TESTIMONY

Statement of
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Allocation Issues in Greenhouse Gas Cap and Trade Systems

before the
Committee on Energy and Natural Resources
U.S. Senate

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Chairman Bingaman, Senator Murkowski, and Members of the Committee, thank you for the invitation to testify this morning on the issue of permit allocation in cap and trade systems. I wish to make the following points in my testimony today.

- The allocation of carbon revenues is a distinct question from the choice of policy instrument (cap and trade, carbon fee, hybrid systems). No particular approach constrains Congress in any way from choosing different schemes and goals for allocation of the scarcity value created by the cap (analogous to the revenue from a carbon fee). In this regard, past cap and trade programs provide too limiting a view of the possible design choices.
- Allocation mechanisms differ on the basis of simplicity, transparency, efficiency and distributional outcomes. All things equal more simplicity and transparency is generally better. While allocation rules have clear distributional implications they can also have important efficiency consequences.
- A cap and trade system acts much like a broad based energy tax in raising the price of energy intensive commodities and reducing returns to factors of production (labor, capital and natural resource owners). Like a broad based energy tax, a cap and trade system is likely to disproportionately impact low-income households. Addressing impacts on low-income households should be an important element of any allowance allocation scheme.
- Allocation design matters for efficiency as well as distribution. Allocations to natural gas and electricity customers through LDCs can blunt some of the impact of carbon pricing but if not done carefully can raise the costs of achieving targets significantly.

I. Background

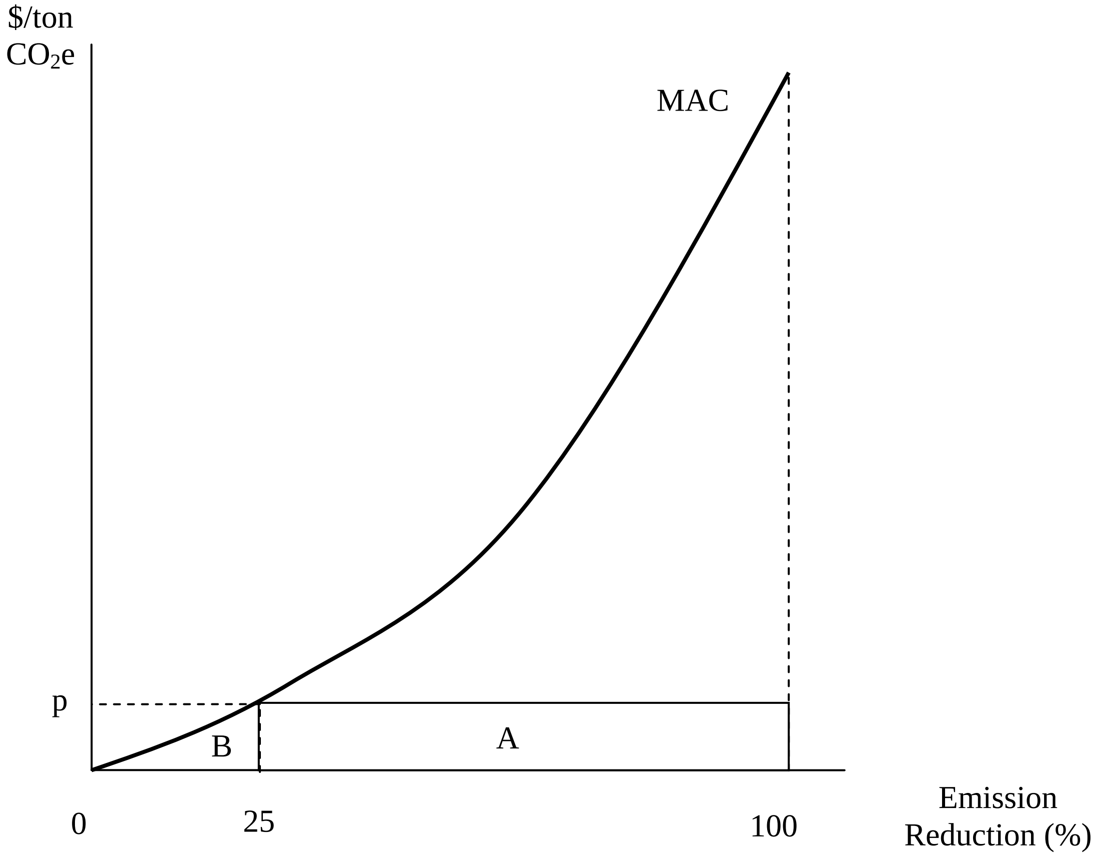
The United States has taken important steps towards enacting comprehensive climate change policy. President Obama campaigned in 2008 in part on a platform of re-engaging in the international negotiations on climate policy and supported a U.S. cap and trade policy with 100 percent auctioning of permits. Congress has moved rapidly in 2009 with the House of Representatives voting favorably on the American Clean Energy and Security Act of 2009 (H.R. 2454) in late June. Earlier this month Sens. Boxer and Kerry filed S. 1733, the Clean Energy Jobs and American Power Act. This bill also proposes a cap and trade system for greenhouse gases.

Cap and trade legislation acts like a tax in raising the price of carbon based fuels and other covered inputs that release greenhouse gases. Raising the price of carbon based fuels is an essential component of a greenhouse gas control program. Higher prices send the appropriate market signals to consumers to reduce consumption of carbon-intensive products and to firms to adjust production processes to reduce greenhouse gas emissions. Higher prices serve as the tool in Adam Smith's invisible hand to guide the economy to more productive and socially efficient outcomes.

The monies involved in a cap and trade program can be significant. The Congressional Budget Office estimated last June that H.R. 2454 would increase federal revenues by nearly $850 billion between 2010 and 2019. Since the bulk of permits are freely allocated in early years of the program, spending would also increase over that period by roughly $820 billion.[1]

It is important at the outset to distinguish between the costs of reducing greenhouse gas emissions and the revenues that could be raised if permits are fully auctioned. Figure 1 illustrates the distinction.

Figure 1. Costs and Transfers in a Cap and Trade System



This graph shows how the cost of reducing greenhouse gas emissions rises as a program is made increasingly stringent. The curve labeled *MAC* shows the cost of abatement as emissions reductions rise measured in dollars per ton of carbon dioxide equivalent. For small cuts in emissions the cost of reducing emissions – and the resultant

[1] See Congressional Budget Office, "H.R. 2454 American Clean Energy and Security Act of 2009 Cost Estimate," (Washington, DC: Congressional Budget Office, 2009) The CBO treats freely allocated permits as both revenue and spending. Ignoring impacts on other tax revenues the free allocation of $100 of permits would be scored as $100 of revenue and $100 of spending. CBO's scoring approach is described in Congressional Budget Office, "Assessment of Potential Budgetary Impacts from the Introduction of Carbon Dioxide Cap-and-Trade Policies," (Washington, DC: Congressional Budget Office, 2009).

price for an emissions permit – is low. But as the required reductions rise so do the costs and the resultant permit price.

Consider a cap and trade system that mandates a 25 percent reduction in emissions. The price of permits would equal *p* as shown in Figure 1. The value of the permits created in this program is the product of the permit price times the number of permits allocated or auctioned. This is shown in Figure 1 as the area of the rectangle *A.* This value would be received by the government if it were to auction all of the permits. It would be received by households and/or firms to the extent that the permits are freely allocated. Regardless of how the permits are allocated, they have a value equal to the area of this rectangle. Allocation rules simply determine who receives this permit value.

The cost of the reduction in this figure is shown by the triangle labeled *B*. This is the actual cost to society of reducing greenhouse gas emissions. It includes the cost of using higher priced electricity generating sources that emit fewer greenhouse gas emissions per kWh of electricity, the costs of carbon capture and storage and the cost of improving vehicle efficiency in the transport system among other things.

As Figure 1 makes clear the value of permits is quite different than the costs of reducing greenhouse gas emissions. The figure also makes a conceptual point that is borne out by a number of analyses of greenhouse gas control programs: the value of permits dwarfs the initial costs of greenhouse gas reductions. This simply reiterates the point that permit allocation is a very important topic for Congressional consideration.

II. Policy Choice and Allocation

Much debate has ensued both in academic circles and in policy circles over the relative merits of cap and trade systems and carbon taxes for controlling greenhouse gas emissions.[2] This is not a hearing about instrument design but it is worth making the following point: the choice of instruments is entirely distinct from the decision about allocation of the value of permits in a cap and trade system. This value – technically known as the scarcity value of emissions – can be allocated in exactly equivalent ways regardless of the choice of instrument used to impose a carbon price.[3]

Conversely no particular approach constrains Congress in any way from choosing different schemes and goals for allocation of the scarcity value created by the cap (analogous to the revenue from a carbon fee). A decision by Congress to use a cap and trade system to control greenhouse gas emissions in no way limits Congress from

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[2] A recent symposium in the *Review of Environmental Economics and Policy* is but one example of this discussion. See the papers by Nathaniel Keohane, "Cap and Trade, Rehabilitated: Using Tradable Permits to Control U.S. Greenhouse Gases " *Review of Environmental Economics and Policy* 3, no. 1 (2009), Gilbert E. Metcalf, "Designing a Carbon Tax to Reduce U.S. Greenhouse Gas Emissions," *Review of Environmental Economics and Policy* 3, no. 1 (2009), and Brian C. Murray, Richard G. Newell, and William A. Pizer, "Balancing Cost and Emissions Certainty: An Allowance Reserve for Cap-and-Trade," *Review of Environmental Economics and Policy* 3, no. 1 (2009).

[3] See David Weisbach, "Instrument Choice Is Instrument Design," (Washington, DC: American Tax Policy Institute, 2009) for discussion of this point.

allocating permits to achieve any desired policy goals. In this regard, past cap and trade programs provide too limiting a view of the possible design choices. The two major cap and trade systems in place are the U.S. Acid Rain Program and the European Union Emission Trading Scheme. The Acid Rain Program requires permits for sulfur dioxide emissions from all significant electric generators. The EU Emission Trading Scheme requires permits from electricity generators and certain energy intensive industries. In both systems permits are allocated to the covered sectors at essentially no cost.

That the two extant major cap and trade systems do not auction permits to any significant degree does not preclude Congress from auctioning permits for greenhouse gas emissions. Indeed the stakes for auctioning are much larger. The scarcity rents for either of these two existing systems are dwarfed by the projected rents from a U.S. cap and trade system. The real question before Congress is the best use of these scarcity rents. While the focus on revenue use is clear if permits are auctioned, the question is no less relevant if permits are freely allocated.

III. Criteria for Evaluating Allocation Systems

Allocation systems can be assessed on a number of important policy dimensions. Four dimensions of particular importance are simplicity, transparency, efficiency and distributional outcomes. All things equal more simple and transparent systems are generally better. In its effort to achieve a variety of goals H.R. 2454 has designed an exceedingly complex allocation scheme that is far from transparent. Simplicity and transparency help engender public trust in a program that the government is being a good steward of the rents created through the cap and trade program.

One particularly transparent and simple allocation scheme is a Cap and Dividend scheme whereby every U.S. household receives an equal carbon dividend check. This approach is similar in spirit to the economic stimulus checks provided to taxpayers in 2008. Payments could be made on an annual or quarterly basis to all individuals with a valid Social Security Number. Filing for the payment could be made quite easy as part of the income tax form 1040 and a simple one-page form for non-income tax filers. Another approach that I discuss elsewhere is to provide a capped credit of payroll taxes along with an adjustment to Social Security and transfer benefits for non-workers.[4]

While a cap and dividend policy is both highly transparent and simple, it foregoes the opportunity to achieve important efficiency benefits by using the revenue to lower existing tax rates. The efficiency losses from taxes, referred to by economists as deadweight loss, rise with the square of the tax rate. So modest reductions in tax rates can have significant efficiency benefits. A large literature in Economics consistently demonstrates the efficiency benefits of using carbon revenue to lower existing tax rates.

The trade-off between a cap and dividend approach and tax rate reduction approach illustrates a tension between achieving distributional and efficiency goals.

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[4] This is described in Gilbert E. Metcalf, "A Proposal for a U.S. Carbon Tax Swap: An Equitable Tax Reform to Address Global Climate Change," (The Hamilton Project, 2007).

While recycling greenhouse gas revenues through tax rate reductions has efficiency benefits, it may not fully offset the regressivity of carbon pricing. Carbon pricing, whether through a carbon tax or a cap and trade system, has similar distributional impacts as broad-based energy taxes. It disproportionately impacts lower income households for whom energy expenditures constitute a higher share of income than occurs for higher income households.

A recent analysis I did with colleagues at the MIT Joint Program on the Science and Policy of Global Change illustrates the trade-offs.[5] In our analysis we consider a variety of allocation schemes for a $15 per ton of carbon dioxide equivalent (CO_2e) cap and trade system covering all greenhouse gases. The model takes into account income sources for households of different income groups as well as spending patterns. A cap and trade system – like any greenhouse gas pricing system – will affect households by raising the prices of carbon-intensive products and also potentially lower wages, resource rents and returns to capital. We model all of these impacts and trace income and spending changes to individual households sorted by income.

Table 1 shows the income groups that we considered in the model. Our model is able to trace income and spending changes for the lowest income groups with household income less than $10,000 to the richest groups with household income in excess of $150,000. The model is calibrated to 2006 and all dollar amounts are reported in real 2006 dollars.

Table 1. Income Groups in US-REP Model

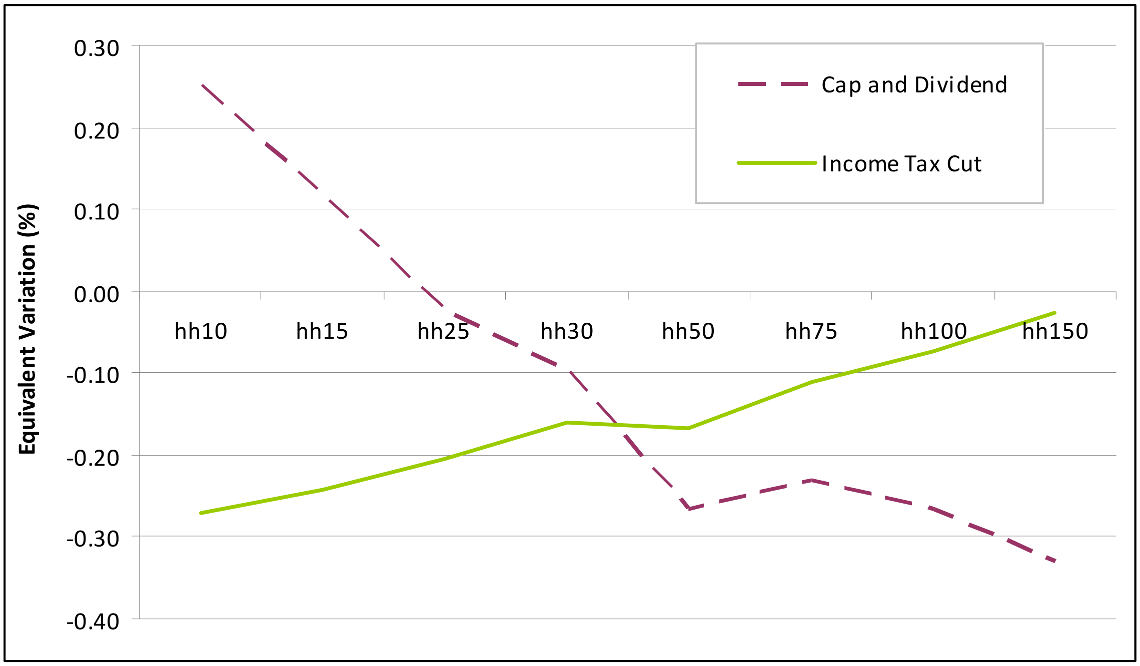
Income class	Description	Cumulative Population for whole US (in %)
hhl	Less than $10,000	7.3
hh10	$10,000 to $15,000	11.7
hh15	$15,000 to $25,000	21.2
hh25	$25,000 to $ $30,000	31.0
hh30	$30,000 to $50,000	45.3
hh50	$50,000 to $75,000	65.2
hh75	$75,000 to $100,000	78.7
hh100	$100,000 to $150,000	91.5
hh150	$150,000 plus	100.0

Figure 2 shows the distributional impacts of two allocation schemes. The first is a cap and dividend scheme where revenue from a fully auctioned cap and trade permit

[5] Sebastian Rausch et al., "Distributional Impacts of a U.S. Greenhouse Gas Policy: A General Equilibrium Analysis of Carbon Pricing," (Washington, DC: American Tax Policy Institute, 2009)

system is given back to households in a lump-sum fashion. Impacts are measured in dollars as a percentage of household income and include both the changes in costs of purchasing goods and services, changes in factor incomes and any deadweight loss from behavioral responses to pricing greenhouse gas emissions.[6] Income changes include the check each household receives as its share of the permit revenue net of permit revenue kept by government to replace reductions in other taxes to maintain overall revenue neutrality in the U.S. government budget. The second uses the revenue to reduce marginal income tax rates.

Figure 2. Distributional Impacts of Two Allocation Schemes



The cap and dividend approach is distinctly progressive (dashed line). Lower income households benefit on balance from the combination of carbon pricing and the carbon dividend. Net benefits as a percentage of annual income are between 0.1 and 0.2 percent for the lowest income households and fall to between -0.2 and -0.3 percent of income for the highest income households.

While the cap and dividend allocation approach may be appealing on distributional grounds it foregoes any efficiency benefits resulting from lowering tax rates. The solid line in Figure 2 shows the net distributional impact of the income tax cut. This policy is modestly regressive. More precisely, the rebate of income tax revenue cannot undo the sharp regressivity of carbon pricing. Low income households lose between 0.15 and 0.25 percent of income while the loss for the highest income groups approaches zero. While less progressive, cutting the income tax reduces the efficiency loss of the cap and trade system by over twelve percent.

[6] Technically we measure equivalent variation, a dollar based measure of the change in household well-being arising from the program. We divide this by a measure of full household income including the value of leisure and housing services.

These are but two of many possible allocation mechanisms. It is certainly possible to construct allocation schemes that combine tax rate reductions with allocations that address the regressivity of carbon pricing. However this is done it would be preferable to design as simple and transparent an allocation formula as possible.

IV. Policy Design and Efficiency

Allocation design can also have significant impacts on the overall efficiency of the cap and trade policy. A clear example here is the design of mechanisms to provide benefits to electricity and natural gas consumers through local distribution companies (LDCs). The American Clean Energy and Security Act of 2009 allocates roughly one-third of the permits to LDCs between 2012 and 2030 for consumer relief. The bill is clear that it does not intend this permit value to be used to lower electricity and natural gas rates. But it is less clear on how this value is to be distributed and how we avoid consumers misperceiving this value as a reduction in energy prices.

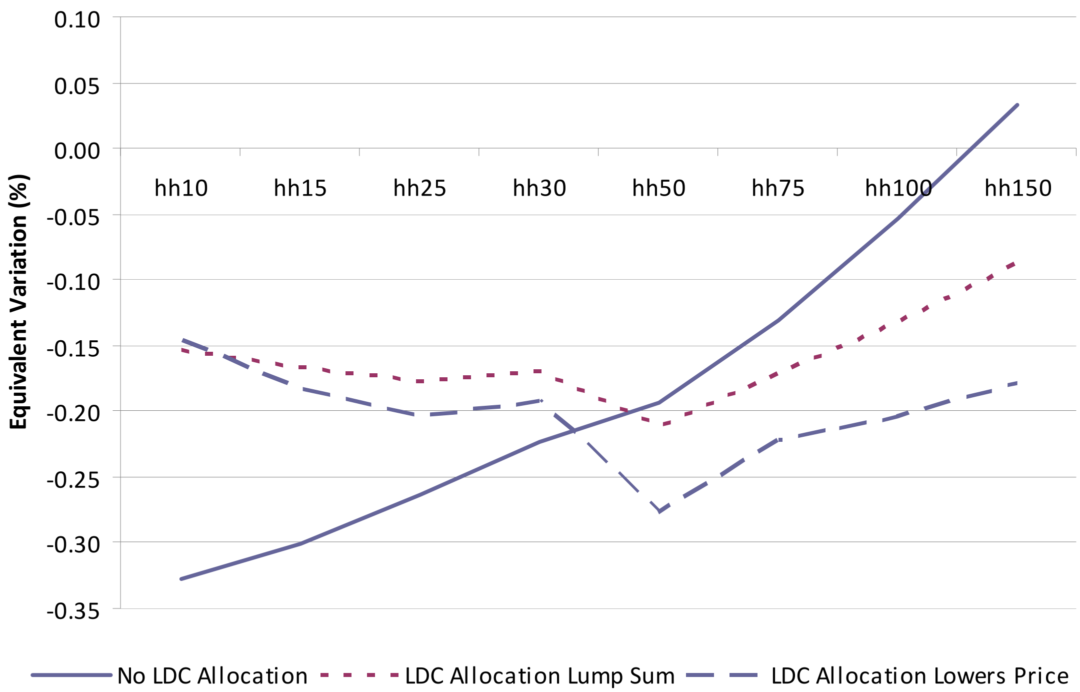
If the value of the permits allocated to LDCs is returned to customers on their monthly bill it is quite likely that many consumers will misperceive this as a reduction in the price of consuming electricity and natural gas. To explore the consequences of a poorly designed program that energy consumers misunderstand, we ran two different simulations of allocations to LDCs. In the first one we assume that LDCs design a program to pass on the value of LDC permits that is correctly perceived not to lower the price of a kWh of electricity (or therm of natural gas). Rather the allocation is a lump sum allocation unrelated to individual household energy consumption. The second simulation treats the LDC allocation as lowering the price of electricity or natural gas. This leads to a smaller decline in energy consumption by LDC customers thereby leading to more expensive emission reductions elsewhere. Finally we also report a simulation in which permits are freely allocated to the covered sectors on the basis of historic emissions with no permits set aside for customer relief through LDCs. Results are shown in Figure 3.

The first thing to note is that free allocation of permits to covered sectors on the basis of historic emissions is sharply regressive. This policy simulates permit allocations under the Acid Rain Program in the United States and the EU's Emission Trading Scheme. It is regressive because the free permit allocation conveys a windfall gain to owners of firms receiving those permits. Since capital is disproportionately held by higher income households the regressive outcome occurs.

Carving out one-third of the permits for LDCs to use for rate relief eliminates the regressivity in the lower half of the income distribution and blunts it in the upper half. If, however, the LDC program is misperceived to reduce electricity and natural gas rates for consumers then every household is made worse off than when the policy is designed to avoid this misperception. This is a clear case where policy design matters in the details.

The efficiency loss from consumer misperception of energy prices raises the costs of the cap and trade program by over thirty percent.[7]

Figure. 3. Free Permit Allocation



Another area of concern is regional distribution. Here one must tread more cautiously. While it is tempting to allocate a portion of permits to different regions based on the costs those regions will face due to prior investment in carbon intensive technologies, we risk enshrining older carbon intensive technologies through subsides offered to provide rate relief to customers in those regions.

If regional allocation adjustments are considered they should pass a number of tests. First, they should be temporary and short lived to provide the incentive to make a rapid transition to newer and cleaner technologies. Second, it would be preferable to provide benefits in the form of support for new technology substitution rather than customer rate relief. This would further speed the transition to a less carbon-intensive regional economy. Third, any regional reallocations should take into account the fact that certain regions have become less carbon intensive as a result of past investments. Those investments have often led to higher energy prices now being borne by regional ratepayers. According to the Energy Information Administration, for example, Connecticut, New York and Massachusetts are ranked in the top five states for high residential electricity prices. These states receive a higher than average share of electricity from nuclear power plants.

[7] This understates the incremental efficiency loss as our simulations held permit prices fixed rather than emissions. Holding emissions fixed would have required increased costly reductions elsewhere to achieve the emissions target driving up the cost of the program further.

V. Summary

Enacting a carbon price through a greenhouse gas emissions cap and trade system will help the United States move to a carbon free economy in the most efficient manner possible. Passing cap and trade legislation, therefore, should be at the top of the political agenda for Congress and the Administration. Thus it is laudable that the Senate Energy and Natural Resources Committee is holding these hearings on allocation.

Key to thinking about allocations is that this is fundamentally a decision over the rights to the scarcity rents from restricting greenhouse gas emissions. These rents dwarf rents from any previous cap and trade program and so the allocation mechanism deserves careful study.

I have argued in this testimony that past allocation decisions in those cap and trade programs should in no way constrain Congress as it designs allocation mechanisms in greenhouse gas legislation. Moreover it should strive to develop a simple and transparent mechanism that engenders public trust in the stewardship of these public atmospheric rents.

Any allocation mechanism should address the regressivity of carbon pricing ideally in a way that does not forego the opportunity for gains in economic efficiency through the possibility of tax rate reduction. However the balance between efficiency and equity is struck, it is important to design the mechanism carefully to avoid customer misperceptions that any return of allowance value is diluting the price signal required to achieve maximal emission reductions at minimal cost.

I would be happy to answer any questions members of the Committee may have. Thank you for the opportunity to testify today.

Gilbert E. Metcalf is a Professor of Economics at Tufts University and a Research Associate at the National Bureau of Economic Research. He is also a Research Associate at the MIT Joint Program on the Science and Policy of Global Change. Metcalf has taught at Princeton University and the Kennedy School of Government at Harvard University and been a visiting scholar at MIT.

Metcalf has served as a consultant to numerous organizations including the U.S. Department of the Treasury, the U.S. Department of Energy, and Argonne National Laboratory. He currently serves as a member of the National Academy of Sciences Committee on Health, Environmental, and Other External Costs and Benefits of Energy Production and Consumption. In addition he serves or has served on the editorial boards of *The Journal of Economic Perspectives*, *The American Economic Review*, and the *Berkeley Electronic Journals in Economic Analysis and Policy*.

Metcalf's primary research area is applied public finance with particular interests in taxation, energy, and environmental economics. His current research focuses on policy evaluation and design in the area of energy and climate change. He has published papers in numerous academic journals, has edited two books, and has contributed chapters to several books on tax policy. Metcalf received a B.A. in Mathematics from Amherst College, an M.S. in Agricultural and Resource Economics from the University of Massachusetts Amherst, and a Ph.D. in Economics from Harvard University.