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Carbon Caps and Efficiency Resources:

How Climate Legislation Can Mobilize Efficiency and Lower the Cost of GHG Reduction

INTRODUCTION

Chairman Markey, Ranking Member Sensenbrenner, and members of the Committee, I appreciate the opportunity to speak with you today about the critical role of end-use energy efficiency in reducing greenhouse gas emissions and lowering the cost of climate legislation to consumers and to the American economy. I am Richard Cowart, a Director of the Regulatory Assistance Project, a non-profit organization that provides technical and policy research and assistance to governmental decision-makers on energy and environmental issues. RAP has worked in more than 40 US states and has trained government officials in 16 other nations. Prior to joining RAP I served for 13 years as Commissioner and Chair of the Vermont Public Service Board, and for five years as an Assistant Professor of Planning and Environmental Law and director of the Program in Planning and Law at the University of California, Berkeley. Over the past four years I have had the privilege to assist the state and regional initiatives working to design carbon cap-and-trade programs in the US, including the Regional Greenhouse Gas Initiative (RGGI) in the Northeast, and the California, Oregon, and Western Climate Initiatives in the West. My testimony today grows out of all of these experiences.

Summary:

My testimony focuses on *how cap-and-trade systems can be designed to accelerate investments in energy efficiency*, which would permit more rapid carbon reductions at lower cost to consumers and the American economy. It follows four key points:

- Energy efficiency is the low-cost equivalent of a “carbon scrubber” for the electric power sector, and the most important resource to look to as the bridge fuel to the low-carbon power sector we need in coming decades;
- The cap-and-trade architecture used in the US Acid Rain program, and copied in other systems such as the European carbon trading system, is not optimal for carbon management. By focusing on smokestacks, and by awarding carbon allowances to emitters on the basis of their historic pollution, these programs cost consumers more than

needed to achieve a given level of reduction and miss an important opportunity to enhance energy efficiency, which is the least expensive and most effective way to lower carbon output.

- Although adding a carbon price signal to the cost of electricity is directionally correct, cap-and-trade programs that try to reduce emissions through price alone will be much more costly and will save less carbon than a cap-and-trade program that includes proven techniques to deliver low-cost efficiency resources. At the consumer level, higher power prices alone will not reduce demand nearly enough to meet our carbon goals. At the generator level, it requires a very high carbon price to make a meaningful change in the dispatch of the generation fleet. In both cases, the prices required to produce deep reductions are high enough to raise practical political barriers to the reductions now called for by climate science.

- Fortunately, there are alternatives. Modified cap-and-trade designs are being developed in the Northeast, in California, and elsewhere that would make efficiency an integral part of the carbon-reduction program and lower the cost of GHG reductions by allocating allowances for consumer benefit, and investing allowance values in programmatic efficiency measures. Congress should build on this state and regional experience by creating **a performance-based "efficiency allocation"** of carbon credits in any national cap-and-trade program now being developed.

STATEMENT

There are very good reasons that national climate legislation, as well as Governors, legislators, and environmental advocates are focusing on the power sector to lead the move to a lower-emissions economy. The main reason is that the power sector is the largest single source of industrial pollution, accounting for 38% of US global warming gasses.[1] Emissions from the US power sector[2] exceed the total *national* GHG emissions of every other nation except China.

The sector is also traditionally regulated, is not vulnerable to international competition, and consists of a reasonably small number of known sources. It not a surprise that major cap-and-trade efforts on both coasts have begun first with the power sector – the utility sector is probably the easiest large sector to manage. The sector is also expected to supply a large fraction of total emissions reductions sought under national climate bills.

However, significantly reducing emissions from the power sector will not be easy. About half of the nation's electric power comes from coal generation, and coal use continues to grow. After a decade in which natural gas combined cycle plants provided the large majority of new capacity additions, gas prices and availability concerns are driving renewed interest in coal for new

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[1] U.S. EPA, "National Emission Inventory. Air Pollutant Emission Trends." Current Emission Trends Summaries, 2001. See http://www.epa.gov/ttn/chief/trends/index.html and Environmental Protection Agency, eGRID, Emissions & Generaton Resource Integrated Database, www.epa.gov/cleanenergy/egrid/.
[2] Electric power production in the US produced 2,233.4 million metric tons of CO2 in 2001. Source: EIA State Energy-Related Carbon Dioxide Emissions by Energy Source, 2001. See http://www.eia.doe.gov/oiaf/1605/ggrpt/pdf/appc_tbl2.pdf.

generation, with “upwards of 90 GW [of new coal generation capacity now] on the boards.”[3] Load growth continues, renewable sources can cover only a part of the new demand, and nuclear power is unlikely to provide significant new capacity to regional grids. Meanwhile, fossil fuel prices continue to rise.

I. The Critical Role of End-Use Efficiency in Meeting Carbon Reduction Goals

To many knowledgeable observers, the obvious solution to power system challenges is aggressive, accelerated investments in energy efficiency. Several well-documented studies demonstrate that the cost-effective reservoir of efficiency opportunities is large enough to meet 50% to 100% or more of all new electric demand.[4]

In addition to being quite large, the efficiency reservoir can be tapped at low cost. End-use efficiency is the least costly means to significantly reduce carbon emissions from the power sector. Cost-effective efficiency provides “avoided tons” of carbon at negative cost – by any measure less expensive than displacing fossil fuels with low-emission generation. In electricity markets, the efficiency savings potential has been shown to be on the order of 25% of total electricity usage, at a levelized cost of about 3 cents per kilowatt-hour.[5] This is much less than the average national retail price of electricity, currently at more than 8 cents per kWh[6] or even the marginal generation cost of new power plants, estimated, depending on the technology, to cost 5 to 10 cents per kWh and higher. Energy efficiency is the equivalent of a low-cost “carbon scrubber” for the power sector.

The *emissions* reduction potential is also quite large. IPCC studies, for example, reveal that across many sectors, the efficiency potential is quite large, with the largest single source of GHG emission reductions occurring in the buildings sector through efficiency actions.[7] Another recent study[8] by the McKinsey consulting firm found that by 2050, energy efficiency could reduce United States carbon dioxide emissions by 40%: 16% from buildings, 13% from transportation and smart growth, and 11% from industrial efficiency. The McKinsey study results are shown graphically in Figure 1 below.

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[3] “Coal: America’s Energy Future,” Coal Leader Vol. 39, No.4, April 2006, p.6. Even though a number of planned coal plants have recently been canceled or delayed, as of October 2007, there were at least 24 new plants (12,500 MW) under construction, and another 21 plants (over 11,000 MW) already permitted and/or nearing construction (National Energy Technology Lab OSAP 10/10/2007).

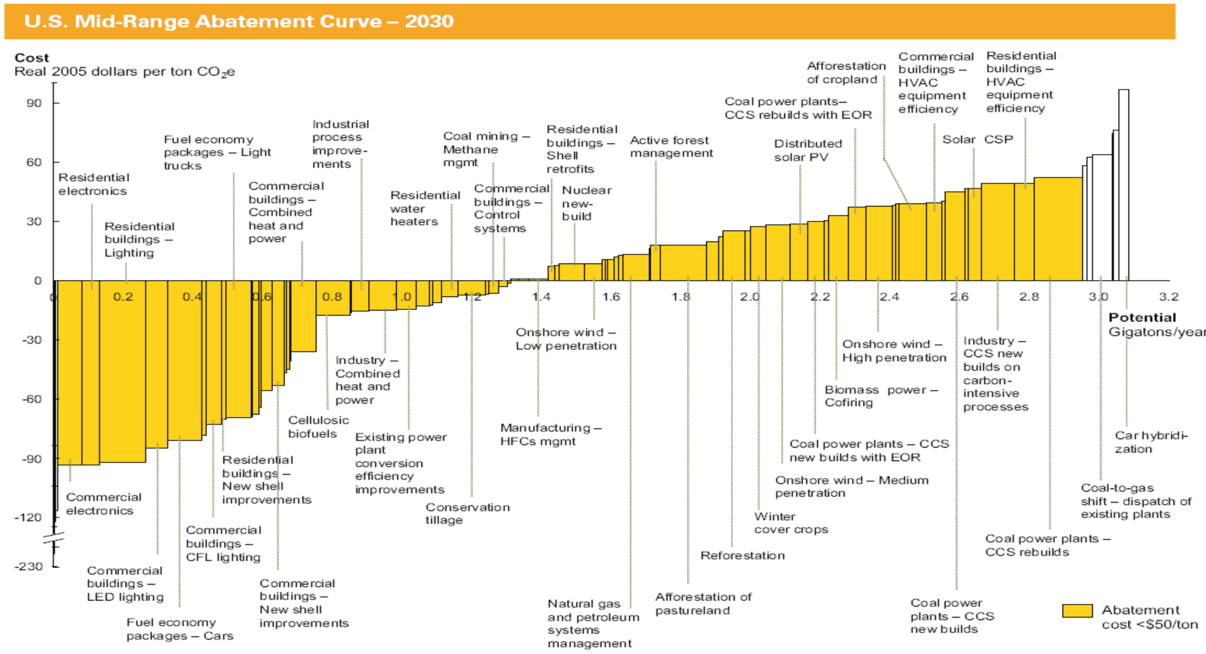
[4] See, e.g., Interlaboratory Working Group, *Scenarios of US Carbon Reductions: Potential Impacts of Energy Technologies by 2010 and Beyond* (September 1997) at pages 3.11 and 4.9. (The 5 Labs Study”) http://enduse.lbl.gov/Projects/5Lab.html. More recent studies in the U.S. West and northeast have reached similar conclusions.See, e.g., http://www.swenergy.org/nml/New_Mother_Lode.pdf; and http://www.neep.org/files/Updated_Achievable_Potential_2005.pdf..

[5] Kushler, et al., *Five Years In: An Examination of the First Half-Decade of Public Benefits Energy Efficiency Policies*, 2004, American Council for an Energy-Efficient Economy.

[6] US Energy Information Administration, 2007. See the U.S. Energy Information retail electricity price website at http://www.eia.doe.gov/cneaf/electricity/epa/epat7p4.html.

[7] This is partly attributable to the fact that the IPCC’s methodology includes electricity generation related GHG emissions in the end-use sectors rather than in the energy supply sector.

[8] McKinsey, *The New Energy Economy: Putting America on the Path to Solving Global Warming*, 2007.



Source: McKinsey analysis
Note: The McKinsey report only examines a scenario through 2030. NRDC recommends a goal of 80 percent emissions reductions by 2050.

Figure 1: Cost of Energy Efficiency Measures and Scale of Potential in U.S. Through 2030

Figure 1 above ranks GHG reduction potential by cost, from left (greatest savings to implement) to right (most expensive to implement), with the size of the bars representing the scale of potential GHG reductions in each category of actions. The carbon reduction options on the left end of the graph are almost all energy efficiency technologies. These efficiency options show a negative net cost of CO_2 abatement, and account for almost half of the total emission reductions on the graph. Importantly, the net savings from the efficiency options offset the costs of the emission reductions on the right side of the graph – those with net positive costs. These efficiency technologies are thus essential to achieving an entire package of emissions reductions at low net costs to the economy.

In the U.S., as in most countries, analyses have shown that the efficiency potential has been tapped only in small measure.[9] These analyses, along with the recent IPCC and McKinsey analyses consistently show that efficiency is not only a large energy resource but also offers major opportunities for addressing the global warming problem. They generally show that aggressive efficiency investment, driven by policy commitments, can meet most or all of the projected growth in energy demand in the U.S., especially in the electricity sector, and that growth in GHG emissions can be arrested through accelerated energy efficiency technology deployment.

[9] Intergovernmental Panel on Climate Change, *Fourth Assessment Report, Working Group III Report*, 2007; UN Foundation, 2007; ORNL, 2000; Nadel, 2004. For a discussion of many of these points see Schiller, et al, *Energy Efficiency and Climate Change Mitigation Policy* (ACEEE 2008 in peer review).

One of the principal aims of cap-and-trade programs is to lower the overall societal cost of environmental improvement. Efficiency studies and two decades of utility DSM experience remind us that it will cost far less to avoid carbon emissions through energy efficiency than by adding or substituting expensive low-emissions generation on the grid. Thus it is entirely consistent with the overall goals of cap-and-trade to design a trading system that builds directly on efficiency as a resource.

Simply stated, a carbon program that directly mobilizes end-use efficiency will cost less and achieve more than one that focuses only on generators.

However, realizing these opportunities will take policy actions, including improvements in the allocation of carbon credits in any national cap-and-trade program.

II. Cap-and-Trade Basics: Why Cap-and-Trade Must Be Modified to Support Efficiency

There is pretty broad agreement among air experts that the U.S. Acid Rain program and the NOx trading and similar programs modeled on it have been a success – lowering emissions substantially at a lower cost than historic command and control systems.[10] The success of this model has led many decision-makers to conclude that carbon cap-and-trade programs should be built on the same basic structure. However, this does not mean that we should extend this model directly to carbon cap-and-trade systems. Among several crucial differences:

(a) First, carbon reduction programs are going to involve a lot more dollars, and will involve larger economic transfer payments over time, so flaws in architecture matter more.

(b) Second, energy markets are profoundly different today. When the Acid Rain program was designed, generators were part of vertically-integrated, rate-regulated companies. If they did not have to buy allowances, then consumers did not have to pay for them, since the generators were regulated on a cost-of-service basis. Today, US power markets are much more complex, and a large fraction of the power sold passes through wholesale markets that are not rate-regulated. As a result, cap-and-trade policies that might work well for consumers of vertically-integrated, rate-regulated utilities in about half of the nation, would confer windfall gains on generators and inequitable results for consumers in the other half.[11]

(c) Third, control options for carbon and for conventional pollutants are quite different. SOx and NOx reductions can usually be accomplished by generators at power stations

[10] See, e.g., http://www.whitehouse.gov/news/releases/2002/02/clearskies.html.

[11] Using the single-price auction rules now governing organized wholesale markets, all generators get the benefit of higher clearing prices, and all consumers have to pay (some immediately, some later when long-term contracts turn over). If fossil units setting the clearing price raise their bids due to the value of allowances they must use, costs will rise for consumers across all MWh sold in that market. These costs to consumers can be much higher than the actual cost of allowances to generators, especially if the allowances were awarded to emitters for free. See text accompanying notes 25-28 below.

through changes in fuel inputs (e.g., switching to low-sulfur coal) or plant modification, such as scrubbers. In contrast, as is often said, "there is no carbon scrubber" that can be added to a conventional power plant.[12] Real reductions in carbon intensity will come from *actions taken mostly by power buyers* – for example, substituting gas or renewables in the resource mix of a load-serving entity (LSE), or adding more efficiency and reducing consumption generally. These are actions that consumers – not fossil generators – will need to take and will have to pay for. It is widely understood that the Acid Rain program did almost nothing to promote end-use efficiency, but that a climate change program will have to do so to be effective.

For these reasons, it is increasingly apparent that national climate legislation will need to include design elements to avoid windfall gains to generators in states with competitive wholesale markets, to promote renewable power and other portfolio improvements among utility load-serving entities, and to deliver much more energy efficiency than we could expect from an Acid Rain-style cap-and-trade program alone.

III. Cap and Market Realities – Why Carbon Prices Alone Will Not Deliver Needed GHG Reductions in the Power Sector

Economists and policy-makers often assume that a carbon tax or its equivalent, such as an auction of pollution credits, will, at realistic prices, drive significant reductions in the carbon footprint of the electric power sector. [13] Those reductions are expected to come chiefly from two sources: demand reductions by consumers, and changes in the generation mix. In reality, it is very difficult to produce significant reductions in either location at carbon prices that governments can realistically expect to impose.

A. Carbon prices alone do not deliver an adequate consumer conservation response

First, on the demand side, it is difficult to inspire a conservation response among consumers that will deliver the socially-optimal level of investment in end-use efficiency. Cap-and-trade architects know that lowering carbon emissions from power plants will raise the cost of electricity and assume that those price increases will reduce consumption. Influenced by standard economic theory on internalized external costs, they often view increased power prices as *desirable*, and any resulting demand reductions as merely a *consequence* of the program. A better approach is to view *avoidable increased costs* as *undesirable*, and efficiency as an *integral component* of the cap-and-trade program.

Why? There are two related reasons. To begin with, there are numerous, well-documented **market barriers** to cost-effective efficiency investments, and those market barriers are not removed by carbon prices being applied to power generators -- they will continue to block

[12] Burning low-sulfur coal or scrubbing emissions of conventional pollutants do not materially alter the carbon content of the emission stream, while carbon capture and storage options are too costly to be realistic as add-on options for existing power plants.
[13] Or even the free allocation of credits under a cap-and-trade system. Most economists agree that once credits are made tradable through a cap and trade system, they will put upward pressure on power prices in wholesale markets regardless of whether they were initially sold to emitters or distributed for free.

needed improvements even after whatever rate increases could possibly be expected to flow from a carbon cap-and-trade program.[14] Builders don't pay the energy bills in the offices and homes they build. Consumers are confused by energy choices and apply very high discount rates to incremental costs for energy efficiency. Many homeowners don't expect to live in a home long enough to recover the savings from efficiency improvements, even though the investment may be cost-effective over the life of the structure. A new International Energy Agency study reports that up to 50% of residential energy use in the U.S. is affected by such barriers.[15] Even large industrial customers tend to under-invest in efficiency, and need technical and financial incentives to apply energy-saving solutions.

Moreover, whether due to market barriers or not, there is solid evidence extending over several decades that **demand for electricity in our modern economy is relatively inelastic**. Demand does respond somewhat to price, but the long-term reduction due to price increases is relatively small.[16] A 10% increase in power prices will, over 20 years, reduce demand by just 2.5% to 3%, which might offset the amount of load growth normally expected in less than 2 of those 20 years. It would take a much larger rate increase to offset expected load growth, much less to produce reductions in demand that could permit absolute reductions in emissions from the nation's huge generation fleet.

B. Carbon prices delivered to generators must be quite high to significantly alter generator dispatch --

The second problem with cap-and-trade designs that rely on carbon prices to alter power sector emissions is that, as a practical matter, given the make-up of the U.S. generation fleet, it takes a very high carbon price to materially alter the dispatch order, and thus emissions resulting from generation in the usual course of business. While this fact can be demonstrated through complex power models, the reasons are logical and straightforward.

- On a daily and hourly basis, power plants are dispatched largely in the order of their *marginal operating costs*, or in competitive wholesale markets, their bid prices, which are logically based on those marginal costs.
- Because they do not burn fossil fuels, power plants with the lowest GHG emissions (such as hydro stations and wind farms) tend to have low marginal costs and so are dispatched whenever they are available. Nuclear units are also dispatched whenever they are available. Thus, the existence of high carbon prices does little to cause these units to run more often.
- Carbon prices will force modest improvements in the performance of fossil plants, and some efficient plants will displace less efficient plants in the dispatch order. However,

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[14] There is an extensive literature detailing these market barriers, including access to information, high first-cost problems, consumers' high discount rates, unpriced externalities, the landlord-tenant problem, and others.

[15] Prindle, et al., *Quantifying the Effects of Market Failures in the End-Use of Energy*, 2007, American Council for an Energy-Efficient Economy, final draft report to the International Energy Agency.

[16] The long-term price-elasticity of demand is approximately -0.25 to -.32. The U.S. DOE's National Energy Modeling System (NEMS) has price elasticities built into it. Their long run elasticities (assuming price effects remain for 20 years) are -0.31 for residential electric use and -0.25 for commercial electric use (see http://www.eia.doe.gov/oiaf/issues/building_sector.html).

these impacts are small in GHG terms. To greatly improve the emissions profile of the existing U.S. power fleet, it will be necessary for lower-emitting gas units to displace higher-emitting oil and coal units in the dispatch.

- Since carbon taxes and allowance auction prices affect all fossil units to some degree, carbon prices drive up the cost of gas as well as coal, and it takes a relatively high price to cause the marginal price of coal generation to exceed the marginal price of gas generation.

Applying that high price across all generation can greatly raise the price of power, particularly if the total cost to consumers is measured on cost-per-ton of avoided GHG emissions.

This problem has been documented in a variety of studies. One report from the Electric Power Research Institute modeled the effect of various levels of carbon taxes or allowance prices in the Upper Midwest (which is highly dependent on coal) and in Texas (which relies heavily on gas). That study found that in the upper Midwest, a carbon charge of $25/ton would raise wholesale power prices $21/MWh, almost doubling the price, with little impact on emissions. "Even a CO2 value of $50/ton would produce only a 4% reduction in regional emissions given the current generation mix."[17] In Texas the problem is different but the result is similar. Since gas plants are at the margin already, high carbon prices raise the price of power with very little impact on overall emissions: "when gas is selling for around $8MMbtu, even a CO2 value of $40/ton produces little emissions reduction" from the existing mix.

C. There is good news however: Efficiency programs are more powerful than price increases or supply-side carbon prices

The existence of market barriers and inelastic demand does not mean that the efficiency resource is small, merely that it must be tapped through proven techniques that surmount market barriers. More than two decades of experience with utility DSM programs has demonstrated in practice that well-managed *efficiency programs* can deliver significant savings to the power grid, and thus can lower carbon emissions at low cost to the nation.

In fact, the power system will realize about 5 to 7 times more savings – in MWh, and thus in GHG emissions – from each dollar spent in a well-managed efficiency program, than it will through a generalized, across-the-board price increase.

The following example illustrates this reality. Using the generation, rates, and sales characteristics of a large U.S. Midwestern state, the example calculates the reductions in GHG emissions likely to result from two cases:

(a) Adding a 3% increase in prices, such as might result from a rate increase or a small increase in fuel prices due to an upstream carbon tax or auction price; and

[17] Victor Niemeyer, (EPRI) *"The Change in Profit Climate: How will carbon-emissions policies affect the generation fleet?"* Public Utilities Fortnightly *May 2007.*

(b) Taking the same 3% rate increase or carbon cost, but assuming that the revenue is invested in utility-sponsored or third-party energy efficiency programs at a cost of 3 cents/kWh.[18]

Due to the low price-elasticity of demand for electricity, the rate increase itself would result in a small decrease in demand and a corresponding reduction in emissions. If the proceeds from a system benefit charge or carbon credit auction are invested in programmatic energy efficiency, however, the savings are much greater, both in MWhs and in GHG reductions. In fact, investing the proceeds of a carbon charge in energy efficiency in this manner will increase the savings by a factor of 5x in the first decade (see Figure 2).[19] Extended over a longer time frame, the savings will grow to 7 times larger through intentional efficiency programs than through the price increase alone.[20]

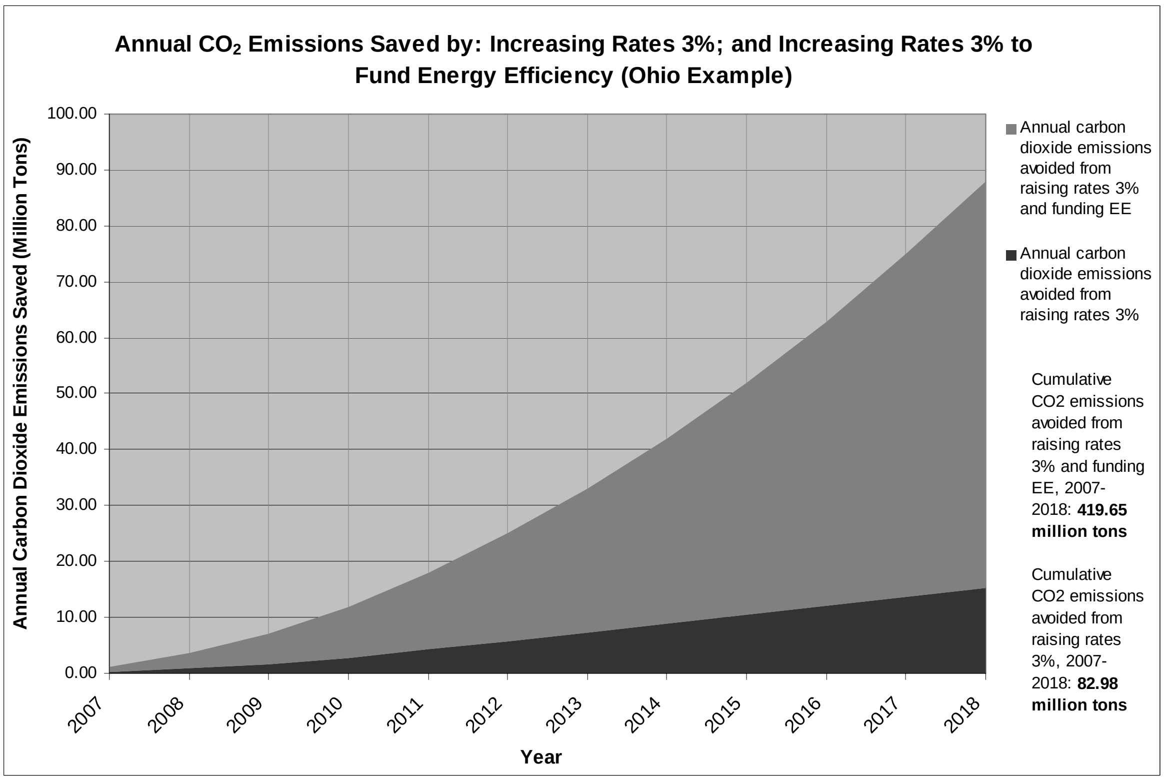

Figure 2: Efficiency programs save 5 times more carbon than carbon taxes or auction prices (for the same consumer cost)

Conclusion: What this means for carbon programs is that for a given economic cost, society can reduce much more carbon pollution through *energy efficiency programs* than it can through

[18] As noted earlier, many successful efficiency programs deliver significant savings at an average cost of under 3 cents per kWh saved.

[19] Raising rates without energy efficiency investment would save about 83 million tons of CO_2 between 2007-2018; raising rates with energy efficiency investment would save nearly 420 million tons.

[20] Over a 20-year period the ratio stabilizes at about 7:1. This is because some of the early efficiency measures are retired, and program funds are used to replace the savings they were delivering.

pollution programs that focus only on the supply side and raise the price of electricity and only incidentally reduce demand.

IV. Cap-and-Trade Design Choices for Efficiency
How can cap-and-trade architecture mobilize efficiency for carbon reduction?

A. Lessons From RGGI and the Northeast States: The Consumer Allocation

The Regional Greenhouse Gas Initiative (RGGI) is the leading effort in the United States to cap GHG emissions from the power sector. The RGGI region now extends to 10 states, stretching from Maine to Delaware.[21] The RGGI Memorandum of Understanding sets out the essential elements of a proposed Model Rule, which will need to be adopted by each state that will be part of the cap-and-trade region.[22] Rulemakings are now underway in most states, with implementation set to begin in 2009.

One of the signal achievements of the RGGI process has been the creation of a formal Consumer Allocation of carbon credits, rather than the automatic allocation of all credits to generators on the basis of their historic emissions.[23] This is a significant departure from previous cap-and-trade regimes; depending on how states implement this objective and the market price of allowances, it could substantially advance investments in energy efficiency in the RGGI region. A recent analysis by the RGGI state staff found that if 100% of RGGI allowances were auctioned in each state, per capita energy efficiency program spending could increase between 10% to 443% for each state (if allowances cost $2 per ton), or 15% to 664% (if allowances cost $3 per ton).[24]

(1) Two purposes for the Consumer Allocation: Recapturing Windfalls and Promoting Efficiency

Both experience and economic studies show that there can be a very large generator windfall from the wrong type of carbon allocation. Several studies on the free allocation of carbon allowances to generators have found the likelihood of substantial windfall gains to generators. One study prepared for RGGI estimated that total generator windfalls from 100% historic free allocation could total $1 billion or more annually.[25] More generally, the Congressional Budget Office found that for the nation as a whole "[p]roducers would have to receive only a modest

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[21] Six states in New England, plus New York, New Jersey, Delaware, and Maryland are likely to enact implementing regulations by the end of 2008. Pennsylvania is officially an observer state, and unlikely to join RGGI soon.

[22] While styled as a "regional" effort, there is no regional governmental body with regulatory authority to implement RGGI. Individual states must enact their own regulations, simply agreeing to recognize carbon credit trading with credits from other states on a reciprocal basis.

[23] Regional Greenhouse Gas Initiative, Memorandum of Understanding, Section G (1) (December 2005).

[24] RGGI Staff Working Group, *Potential Emissions Leakage and the Regional Greenhouse Gas Initiative*, Final Report of the RGGI Emissions Leakage Multi-State Staff Working Group to the RGGI Agency Heads, March 2008).

[25] Dallas Burtraw et al, *Allocation of CO2 Emission Allowances in the Regional Greenhouse Gas Cap-and-Trade Program* Resources for the Future (December 24, 2004).

portion of the allowances to offset their costs from a cap on carbon emissions…"[26] European governments that initially allocated allowances to generators on a free, historic basis are now having second thoughts, based on the early experiences of the European Union carbon trading system.[27]

The simplest way to solve these problems and reduce the unnecessary rate impacts of a generator-based cap is to award a large fraction of allowances in each compliance period to consumers, represented by their distribution companies or other supervised trustees acting on their behalf. By then selling these allowances in the credits market to generators, consumers' agents can recover through the credits market some of the generator windfalls that flow from the structure of today's wholesale power market. This revenue-recapture mechanism is essentially a market-based means of doing through program design what regulators historically would have done through cost-of-service ratemaking.

(2) Using the consumer allocation to support efficiency and lower the cost of carbon management

A large consumer allocation can lower the cost of the carbon reduction program to consumers by recapturing and recycling generator price increases for the benefit of consumers. But in what form should those benefits be returned to consumers? Some consumer advocates will naturally propose that revenues from the sale of carbon credits should be returned to consumers in the form of rate rebates. However, this will not produce the best long-term result for consumers.

The best outcome for consumers as a whole, and the best way to lower the overall cost of carbon reduction, is to invest carbon credit revenues in low-carbon resources serving consumers, especially low-cost energy efficiency measures.

There is good evidence for this conclusion. For example, modeling runs conducted by ACEEE for RGGI revealed that increasing the region's spending on energy efficiency was the key to lowering the overall cost of carbon reductions to the economy. That study found that doubling investments in energy efficiency throughout the RGGI region would lower projected load growth to 2020 by two-thirds, from about 20% above to about 6% above 2006 sales levels.[28] Efficiency also reduces carbon emissions, holding them roughly constant for an extended period (compared to a 15% rise in the base case) and thus greatly reducing the cost of attaining the reductions needed to meet RGGI's overall carbon objectives. The ACEEE study also concluded that doubling efficiency could avoid around 8,000 MW of new capacity additions, and would reduce the average household power bill by over $100 annually by 2020.[29]

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[26] Congressional Budget Office, *"Issues in the Design of a Cap-and-Trade Program for Carbon Emissions,"* Nov. 25, 2003. Others have found that generators would require as little as 13% of allowances to recover their compliance costs in a cap-and-trade program.

[27] E.g., "We also noted that the use of grandfathering as a means to allocate emissions permits is likely to result in substantial windfall profits for power generators throughout the EU." United Kingdom House of Commons, Environmental Audit Committee, "The International Challenge of Climate Change: UK Leadership in the G8 and EU" (March 2005 at p.17).

[28] William Prindle, et al, "Energy Efficiency's Role in a Carbon Cap-and-Trade System: Modeling Results from the Regional Greenhouse Gas Initiative" ACEEE (2006) at 2.

[29] Ibid. at pp 2-4.

Where additional investments are made in cost-effective efficiency measures, they will provide additional carbon reduction at the lowest cost to consumers and the economy. Selling carbon credits to emitters and then investing the revenues in low-cost efficiency provides greater benefit to consumers than a simple short-term rebate of the sales revenues. Recycling the credit revenues this way can lower the cost of carbon reduction to consumers and the economy and advance other goals, including lower power bills and greater reliability.[30]

(3) Consumer Allocation: Status

In December 2005, the Governors of 7 of the RGGI states signed the RGGI MOU, which includes a provision under which each RGGI state will propose to assign at least 25% of the state's carbon allowances to a consumer allocation.[31] Shortly thereafter, Vermont enacted legislation confirming Vermont's participation in RGGI and creating a 100% consumer allocation of carbon credits, and applying the value of carbon allowances entirely to energy efficiency. The legislation stated,

"In order to "provide the maximum long-term benefit to Vermont electric consumers, *particularly benefits that will result from accelerated and sustained investments in energy efficiency* and other low-cost, low-carbon power system investments…the public service board…*shall allocate 100 percent* of [Vermont's] tradable power sector carbon credits and the proceeds from the sale of those credits through allocation to one or more *trustees acting on behalf of consumers*."[32]

Vermont thus became the first jurisdiction to create a substantial consumer allocation of power sector carbon credits, and the first to use those credits to finance expanded investments in energy efficiency.[33]

Other states in the RGGI region are also allocating a significant percentage of allowance proceeds to energy efficiency. For example, in Connecticut at least 66% of allowance proceeds are expected to be invested in energy efficiency and conservation programs. In Maine, most allowance proceeds will be transferred to a consumer benefit account, with a portion targeted at combined heat and power at manufacturing facilities. Massachusetts DOER regulations express an intention to use the proceeds for energy efficiency, and additional legislation is pending. Currently, most states are in the process of codifying how allowances are used through proposed legislation and rulemaking proceedings. Between 90% and 100% of allowances currently are

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[30] The benefits will take several forms. Reduced consumption will lower power market clearing prices, producing an anti-windfall effect benefiting all consumers; it will lower power bills for consumers who install efficiency measures; it will lower demands on transmission facilities and improve reliability; and it will lower the cost of carbon reduction, ultimately making it possible to meet carbon reduction needs more quickly and at lower cost to the economy.

[31] Regional Greenhouse Gas Initiative, Memorandum of Understanding, Section G (1) (December 2005). There are now 10 signatory states.

[32] H.860 (2006) codified at 30 VSA S254 (c)(2). (emphasis added).

[33] In 2008, the Vermont legislature revisited this issue, confirmed the consumer allocation for efficiency, and directed that the credit value be used to support efficiency in buildings across all fuels on a "whole buildings" basis (S.209, 2008).

expected to be auctioned in each state. Some of the states are directing a percentage of allowances for certain set-asides or direct allocations, but these are transitional and are expected to phase out over time. In every state that is in the more advanced stages of its decision-making, energy efficiency is the primary activity for RGGI allowance proceeds.

B. Creating a Performance-Based Efficiency Allocation in National Climate Legislation

A number of observations can be drawn from the experience of power sector efficiency programs, from the history of air quality programs, and from the efforts underway in the RGGI and Western states to design state and regional cap-and-trade programs. Building on those experiences, if Congress enacts cap-and-trade legislation, it should create a national, performance-based **Carbon Allocation for Efficiency**[34] with a significant fraction of carbon allowances. The purpose of this allocation is to advance the national interest by encouraging states and utilities to accelerate the delivery of energy efficiency services to families and businesses in their states. Accelerated investments in efficiency, as shown above, will:

- Reduce power sector GHG emissions at lower cost than other options;
- Lower bills for consumers and offset other energy cost increases due to world market forces and other aspects of climate change legislation;
- Lower price pressure on carbon allowances, providing a cost containment benefit to the entire climate program;
- Reduce demand growth on power grids, improving reliability and reducing the need for expensive and economically riskier generation and transmission investments; and
- Improve the nation's energy security by reducing demand for imported energy.

Under this proposal, a significant fraction of allowances created in a national cap-and-trade system would be allocated annually to states (and/or local electric and gas utilities) in order to promote and reward the multitude of state and local actions that are necessary to deliver greater energy efficiency in millions of customer locations and communities across the nation.

The **Efficiency Allocation** should be performance-based. At first, allowances could be allocated to every state on a common formula, based upon population and historic energy consumption. However, over an initial ramp-up period of 4 to 5 years, allowances should be distributed to states to reflect their rate of improvement in efficiency, according to standard measures established by the national program administrator. Each state's annual allocation would be based on demonstrated improvement against *that state's own historic baseline*, providing an even-handed way to encourage greater efficiency in each jurisdiction. It does not favor today's leading states, nor does it grandfather a high level of emissions allocations to today's high-emitting states. Recent actions can be rewarded through selection of the baseline years.

[34] A brief description can be found at *Carbon Allocation for Efficiency: A performance-based distribution of carbon allowances to reduce CO2 emissions and lower the cost of cap-and-trade* (Richard Cowart, RAP, and Steve Nadel, ACEEE (March 2008) posted at www.raponline.org).

While the focus in this testimony is on the power sector, there could be separate allocations (or measurements) for improved efficiency in the utility sectors, in buildings, and in transportation. Improving energy efficiency is the least-cost method for attaining national emission reductions, but most of the work has to be done locally and through state policies. A large fraction of allowances (30% or more) could be distributed to states to encourage aggressive state action.

The national program would not need to dictate methods or means of achieving efficiency goals – states, local governments, utilities, and third parties should be free to use a variety of techniques, and to experiment. Thus, codes, standards, incentives, utility programs, ratemaking, smart growth policies, competitive acquisition, etc. can all be supported without the need for national rules or standards for today's preferred techniques.

With respect to the use of allowance values, national legislation could either establish eligible categories of expenditures or categories of recipients, or leave distributional questions to the states. If distribution among the states is performance-based, and based on the right criteria, then national objectives are being met regardless of how states distribute allowances or spend the revenue.

V. Conclusions

National climate change legislation faces the daunting challenge of setting a path to achieve deep reductions in GHG emissions, while moderating economic costs and dislocations from the program. **Greatly enhanced end-use energy efficiency is clearly critical to achieving both of these goals, and national climate legislation should be designed to capture those resources, either through direct federal actions or by providing incentives to states, utilities, and other service providers.** Policy-makers and program designers should take account of the following lessons in crafting carbon cap-and-trade and other national climate legislation:

- A carbon program that directly mobilizes end-use efficiency will cost less and achieve more than one that focuses only on generators.
- Portfolio management policies such as renewable standards, environmental dispatch, and Efficiency Power Plants will provide most carbon savings and lower the cost of any power sector cap-and-trade system.
- Free allocation of carbon credits to generators based on historic emissions can lead to substantial windfall gains to generators with only small reductions in GHG emissions.
- Merely increasing the price of fossil power through carbon taxes or credit auctions will not reduce demand very much, and will thus be an expensive path to GHG reductions.
- An auction of emissions allowances, with revenues devoted to energy efficiency, is a positive way to use the "polluter pays" principle and to fund low-cost GHG reductions at the same time.

Addendum
Richard Cowart -- Director, Regulatory Assistance Project

Richard Cowart is a Director of The Regulatory Assistance Project, a nonprofit institute that has advised governments in more than 40 US states and 16 other nations on energy and environmental policy issues.

One of the nation's most experienced regulatory commissioners, Richard served as Commissioner and Chair of the Vermont Public Service Board (PSB) for thirteen years under three Governors (1986-1999). He was elected President of the New England Conference of Public Utility Commissioners, and Chair of the National Association of Regulatory Utility Commissioners (NARUC) Committee on Energy Resources and the Environment.

For the past three years, he has been deeply involved in the design of GHG-focused strategies for the power and natural gas sectors as a technical and policy advisor to each of the state and regional cap-and-trade initiatives launched in the US to date: the Regional Greenhouse Gas Initiative (RGGI), the Oregon Carbon Allocation Task Force, the California PUC and CEC's dockets to implement AB32, and the Western Climate Initiative. He has also worked with officials at the national, provincial, and local levels in China through the China Sustainable Energy Project.

Before his appointment to the Vermont PSB, Mr. Cowart was Assistant Professor and Director of the program in Planning and Law at the University of California, Berkeley (1980-85), and Executive Officer and General Counsel of the Vermont Environmental Board (1978-80). He received his B.A. from Davidson College, and the J.D. and Master of City Planning degree with honors from the University of California, Berkeley.

He received the Walton Award for outstanding public service to the State of Vermont (1996), the State Leadership Award, for "National Leadership in Renewable Energy," American Wind Energy Association (1997), NARUC's Kilmarx Award for national contributions on efficiency and renewable energy (2004), and the Conservation Law Foundation's highest award, the John H. Chafee Award for Environmental Leadership (2006).

Richard and his family live in Calais, Vermont, where they manage one of central Vermont's oldest Christmas tree farms.