Another Option for Power Sector Carbon Cap and Trade Systems -- Allocating to Load

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Regional Greenhouse Gas Initiative (RGGI)
Concept Memo -- May 1, 2004

Summary: It is generally assumed that initial calculation of carbon caps will be based on *in-region generation* figures, and the allocations of carbon credits in carbon cap-and-trade systems will be made to electricity *generators,* following the model of the SO2 allowance trading system. Another option, however, would be to place carbon caps on *wholesale electricity buyers* and make initial allocations to the demand side of the electricity system – to the distribution companies or other "load-serving entities" that purchase from generators and supply power to ultimate customers. Caps and allocations to the load side of the power system may offer significant advantages with respect to the incentives provided to those in the best position to support low-carbon generation options, and to invest in customer-located energy efficiency measures. The model builds on utility experiences on the demand side of the market (like the Renewable Portfolio Standard, or the Texas Efficiency Performance Standard) rather than supply-side regulations like the SO2 trading program.

Public policy efforts aimed at power sector carbon cap-and-trade systems should closely examine the merits of load-side cap-and-trade systems. The RGGI process should examine the policy pros and cons of load-side allocations as well as other models, and should include the most promising load-side options in the system models now being launched.

Since this alternative was first suggested at the RGGI Stakeholders meeting in April, several RGGI participants have asked for more details on how it might work. This memorandum provides an initial sketch of the load-side allocation concept. If there is interest in exploring the idea further, a more thorough review, including relevant modeling runs, will be needed.

(A) Setting: The Regional Greenhouse Gas Initiative (RGGI) was established to create a viable cap-and-trade system for power sector GHGs across a multi-state region. Building on the success of the US acid rain program, and on the experience of source-based air quality regulation under the Clean Air Act, RGGI's discussions of program options have concentrated on various ways to allocate carbon credits to power generators, and to limit total GHG emissions by lowering the total number of credits permitted in the RGGI region over time. This supply-side focus is common in GHG discussions. There is a lot to be said for this approach; however, we will not know whether load-side allocation systems are better unless we study them too.

An initial observation is that CAA programs like SO2 allowance trading tend to assign clean-up responsibility and credits to the actors (owners of smokestacks) best in position to take mitigating actions – e.g., switches to lower-sulfur fuels, combustion technology changes, and scrubbers. CO2 mitigation, on the other hand, opens up a broader set of possible actions, many of which are within the authority of electric service providers, portfolio managers, and end-use customers – including switching to different forms of generation (say, gas v. coal), choosing renewable supplies, and investing in end-use energy efficiency. These differences may suggest taking a different approach to GHG allocations, notwithstanding our general familiarity with CAA cap-and-trade programs. ,

(B) The basics: what would "Allocation to Load" look like?

(1) The load-side allocation system discussed here would be a "hard cap" system, based upon a regional or state-by-state determination of total permitted emissions, followed by an initial allocation of credits, and ongoing trading of them.[1] There are two main ways to allocate any year's emissions allowances: by auction, or by allowance allocation. Most RGGI observers believe that an auction of GHG credits is not likely for political reasons, so it is assumed that emission entitlements (credits) will be allocated administratively, without charge. But awarded to whom?

(2) In a load-side allocation scheme, GHG obligations and credits under the cap are awarded not to power generators as generators, but to the retail providers of electric power serving customers in the RGGI region. Importantly, "load-side" in this context does not mean each and every retail electric customer, but rather the much smaller number of distribution electric companies or other retail providers who are responsible for providing electric energy and capacity to end-users (in utility terminology, these are "load-serving entities").

- There are several different kinds of LSEs in the RGGI region, but there is a relatively small number of them, and as retail providers of an essential public service, they are registered with and supervised by state regulatory commissions.[2] In most RGGI states the vast majority of customers are served by distribution utility companies under traditional regulation or state-supervised Standard Offer or Default Service plans.

(3) In a load-based cap-and-trade scheme, each LSE would be obliged to secure GHG credits during each accounting period to cover its customers' combined contribution to regional GHG emissions during that period. Obviously, an LSE with a portfolio of low-emission resources would require fewer credits than an LSE with high-emission resources, and an LSE with lower consumption (for any reason, including investments in

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[1] This distinguishes this model from a "soft cap" system like an Emissions Performance Standard that focuses on the load side (setting emissions per kwh), but where the total emissions could change with changes in overall consumption.

[2] I haven't researched the point, but there are probably fewer LSEs in the RGGI region than there are individual power plants.

end-use energy efficiency) would need fewer credits than an LSE with higher sales volumes.

- Since LSEs do not have boilers and smokestacks, it is reasonable to ask how an LSE's obligation can be determined. The good news here is that for reliability and billing purposes, the power system is run and tracked so that each MW and MWh of generation is linked from individual sources to individual LSEs. An LSE's cumulative GHG contribution can be known with roughly the same degree of accuracy as the output of the generating stations that it uses to supply its customers (in other words, with the same degree of accuracy as a generator-based system). The same type of tracking software that is used for Renewable Portfolio Standards, Emission Performance Standards, or for environmental disclosures on electric bills can be used to track an LSE's GHG emissions and obligations.

  For persons unfamiliar with utility accounting, it is useful to consider the question: "How do the dollars I pay on my electric bill get to the generators who ran the turbines that delivered 'my' power to the grid?" The answer is that there is a very well-developed accounting system to connect customers through their LSEs to the generators that supplied the power that the LSE called upon to serve them. If we can follow the dollars from customer to generator (which we do every day), we can assign the GHG emissions from the generator to the customer.[3]

(4) What emissions would be counted? LSEs acquire resources in a variety of ways: by running owned generation, by purchasing from affiliates or others in the wholesale market, or by investing in energy efficiency and other DSM resources with their customers. The LSE would be obliged to secure credits to cover its share of emissions from all of these sources, regardless of ownership or location (in other words, emissions from imported power would be tracked and counted just like emissions from generators in the RGGI region).

(5) How would an LSE acquire GHG credits? In the absence of an auction, those credits could be secured either by initial allocation or by purchase from others in a trading pool, or both, just as in a generator-based system.

- Allocation options here, as in generator-based schemes, are important to consider. One possibility is to award initial allocations on a grandfathered basis, so that on Day 1 of the system, each LSE has exactly enough credits in hand to cover its historic power supply needs. Another option is to award

[3] The Generation Information System (GIS) in effect in the six New England states provides the basis for RPS and emissions disclosure rules in New England today, and could be adopted to track GHGs as well as other generation attributes. Although RGGI might want to examine some details (e.g., should the GIS system be modified to account for imports more explicitly, rather than using default system averages?), the system provides a sound basis for an allocation-based cap-and-trade program. New York and PJM are moving towards generation tracking systems that would do this as well.

credits on an average MWh basis, which would give "clean" LSEs a surplus of credits, which LSEs with worse supply mixes would need to purchase. A variant on this scheme would award credits on an adjusted-MWh basis, giving some extra credit to LSEs where historic efficiency investments had already reduced MWhs and emissions.

(C) A quick comparison on some key issues:

There are, of course, many ways to allocate emission rights. At a minimum, the following options can be considered:

Auction vs. Administrative allocation
Allocation to generators
Emissions Performance Standards (EPS) requirements
Allocation to Load

Within this mix, the load-based allocation model described above seems to offer the following:

- *Compared to a generation-based allocation: Greater and more direct support for energy efficiency and low-emission resources.*

  One of the most important issues in designing a cap-and-trade system is how clearly it supports renewable energy and energy efficiency. Continual improvement in emissions over time will only occur if reliable, low-cost resources are brought forward to lower emissions at reasonable cost and minimal public pain. Thus not all caps (even at the same level) are really equal. The allocation scheme selected can help accelerate future progress towards lower caps, or it can lead to stalls and reversals.

  In this respect, allocation to load may provide a better fit between responsibility and opportunity than allocation to generators. By assigning GHG responsibility to LSEs, this plan would give GHG responsibility to the entity that is in the best position to make the portfolio management decisions, including decisions to invest in energy efficiency, that are most likely to lower GHG emissions rapidly, and at low cost. On Day 2 of a load-based scheme, each LSE has a new incentive to invest in efficiency and to move toward a cleaner power portfolio. Since it is LSEs, not generators, who assemble those portfolios, and since LSEs are historically the providers of efficiency services, allocating caps and credits to them may yield more rapid improvements in the overall RGGI region portfolio than would occur if GHG credits were held by generators.

  Another potential benefit of a load-based allocation is that it can be mathematically straightforward. If all LSE consumption is treated the same, it is unnecessary to distinguish among types of generators in the allocation of credits, or to create special pools of credits or offsets for energy efficiency or other non-emitting resources.[4]

- *Compared to an EPS system: Provides a hard, not a soft cap.*

  Some analysts and advocates have been looking closely at EPS plans as a way to create a tighter link between load and GHG emissions, and to put credits in the hands of the entities in the best position to change power sector investment choices. One problem with the EPS approach is that, if it is based solely on a performance requirement rather than an allocation, it creates only a "soft cap" on total emissions --emissions can grow if load grows. An allocation to load under a cap-and-trade system, on the other hand, can create a "hard cap" and still present the right dynamic incentives to LSEs to lessen demand and improve their portfolios.

  The integrity of the "hard cap" approach is of increased significance in light of potential interest in Europe in trading with RGGI-based CO2 credits. It would also be easier to trade credits across industry sectors under a hard-cap system, if the RGGI program were to be extended to other sectors in the future.

- *Leakage and "reverse leakage" (or "import leakage" and "export leakage")*

  One of the major challenges facing RGGI is the potential for "leakage" of emissions to jurisdictions outside of the RGGI region. An allocation scheme focused on generators that are physically located in the RGGI region raises the possibility that utilities, LSEs, and customers may respond to higher in-region generation costs by importing lower-cost, higher-emissions power from outside the RGGI region. These additional emissions would be linked to consumption, but not generation, within the RGGI region, and thus would not be captured under a generation-based allocation scheme.

  A load-based allocation system that treats local generation and imports equally eliminates this problem. However, it may raise the problem of "reverse leakage," in which generation within the RGGI region still operates but the output is sold outside the region. Some observers believe this may be a problem for the load-based allocation system.[5]

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[4] While such distinctions are not required, they could still be made. For example, if decision-makers in a state wanted to avoid conferring the market value of unneeded carbon credits to purchasers of the power from, say, nuclear plant uprates, or wanted to confer double benefits on purchases from PV systems, the allocation rules could mathematically treat those MWh differently from purchases from other sources. Thus, choosing a load-based allocation system does not by itself determine the outcome of debates on points like these.

[5] Other observers point out that if RGGI-region generators were exporting power, they might be displacing more carbon-intensive resources in neighboring states, thus reducing net carbon emissions, not increasing them.

Without careful analysis it would be premature to conclude whether the potential *exports* associated with a load-based allocation system would be a bigger problem than the potential *imports* associated with a generation-based allocation system. However, since most generation within the RGGI region is on the whole cleaner and more expensive than coal-based generation outside the region, exports of power from within the region (export leakage) may turn out to be a smaller problem than the potential leakage from a generation-based allocation system (import leakage).

(D) Allocations to load: an initial issues list

As the brief discussion above suggests, allocations to load may provide some advantages, but it will take careful analysis to determine if the system is preferable to other options available to RGGI. An initial, short list of issues that will need study:

1. **On what basis should allocations to load be assigned in the first instance?** Options include: grandfathering according to the recent emissions contributions of each LSE's power suppliers (input-based grandfathering); grandfathering on a recent MWh basis (output-based grandfathering) or on an adjusted MWh basis (so as to recognize embedded efficiency programs); assignments based on other factors (GSP, per-capita, etc.); and combinations of different factors.

2. **To which entities should load-side allocations be assigned?** The chief options are (a) distribution wires companies or (b) all load-serving entities, which are often but not always the same. (c) There are also some stand-alone customers who self-generate or purchase directly at wholesale; do we treat them as LSEs serving themselves (probably, above a size threshold).

3. **How about updating?** How should allocations be adjusted to reflect shifts in consumption patterns, locational shifts, etc. Should fast-growing parts of the RGGI region receive a greater proportion of overall credits in later years than slow-growing areas, or should each state or each LSE continue with the same proportion it had at the outset?

4. **What are the dynamic effects of allocations to load in the areas of energy efficiency, renewable energy, and other low-emissions resources?** Can we form any judgment as to the relative importance of those dynamic influences? (i.e., how much might a one-ton credit be worth, and how much would it add to the value of efficiency or low-emissions generation?)

5. **What about impacts on zero-emissions resources** that raise other economic or environmental concerns (e.g., nuclear power and large-scale

hydro)? Is this more or less of a problem in a load-side allocation scheme than it is in a supply-side one? Should special rules be created to limit credit implicitly given to those resources, should individual states have the flexibility to make those adjustments, or should neither be permitted?

6. **How much flexibility should individual states have with respect to allocations and adjustments?** One advantage of a hard-cap system is that it permits individual states to make their own choices about allocations within its overall cap. Presumably, a load-based allocation plan will still work if different states take different approaches to the initial allocations, but this assumption should be examined.

7. **How about imports and exports?** Careful modeling is needed to test the potential for leakage from generation-based vs. load-based allocations. What scenarios should be tested?

8. **What if the region were expanded?** Does the thinking change if the RGGI region is expanded to include PA, MD and DC? Is a load-based allocation system compatible with the notion of an ultimate national system for GHG cap and trades?

9. **How difficult is the tracking system needed to assign, trade, and track load-side allocations, compared with other options?** Environmental regulators have a lot of experience with emissions regulation and emissions trading, and have historically done this with little necessary interaction with utility regulators, distribution companies, or customers. The SO2 cap-and-trade program has been successful in its own terms, mostly because fuel substitution and technology add-ons made compliance possible by individual generators. Designing, tracking, and administering load-based allocation programs would require a different set of actions by environmental regulators, and greater interaction between environmental and utility policymakers. Carbon cap-and-trade may present different challenges, requiring responses by customers and electricity portfolio managers, not just individual generators.

10. And more….

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