential for a "gold rush" of industries seeking relief. The disadvantage, obviously, is that less ambitious emissions reduction targets will produce smaller environmental benefits and weaker incentives for technology innovation.
- Simply exempting certain sectors or types of firms provides a direct response to competitiveness concerns and the most relief to potentially affected industries, but it is also the most costly option in terms of reducing the economic efficiency of the policy.
- More traditional (nonmarket-based) forms of regulation—such as emissions standards or intensity-based regulations—can be used to avoid direct energy price increases and deliver some emissions reductions. Regulated industries will still face compliance costs, however. Meanwhile, the overall cost to society of achieving a given environmental objective using these forms of regulation will tend to be higher than under a single pricing policy.
- Free allowances can be used to compensate adversely affected industries (even if those industries are not directly regulated under the policy) without necessarily losing the efficiency of a broad, market-based approach. Different forms of free allocation—for example, an allocation based on historical emissions or energy use ("grandfathering") versus an updating allocation tied to current output—will have

very different incentive properties and may respond more or less effectively to concerns about retaining production capacity and jobs in the United States. The consequences of different allocation methodologies and their relative advantages and disadvantages in relation to competitiveness concerns and other policy objectives must therefore be carefully considered.

- Trade-related policies (such as border adjustments for energy- or carbon-intensive goods) can both protect vulnerable domestic firms and industries and create incentives for nations without similar GHG policies to participate in emissions reduction efforts. However, such policies also risk providing political cover for unwarranted and costly protectionism and may provoke trade disputes with other nations.
- To some extent, one can mix and match these options. For example, one might consider starting out with a generous allowance allocation for the most severely affected industries—perhaps one based on updating free allocations tied to current output. The free allocations could then be phased out, either at a date certain or once trade-related measures were in place or major trading nations adopted comparable climate mitigation policies.
- In general, the more targeted policies—that is, all the above options except an overall weaker policy—will be difficult to police, and many industries will have strong incentives to seek special protection by taking advantage of these various mechanisms without necessarily being at significant competitive risk.

Thank you.