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RESOURCES FOR THE FUTURE

THE IMPACT OF POTENTIAL CLIMATE MITIGATION POLICIES ON CARBON-INTENSIVE INDUSTRIES AND POSSIBLE REMEDIATION OPTIONS

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Mr. Chairman: I am pleased to appear before this committee to discuss the impact of potential climate mitigation policies on carbon-intensive industries and possible remediation options.

I have been involved in climate change policy issues for the past two decades, having served in senior policy positions at the U.S. Environmental Protection Agency under prior Republican and Democratic administrations, and participated in both the Intergovernmental Panel on Climate Change and several rounds of international climate negotiations. Previously a tenured economics professor, I currently 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 that of RFF.

I believe it is essential for the United States to adopt a mandatory system to reduce its greenhouse gas emissions. But doing so will not be costless. Due to the enormous diversity of GHG sources, efforts to address climate change will—of necessity—have

impacts at many different levels, including that of nations, industries, and individuals. Pursuing a cost-effective approach that minimizes the overall cost to society of achieving a particular emissions-reduction target will tend to reduce the burden imposed on businesses and consumers.

Broad, market-based strategies that effectively attach a price to greenhouse gas (GHG) emissions, such as a cap-and-trade program or an emissions tax, 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 U.S. policy response. Legislation already introduced into both Houses of Congress embodies such an approach, and the Obama administration has specifically endorsed a cap and trade program.

As part of a broad emissions pricing policy, additional flexibility mechanisms to limit hardships on selected industries may 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 further while also ameliorating the potential for adverse impacts on particular sectors or the economy as a whole. Close attention to cost and efficiency considerations in overall policy design should be considered the first step to addressing competitiveness concerns.

At the same time, even with a cost-effective strategy for reducing U.S. GHG emissions, some domestic producers will incur increased production costs. As a result, they will also face increased challenges to their ability to remain competitive globally, especially where 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 that 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 from domestic action. Various policy options have been advanced to address these concerns, although none is without its own problems.

My comments today draw on recent research by me and several of my RFF colleagues on the impacts of a unilateral policy that establishes a price on carbon dioxide (CO_2) emissions and on various options for offsetting these impacts.

A recent paper by myself, Mun Ho, and Jhih-Shyang Shih estimates the likely economic impacts based on adjustments that firms can make over different time scales:

1. In the very short run, firms cannot adjust prices or production techniques and profits fall accordingly.
2. In the short run, firms can raise prices to reflect the higher energy costs, with a corresponding decline in sales as a result of product or import substitution.
3. The medium run, when in addition to the changes in output prices, firms can change the mix of energy, labor, and other inputs in their production processes, but capital remains in place; economywide effects are considered.
4. In the long run, capital may also be reallocated across the economy.

Our analysis assumes a unilateral CO_2 price of $10 per ton and considers the impacts on industrial output, employment, corporate profits, as well as the potential for international leakage of emissions.

Measured by the reduction in domestic output, a readily identifiable set of industries is at the greatest risk of contraction over both the short and long terms. Within the manufacturing sector, the hardest-hit industries are chemicals and plastics, primary metals, and nonmetallic minerals. Another hard-hit industry, petroleum refining, will likely be able to pass along most cost increases, thereby muting the impacts.

Although the short-run output reductions are relatively large in these industries, the reductions shrink over time as firms adjust inputs and adopt carbon- and energy-saving strategies. The industries that continue to bear the impacts are generally the same ones affected initially, albeit at reduced levels. While profits drop in the short term, competitive markets adjust to ensure market rates of return in the longer run.

Focusing on the nearer-term timeframes, the largest cost increases are concentrated in particular segments of affected industries. For example, petrochemical manufacturing and cement see very short-run cost increases of more than four percent while iron and steel mills, aluminum, and lime products see cost increases exceeding two percent. While a more complete picture of industry impacts at a highly disaggregated level would clearly aid in the design of policy remedies, limitations on the publicly available data hamper such efforts.

In nonmanufacturing companies, the overall size of the production losses also declines over time in most sectors, although a more diverse pattern applies. The initially significant impact on electric utilities, for example, does not substantially change over time compared to an industry such as mining, which experiences a continuing erosion of sales as broader adjustments occur throughout the economy. Agriculture faces modest but persistent output declines over time due to higher prices for fertilizer and other inputs.

In terms of employment, short-term job losses are modeled as roughly proportional to those of output. Over the longer term, however, when labor markets are able to adjust, the remaining, relatively small losses are fully offset by gains in other industries, leaving no net change in employment.

Leakage across Borders

In time, most experts agree, the best solution to addressing climate change will be to devise binding international agreements that create parity in carbon markets. But in the interim, unilateral actions must be taken to begin addressing the global challenge. A consequence of this approach is emissions "leakage," wherein domestic reductions are partially offset by increases abroad, as production, demand, and energy supplies are reallocated globally. While domestic consumption of carbon intensive products will clearly decline in the presence of a price on carbon emissions, some leakage will also occur. Over the long term, we estimate that the leakage rate for the few most vulnerable industries can be as high as 40 percent in the case of a unilateral $10 per ton CO_2 price.

Importantly, displacement of production through lost competitiveness is not the only source of carbon leakage. A large-scale withdrawal of demand for carbon-intensive energy from the United States will drive down fossil fuel prices globally and expand consumption elsewhere. This driver of leakage can only be addressed by ensuring that all major international players take on comparable carbon policies and prices.

Policy Tools for Addressing Competitiveness and Leakage

A first response is to ensure that climate policies are cost-effective. For example, carbon pricing through a tax or cap-and-trade policy will ensure access to inexpensive mitigation opportunities throughout the United States (and potentially around the world), minimizing the economic costs of achieving any given emissions target. Beyond that, policymakers have a number of options.

A weaker overall policy—less stringent emissions caps and/or lower emissions prices—would offer relief, but to all industries, not only those facing increased competition. Meanwhile, environmental benefits and incentives for technology

innovation would be smaller. More generous use of offsets from either or domestic or international sources can lessen domestic impacts in similar fashion, albeit without the same loss in environmental benefits.

Exempting certain sectors provides more targeted relief but eliminates incentives for those sectors to deploy even inexpensive measures. More traditional forms of regulation, such as emissions standards, can be used to deliver some emissions reductions while avoiding the added burden of allowance purchases (under auctioned cap-and-trade programs) or tax payments for their remaining emissions. However, the overall cost to society will tend to be higher than under an economy-wide pricing policy.

Pending legislation has focused mostly on free allowance allocation and trade-related "border adjustment" policies. In particular, import adjustment proposals would require importers to purchase allowances based on actual or estimated embodied emissions, leveling the playing field between imported and domestic consumer goods. Full border adjustment via use of an export rebate is another option to lessen impacts on domestic industries, although World Trade Organization (WTO) rules may limit its use. If adopted, such an approach would be based on average emissions payments in the relevant sector.

Alternatively, an allocation policy that keeps domestic costs from rising in the first place would also balance things out. Under such an approach, allowance allocation would need to be updated in accordance with output. The value of that allocation would function like a domestic production rebate. This type of benchmarking with ongoing adjustments stands in contrast to the fixed allocations that were used in Title IV of the Clean Air Act, which do nothing to lower variable costs.

A recent paper by Carolyn Fischer and Alan Fox has examined both trade-related and free allowance allocation options. Not only may different border adjustment policies raise concerns within the WTO, but they also pose different economic tradeoffs. While all the options promote domestic production to some extent, none

of them would necessarily be effective at reducing leakage in a given sector. That is because while they reduce emissions abroad, they expand the emissions of domestic firms. For most U.S. sectors, a full border adjustment, combining an import adjustment based on actual embodied carbon emissions with an export rebate, is most effective at reducing global emissions. Especially when import adjustments are limited for reasons of WTO compatibility to a weaker standard, e.g., the domestic emissions rate, the domestic rebate via free allowance allocation can be more effective at limiting emissions leakage and encouraging domestic production.

Some caveats are especially relevant: First, although an emissions cap can be effective in limiting domestic emissions, awarding additional allowances to certain sectors to compensate for competitiveness concerns will tend to raise allowance prices overall, and shift costs among sectors. Second, border adjustments or other trade-related policies risk providing political cover for unwarranted and costly protectionism and may provoke trade disputes with other nations. Third, many of our largest trade partners are implementing emissions pricing; the European Union already has a cap-and-trade program and Canada has policies developing at the provincial level. For most energy-intensive manufacturing, these trade partners represent a quarter or more of the leakage from lost competitiveness. Consequently, actual leakage is less of a concern than estimated in our modeling, and any allocation scheme must consider how preferential treatment will be phased out.

Finally, I return to the choice of adopting a broad based carbon pricing scheme, presumably cap and trade versus a more tailored policy wherein key sectors are fully or partially exempted from the emissions pricing regime. In that context, I would note that sector-specific policies are more difficult to implement than economywide approaches and can require hard-to-obtain data. Furthermore, they create incentives for rent seeking as individual industries now look for special protection under the available mechanisms without necessarily being at significant competitive risk. Broad-based approaches, such as an economywide cap-and-trade program, offer the greatest prospect for cost-effective emissions reductions. At the

same time, there is a real prospect that a unilateral or near-unilateral carbon pricing approach will cause adverse impacts on certain energy-intensive, import-sensitive industries, particularly in the short to medium term. Over the longer term, emissions leakage would be a concern as well. Overall, until a more global approach can be adopted, free allowance allocation via updating as a transitional measure for the adversely impacted sectors has much to recommend it.

Thank you.