Written Testimony of Dallas Burtraw

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Preventing Climate Change: Second in a Series of Hearings

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Summary of Testimony

These comments highlight three important features in the design of a cap-and-trade policy to regulate greenhouse gas emissions in the United States including the initial distribution of allowance value created under the program, management of costs and the protection of domestic industry from unfair international competition.

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Preventing Climate Change: Second in a Series of Hearings

Mr. Chairman, thank you for the opportunity to testify before the House Committee on Ways and Means. My name is **Dallas Burtraw,** and I am a senior fellow at Resources for the Future (RFF), a 55-year-old research institution based in Washington, D.C., that focuses on energy, environmental, and natural resource issues. RFF is independent and nonpartisan, and shares the results of its economic and policy analyses with environmental and business advocates, academics, government agencies and legislative staff, members of the press, and interested citizens. RFF neither lobbies nor takes positions on specific legislative or regulatory proposals. I emphasize that the views I present today are my own.

For several years, I have studied the performance of emissions cap-and-trade programs from both scholarly and practical perspectives. I have evaluated the sulfur dioxide (SO2) emissions allowance trading program created by the 1990 Clean Air Act Amendments, the nitrogen oxide (NOx) trading program in the northeastern United States, and the European Union Emission Trading Scheme (EU ETS). I have conducted analysis and modeling to support the northeastern states in the design of the Regional Greenhouse Gas Initiative (RGGI). Recently I worked as part of a research team developing recommendations for the design of an auction under RGGI, on behalf of the New York State Energy Research and Development Authority.[1] In another collaborative effort, I worked to provide guidance for the State of Maryland as it implements its plan to join RGGI.[2] Last year, I served on

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[1] Holt, C., Shobe, W., Burtraw, D., Palmer, K., and Goeree, J. 2007. *Auction Design for Selling Co2 Emission Allowances under the Regional Greenhouse Gas Initiative*. October 29. RFF Report.

Burtraw, D., Goeree J., Holt, C., Myers, E., Palmer, K., Shobe, W. 2008. "Collusion in Multi-Unit Auctions: An Experimental Analysis," Resources for the Future Discussion Paper (forthcoming).

[2] Center for Integrative Environmental Research, University of Maryland. January 2007. *Economic and Energy Impacts from Maryland's Potential Participation in the Regional Greenhouse Gas Initiative.*

California's Market Advisory Board overseeing implementation of Assembly Bill 32, the centerpiece of the state's greenhouse gas initiative.[3] Recently we have conducted modeling to provide additional guidance for the implementation of that policy.[4]

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My comments highlight the most important features in the design of a cap-and-trade policy to regulate greenhouse gas emissions in the United States. A carbon dioxide (CO_2) cap-and-trade program would constitute the greatest creation of government-enforced property rights since the 19th century. Depending on the stringency of the cap and breadth of the program, the annual market value of these property rights will range from $100 billion to $370 billion. To be specific, the allocation of allowances involves the distribution into the economy of this much property value every year. The means by which these rights are organized and initially distributed is of historic significance for the economy as well as the environment. Policymakers might frame the decision about allocating emissions allowances in the following way: Imagine we are implementing a new program that will create well over a trillion dollars in value in the next decade. Now, how do you want to allocate that value?

While the level of the emissions cap is the most visible decision facing policymakers, the most important aspect of the policy's design is the initial assignment of the market value of the allowances. This decision affects both the efficiency and distributional consequences of the program. If allocation is not treated carefully, it could undermine the efficiency virtues of cap-and-trade, or lead to unexpected distributional outcomes.

Emitting CO_2 into the atmosphere is an inherent part of economic activity, but in the absence of a market, the economic value of that activity is not apparent to

[3] *Recommendations for Designing a Greenhouse Gas Cap-and-Trade System for California*. 2007. Recommendations of the Market Advisory Committee to the California Air Resources Board. (June 30).

[4] Palmer, K., Burtraw, D., Paul, A., 2008. "Compliance Responsibility and Allowance Allocation in a CO_2 Emissions Cap-and-Trade Program for the Electricity Sector in California." (Draft report: July).

investors. The government commitment to enforce the limited property rights associated with emissions allowances is the precondition that sustains a market price. This role for government in a cap-and-trade program is analogous to the establishment of property rights in the great American west because the land did not have a well-identified market value until the government committed to the enforcement of property rights.

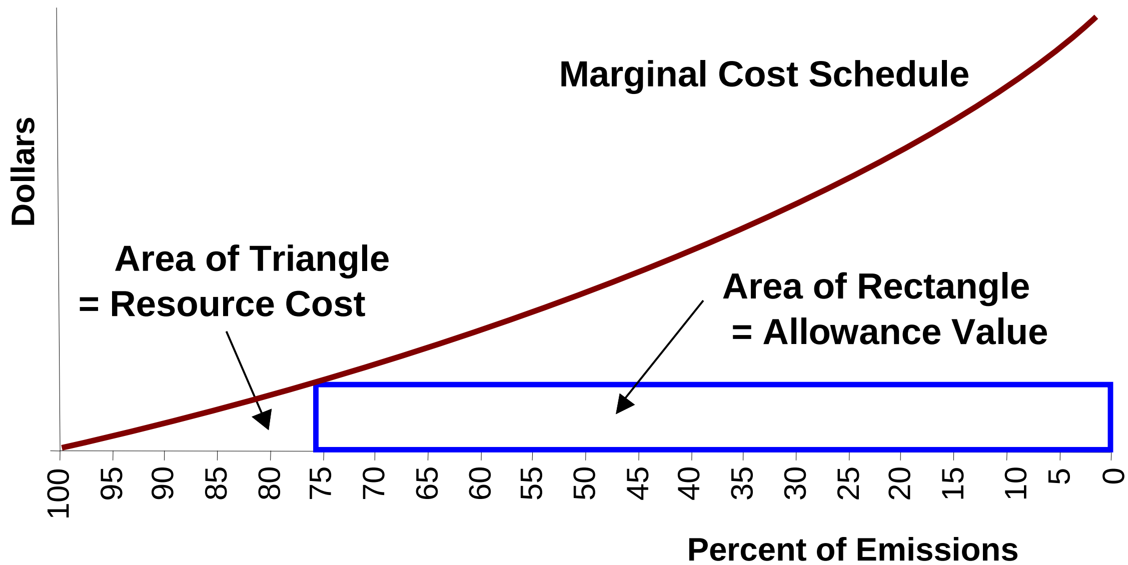

Figure 1. Resource Cost and Allowance Value in a CO_2 Cap-and-Trade Program

For the next couple of decades at least, the value of emissions allowances under a cap-and-trade program should be substantially larger than the value of the resources actually used to achieve emissions reductions. Figure 1 illustrates the mechanism of a placing a price on CO_2 emissions through the introduction of a cap-and-trade policy. The horizontal axis in the graph is the reduction in emissions (moving to the right implies lower emissions), and the upward sloping curve is the incremental resource cost of a schedule of measures to reduce emissions; thus it sketches out the marginal abatement cost curve. The hypothetical emissions cap in the figure is set at about 75 percent of baseline emissions. The graph illustrates how the allowance value rectangle—the height of the rectangle equals the allowance price and the width is the number of emissions allowances—is much larger than the triangle-shaped abatement costs. Moreover, the value of the allowances (the rectangle) grows faster than the cost of emissions reductions (the triangle) as the emissions cap is tightened until reductions of about one-third are reached. These facts highlight the important role played by the allocation of emissions allowances in determining the regressivity of climate policy under an incentive-based policy such as cap-and-trade or a carbon tax.

The substantial size of the program will create costs that could cause severe distributional consequences, depending on how the value of the allowances is distributed in the economy. Nonetheless, a cap-and-trade approach has the advantage of being able to identify the lowest cost emissions reductions. There is tremendous variation in the cost of emissions reductions among agents in the economy, and indeed among nations, and cap-and-trade regulation is expected to yield emissions reductions where they are least expensive, leading to a much lower overall compliance cost than traditional pollution control measures. In addition, cap and trade establishes a price that provides a financial signal to agents in the economy about the resource costs of goods and services, just as do prices of other goods. In each case, these signals help ensure that resources are allocated to their highest valued use.

This brings me to my first point. The award of free CO_2 emissions allowances is equivalent to a grant of cash. The allocation of allowances does not affect the production decisions of plant managers. If a cap-and-trade approach works as intended, emission allowances will be used where they are most valuable and emission reductions will occur where they are the least expensive. Where these activities occur does not depend on whether emissions allowances are distributed for free or not.

By analogy, consider the decision of a firm that owns a production facility such as an aluminum smelter and also owns a nearby hydroelectric facility originally built to provide power for that smelter. If electricity prices on the grid rise substantially, the opportunity cost of aluminum manufacturing increases because the firm could sell the hydroelectric power onto the grid and reduce production at the smelter. The fact that the smelter owns the power plant does not change the price it is willing to pay for electricity. We have seen many examples of firms making this decision as smelters, pulp and paper facilities, etc. reduce their economic activity despite being adjacent to power-generating facilities originally built to provide them with reliable power.

A corollary idea is that in a competitive market how the emissions allowances are initially distributed does not affect the price of goods and services in the economy. This follows if the allowance market is sufficiently liquid that allowances flow to their highest value use (just as electricity flows to its highest value- use). The firm will charge its customers for the use of allowances as an input to production just as it will charge for fuel or labor used for its production activities, whether it has paid for the allowances in the market or in an auction or received the allowances for free. By analogy, if you were buying a house, it would not occur to you to think that its price might depend on whether its previous owner had bought or inherited the house – you would expect the owner to charge what the market will bear. The managers of firms should be expected to do the same in order to realize the maximum possible value for allowances that might be received for free. Otherwise, they would have some explaining to do – to their shareholders!

One exception to this proposition is the electricity sector, because in much of the nation it does not behave as a conventional competitive market. Instead, many states employ cost-of-service regulation, giving regulators the responsibility to see that prices are set so as to recover justly incurred costs. If allowances are distributed through an auction, firms in regulated regions could expect to have retail prices adjust in order to protect shareholder value. Conversely, if allowances were received at no cost in regulated regions, then electricity prices in those regions would not change as much and electricity consumers would see lower electricity prices (and consume more electricity) than under an auction.

One dilemma that surfaces with free allocation to the electricity sector is that it would have an asymmetric outcome, leading to substantially higher changes in electricity prices in some regions of the country, depending primarily on their regulatory status, not on the emissions associated with electricity generation and consumption. Under free allocation, the price change would be larger in competitive regions because firms in a competitive market will charge their customers the market value of emissions allowances used in production even if they have received these allowances for free.

One might offer a policy justification for free allocations of allowances because government often plays a role in compensating entities that are severely harmed by a policy. The electricity sector might be considered a deserving candidate because it is currently responsible for 40 percent of our CO_2 emissions, but on the other hand, it is expected to provide two-thirds to three-quarters of the emissions reductions that would be achieved during the first couple decades of a cap-and-trade program.

Detailed simulation modeling indicates that in competitive regions under an auction, to keep the electricity sector whole – that is, to maintain the market value of companies currently in operation - it would be sufficient to freely allocate just 11 percent of the allowances that would be used in those regions. (This is equal to just 6 percent of the allowances used nationally in the electricity sector.[5]) The free allocation does not have an effect on the retail price paid by consumers; it just reduces the costs to the firms compared to an auction. Unfortunately, even if compensation to the shareholders of these companies is desirable, we find that the

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[5] D. Burtraw and K. Palmer, 2008. "Compensation Rules for Climate Policy in the Electricity Sector," *Journal of Policy Analysis and Management,* 27 (4):819-847. This estimate is consistent with those derived from more aggregated general equilibrium analysis. See: Bovenberg, A.L., and Goulder, L.H. 2001. "Neutralizing the Adverse Industry Impacts of CO2 Abatement policies: What Does it Cost?" In C. Carraro and G. Metcalf (eds.), *Behavioral and Distributional Effects of Environmental Policy*. Chicago: University of Chicago Press; and Smith, A.E., Ross, M.T., and Montgomery, W.D. 2002. "Implications of Trading Implementation Design for Equity-Efficiency Trade-Offs in Carbon Permit Allocations." Washington, DC: Charles River Associates.

precise policy or institution that could be used to deliver this compensation is very problematic because it is difficult to separate the firms that lose from those that gain under the policy. To compensate the losers would, in practice, require a much larger share of allowance value, the difference going to other firms as undeserved compensation.

In sum, free allocation creates the possibility for so-called windfall profits, which simply means that the change in firms' revenues is greater than their change in costs. Our research leads us to conclude that policymakers may want to substantially limit free allocation to shareholders because it would lead to the creation of windfall profits without changing the retail price for electricity customers and it comes at the expense of directing allowance value away from other potential purposes.

In Europe, the realization that free allocation resulted in windfall profits has been the most controversial aspect of the design of the EU Emissions Trading Scheme (ETS). It has led to investigations in several countries and is the area where we can draw the most valuable lesson. Our modeling and that of the Energy Information Administration reaffirms the experience in Europe that customers bear most of the cost of climate policy. Customers bear eight times the cost of climate policy in the electricity sector compared to the cost that falls on firms, which pass on most of their costs through changes in retail prices.

As a potential remedy to both the prospect of asymmetric changes in retail prices and to the possibility of windfall profits, some observers including the National Association of Regulatory Utility Commissioners have advocated free allocation to local distribution companies (LDCs) that sell electricity to retail customers. LDCs are universally regulated, even though they may participate in a competitive wholesale power market. Consequently they could act as trustees on behalf of consumers and apply the value of allowances that they receive to offset the change in prices in the wholesale power market. In this case, free allocation would not affect the wholesale price of electricity; the allowance value would function as a subsidy by electricity consumers to offset the change in the retail price.

Unfortunately, this approach introduces a new dilemma because in this case the change in retail price in the electricity would be lower than would be expected in other sectors of the economy, and therefore spur more electricity consumption and consequently more emissions in the electricity sector. Achieving the allowance cap would require a higher allowance price and greater emissions reductions in other sectors. Our research indicates the allowance price would have to rise by almost 15 percent if the emissions were to achieve the Lieberman-Warner target.[6]

The subsidy to offset allowance costs associated with electricity consumption leads to a violation of the "law of one price" that is necessary to achieve economic efficiency. As with the allocation of any scarce resource, efficiency requires that one price consistently reflects the scarcity value of emission allowances. A lower electricity price means that electricity consumers would have less incentive to purchase energy-efficient air conditioners and refrigerators. In practical terms, if you drive a car, or use natural gas to heat your home or run your industrial facility, you might be concerned that a subsidy to electricity consumers comes at the cost of higher prices for other uses of energy.

In sum, the idea of softening any sudden change in electricity prices is compelling but it has an efficiency cost. One may acknowledge that in the short run consumers have an existing capital stock of refrigerators and air conditioners, and they are constrained in their ability to reduce energy use. To achieve emissions reductions, it is important to establish the expectation that future prices will rise to reflect the scarcity value of CO_2 emissions because this would provide an incentive for consumers to purchase new appliances, etc. The imposition of sudden price changes may be disruptive to the economy and perceived as unfair. However, if

[6] A. Paul, D. Burtraw and K. Palmer. 2008. "Free Allocation to Electricity Consumers Under a U.S. CO_2 Emissions Cap," Resources for the Future Discussion Paper 08-25.

legislation goes down this road, from the standpoint of efficiency it is important to acknowledge that allocation to LDCs should be phased out as soon as possible.

Finally, there is a serious additional challenge. The actual metric for determining how to apportion allowances among LDCs is problematic and that decision — whether to base apportionment to LDCs on the basis of their population, consumption, or the emissions embodied in their consumption — will itself imply big regional swings in the expected change in electricity price.

Drawing away from the special case of the electricity sector to look at the general challenge, policymakers might frame the decision about allocating emission allowances in a general way. There is no inherent right to the property value created under the program; certainly it is impossible to distinguish whether the incumbent users of the atmosphere are firms that operate emitting facilities, firms that might have chosen to employ lower-emitting technologies instead, or consumers of goods that have embodied emissions.

The decision about allocating emissions allowances involves a familiar trade-off between efficiency and distributional outcomes. Federal climate policy would impose potentially significant costs on households that would vary depending on the policy enacted. Taken just by itself, the introduction of a price on CO_2 would be regressive, meaning that it would disproportionately affect lower-income households because they spend a larger portion of their income on energy expenditures. But this is just one-half of the equation. The ultimate impact of the policy would also depend on how the policy distributes the value from the CO_2 price – both the value of emissions allowances, if allocated for free, and the government revenue collected under an allowance auction.

We have examined several options for the initial distribution of allowance value that serve as bookends for the choices policy makers face.[7] Some policies

[7] D. Burtraw, R. Sweeney and M. Walls, 2008. "The Incidence of U.S. Climate Policy: Where You Stand Depends on Where You Sit," Resources for the Future Discussion Paper 08-28.

would convert the regressive nature of the CO_2 price into one that is modestly progressive. These include expansion of the Earned Income Tax Credit and a cap-and-dividend program that would return revenue directly to households.[8]

One aspect of many of the policies we consider is that they lead to an increase in taxable income, which indirectly yields revenue for government. For example, if we assume a dividend of 100 percent of the allowance value back to households would result in about 22 percent of that value coming back to federal and state government.[9] This is important because government will have increased costs under climate policy associated with increased fuel costs, increased obligations associated with indexed entitlement programs, and potentially a decline in other tax revenues. The Congressional Budget Office has estimated these costs could be roughly equal to 23 percent of the total allowance value. In addition, it appears likely that a component of climate policy will include new expenditures associated with investments in new technologies and energy efficiency and helping communities to adapt to a changing climate.

Another policy that is modestly progressive would be investing in efficiency. Some portion of auction revenue could be used to help reinforce program goals and lessen the impact of climate policy. For example, the Model Rule for the 10 northeastern states participating in RGGI specifies that each state must allocate at least 25 percent of its budgeted allowances to a consumer benefit or strategic energy purpose account. (In practice, these states are auctioning off about 90 percent of the emissions allowances.) These “consumer benefit” allowances are to be sold or otherwise distributed to promote energy efficiency, to directly mitigate electricity ratepayer impacts, or to promote lower-carbon-emitting energy technologies. Such a policy is one of the most progressive we examined and would lead to lower allowance prices, indicating less cost would be imposed on other sectors. However, the implementation of this kind of policy is the most problematic

[8] To implement these in a way that reaches households in all income groups would rely on the use electronic benefit transfer, as has been suggested by the Center for Budget and Policy Priorities.

[9] This assumes the recent tax cuts expire in 2010.

of any that we considered because the institutions and policies that would be used have not been identified.

In contrast, three other policies we examined appear severely regressive, even more so than when we just consider the CO_2 price and do not account for the revenue. Two of these involve reducing the income tax or the payroll tax. As an economist, I second many of my colleagues who have pointed out that the use of revenues to reduce preexisting taxes would have important efficiency advantages and would lower the overall cost of the policy. Unfortunately, our results suggest this efficiency advantage may come at a distributional cost as lower-income households would receive less of the benefit of tax reduction and would bear a relatively large burden in these scenarios.

The other severely regressive policy would be free allocation of emissions allowances to the shareholders of emitting facilities (grandfathering) and we find it offers no trade offs; it is costly from an efficiency standpoint and has negative distributional consequences as well. Free distribution to shareholders would not offer the efficiency advantages of reducing preexisting taxes. Furthermore, free allocation directs about 10 percent of the allowance value overseas to foreign owners of shareholder equity and therefore not available to any income group in the United States. Additionally, because the value of the free allowances accrues primarily to higher-income households, this option is decidedly regressive.

Other policies pose the converse trade-off by achieving distributional equity at the expense of efficiency. Exclusion of personal transportation or home heating fuels from the CO_2 cap would lead to higher allowance prices because greater emissions reductions would have to be achieved in other sectors. This has a similar effect as if allowances were used to compensate electricity consumers through free allocation to LDCs, as discussed previously. On aggregate, at the national level, all three of these options are less progressive than simply returning allowance value to households as a dividend.

While the case for equity across income groups is straightforward, interregional equity is more complicated due to differences in preexisting policies, energy prices, resources, and lifestyle choices. Nonetheless, important differences emerge, and the biggest regional differences affect poor households. Households in the lowest two deciles in various regions could incur a substantial welfare *loss* or a substantial welfare *gain* depending on how revenues are distributed. Low-income households in the Northeast, Ohio Valley, and Florida are consistently among the most harmed. Although climate change is a long-run problem, it has an important short-run political dynamic. The local and regional effects of a policy may be fundamentally important to building the political coalition necessary to enact climate policy.

Two Other Important Elements of a Cap-and-Trade Program. I want to briefly touch on two other elements of policy design that can contribute to lowering the cost for the American economy and to protecting households and businesses from unnecessary disruptions. One is to manage the cost of the policy. The opportunity to bank emissions allowances for use in the future is the single most important piece of cost management. With the unfortunate exception of phase 1 of the EU ETS, all previous emissions trading programs that have allowed banking have respected the value of banked emissions when the program has been modified, an important principle for a CO_2 cap-and-trade program. Banking provides an incentive for early action, which expedites the diffusion of new technologies and smoothes the change in costs over time for industry and the economy.

Another cost management tool would be a symmetric safety valve.[10] Plenty of words have been spilled about a price ceiling for an emissions market, but there is only now recognition of the virtue of a complementary price floor. The price floor provides an assurance for innovators and investors that there is a minimum expected value to their efforts. A price floor is naturally achieved as a reserve price

[10] D. Burtraw, K. Palmer and D. Kahn, 2007. "Dynamic Adjustments to Incentive Regulation to Improve Efficiency and Performance." Resources for the Future. Unpublished manuscript.

in an auction for allowances. If the reserve price were not met, a given lot of allowances would not be sold, which would serve to constrain supply.

A reserve price in an auction also is considered to be an important feature of good auction design. Whether thinking about a price cap or a price floor, in order for the market to function in a liquid way and provide price signals to decisionmakers and policymakers, the price cap or floor should be expected to be achieved only occasionally if at all. A price cap that is achieved consistently undermines the expectation that emission targets will be achieved.

Another element of good design is to pay attention to measures that protect domestic firms from unfair competition from foreign firms that may not be subject to environmental regulation. Three general approaches have been suggested to meet this challenge including a border adjustment tax, emission performance standards applied to all imported goods, and free allocation of emission allowances to the domestic firms subject to unfair competition.

The policy that makes the most sense is free allocation of emissions allowances to the affected firms, but this cannot be the same type of one-time decision that characterizes the free allocation of SO_2 emissions allowances under Title IV of the 1990 Clean Air Act Amendments. Instead, it requires free allocation to be conditional on an annual finding by a federal agency of unfair competition for a specific industrial activity in export or import markets. The methodology for such a finding would need to be developed, but my colleagues at RFF have conducted substantial work analyzing this issue. We have found that both the number of firms and the share of GDP that is affected are very small, and the remedy would require only a small sliver of total allowance value. The amount of free allocation would be based on updated data every year about the value added (primarily labor input) in the affected entities.[11] If a facility were to reduce its activity, it would realize a commensurate reduction in its free allocation. Furthermore, that allocation would

[11] This approach, in effect, offers an output subsidy that has some unfortunate consequences, which is why one would not want to apply this approach in general.

be tied not to historic emissions rates but to an identified best practice in the industry. The firm would have to pay for any emissions above this level, thereby retaining an incentive to reduce its own emissions intensity.

In conclusion, the formation of an emissions allowance market for CO_2 is different from the experience with SO_2 allowances because it would create a new asset of enormous value. How that value is distributed in the economy will be very important to the long-term political will to address climate change. Even if the benefits of climate policy outweigh the costs in the long run, the decision about how to initially distribute emissions allowances could have much bigger economic effects on many households in the near term than will the environmental consequences of a changing climate.

Elements of good market design are transparency and simplicity because these attributes reduce risk and invoke confidence in investors. Climate change is an inherently complicated and uncertain challenge; climate policy must strive to be the opposite if the voting public is going to embrace a national commitment to address the problem. These principles apply not just to monitoring and enforcement, but also to the allocation of allowances. Complicated formulas create the perception, deserved or not, of favoritism and game rigging that are likely to erode public support.

Simple tax reform, or even simpler still direct, dividends to households, are approaches that would provide the most convincing signals to the public that we are addressing climate change as a national initiative, one that is not engineered to squirrel away special privileges. We should recognize at the outset that an important part of climate policy may be the need to go back to the American public for further commitments in the future. A transparent and simple approach is the strongest principle one can cling to in making sure the American public understands the policy and understands the national effort to try to solve this problem.

Thank you for the opportunity to testify today.

Dr. Burtraw is a Senior Fellow at Resources for the Future. He holds a Ph.D. in economics and a master's in public policy from the University of Michigan. Dr. Burtraw has conducted research interest in the design of incentive-based environmental policies in the electricity industry and has written extensively on the performance of emissions trading programs in the United States for sulfur dioxide and nitrogen oxides and the European Union's Emission Trading System for carbon dioxide. He also has advised on the design of climate policy for U.S. state governments. He currently serves on the EPA Advisory Council on Clean Air Compliance Analysis and on the National Academies of Science Board on Environmental Studies and Toxicology.