Addressing Leakage in a Cap-and-Trade System: Treating Imports as Sources

Proposal and notes for discussion – April 2006

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The Leakage Subgroup asked RAP to put together some thoughts on how to address leakage in the RGGI program. What follows is an amalgam of previous memos on the subject, to stimulate discussion.

1. Problem statement

In a supply-side cap-and-trade system with a limited geographic scope and the potential for power supply imports (i.e., a system like RGGI), generators outside the capped region could export power to load-serving entities within the region without being covered by the regional carbon cap. This is called "leakage" (this memo also uses the term, "carbon export" to recognize that power imports *per se* are not a problem – it is the carbon associated with the generation behind the imports that concerns policy-makers.) Leakage raises three problems: (a) uncapped imports will have a competitive advantage compared with capped, in-region generation; (b) imports could undermine the effectiveness of the program with incremental emissions that are not counted against the region's emissions limits even though they are associated with power consumed by capped-region customers; and (c) without the discipline that comes from capping imports in some way, outside generation could displace energy efficiency and incremental, cleaner generation within the capped region.

2. Baseline questions

What counts as leakage?: An initial key question is defining what counts as leakage under RGGI. RGGI rules could take a range of approaches:

(a) Leakage is incidental to operation of the power grid, and won't be counted at all unless, over time, monitoring finds it to be a large problem.

(b) RGGI causation -- RGGI will count and attempt to control only incremental imports that are found to be *caused by* creation of the RGGI system (requiring modeling and causation analysis for any changes in generation and imports patterns);

(c) Changes in *net imports* -- RGGI will count all changes in net imports from a baseline period, crediting RGGI generation that is exported from the region against outside generation that is imported;

(d) Changes in *total imports* – RGGI will count as leakage any increase in carbon exports associated with imported power.

Baseline for measurement: The second initial question will be defining the baseline. Among the options are:

(a) Historic baseline period, as with in-region generation; and

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*With thanks to many people whose ideas and comments have contributed to development of these notes. Names are withheld to protect the innocent.

(c) BAU as baseline -- RGGI will only count leakage that is deemed to be in excess of projected "business as usual" trends for imports (requiring modeling that projects what BAU would have been over time).

The choice of a baseline is also relevant to the question of whether RGGI will attempt to show a decrease in emissions relative to the baseline, or just *no net increase* above the baseline. If BAU is chosen, consistency with the in-region cap would seem to require a calculated decrease; if a fixed baseline is chosen, a no-net increase rule could be used.

3. Practical realities:

(a) It is very difficult to try to model or predict leakage years in advance. Leakage modelers often try to guess how big leakage will be by modeling the price of carbon credits and asking whether the rate differential would be large enough to inspire cross-border arbitrage. This is relevant information, but quite incomplete in modeling potential leakage over more than a decade. All else equal, it's reasonable to assume that high carbon prices would add leakage pressure. But there are many other non-price factors that can also greatly affect the amount of leakage: e.g., physical availability of new transmission capacity; ease of siting new generation in coal regions vs. siting a new coal plant within RGGI; the desire of LSEs to add stable-priced coal to a mix that's too heavy in more volatile gas; improved capacity factors at existing external fossil units; ISO reliability rules that give capacity revenues to existing generators; and so forth. Factors like these could lead to additional leakage without any large price differential due to carbon credit costs.

The recent news about AEP's proposed new power line from West Virginia to New Jersey makes this point obvious. While the AEP proposal is an eye-opener, it's important to understand that it does not require anything of this magnitude to punch a big hole in the cap (see (c) below). One of the reasons it's hard to predict is that l**eakage rates will be affected by many things**, not just price differentials between in-region and external resources.

(b) Unfortunately, it only takes a small shift in purchasing patterns to result in quite large leakage percentages. Suppose "leakage happens." Is this a big deal?

Considering the safety valve added to the program at the end, leakage may not rise to the 70% range suggested in some earlier model runs. But it might, and it is possible that it could easily turn out to be in the 40% to 60% range if not controlled. On the optimistic side, the new safety valves mean lower carbon prices, meaning lower in/out price differentials and thus less "pull" on imports. On the pessimistic side, if power purchasers are choosing among (a) in-region gas with potentially volatile prices and uncertain availability, (b) in-region renewables—stable, but intermittent and higher-priced, and (c) imported coal, available long-term at more stable prices, their choice will be influenced by more than just the carbon price differential.

So how much new coal is enough to worry about? The answer is "not much." Here is how critics might look at it:

(i) RGGI is reducing total emissions in stages up to 10% over 10 years (2009-2018). Total reductions are roughly 55 million tons over that 10-year period (5.5 million less in 2015, rising to 22 million less in 2018, for a total of 55 million.)
(ii) Thus, if we lose 55 million tons over 10 years to new imports, RGGI will "give back" ALL of the total program reductions.
(iii) 55 million tons = ~55 million MWh of new coal imports, or on average 5.5 million MWh per year over a decade. Actually, we only have to lose 55 million tons over 13 years -- any new imports in the period 2006-2009 just make the situation worse.
(iv) RGGI's total power consumption (7 states) was roughly 280 million MWh in 2000, projected by ICF to rise to about 375 million MWH by 2019.
(v) 5.5 million MWH is just 1.5% to 2% of total sales in those years.

So: **What this means is that all it would take is new coal imports equal to 1.5% to 2% of the region's power supply over the 10-year period to offset 100% of the actual reductions attributed to RGGI.** Since load growth alone is projected to be about 1.2% to 1.4% per year, an increment as small as 1/8th of load growth served by new coal imports could erase *all* of RGGI's claimed savings.[1]

Overall conclusion: RGGI can and should deal with this issue simply by measuring and accounting for changes in imports. It is unnecessary to debate predictions, or to determine causation, and it forestalls serious program erosion.

4. A Proposed Solution

There are several ways to approach the leakage challenge, including:

(a) Monitor and deal with it later if it seems to be a problem;
(b) Create carbon performance standards for LSEs to forestall carbon imports;
(c) Promote aggressive in-region RPSs, EEPSs, and EE initiatives to lower demand for power generally, thus reducing "pull" for imports;
(d) Creating regional or statewide set-asides to offset leakage at the program level, making generators or consumers "pay" for leakage out of their allocations; and
(e) Assigning leakage responsibility to importers or LSEs, requiring them to retire credits to account for increased carbon exports due to their power purchase decisions.

[1] Milder notes: (a) if we measure the percentage lost to leakage against the projected BAU baseline, which grows higher than the 221 million ton cap, the leakage percentages will be smaller. But critics are likely to focus on what leakage takes back from the 10% reduction; and (b) MWh imports from lower-emitting sources will of course have a smaller impact than increased coal imports. With the math above, even importing 1.5% to 2% new gas into the region could take back 50% of the overall reductions from RGGI.

There are pros and cons to all of these options, and a thorough review will probably look at all of them. This memo focuses on option (e), which is the most direct way to deal with the import leakage problem. Simply stated, it would extend the cap to cover power supply that is either generated within the RGGI region ***or*** serving load within the region.

Essentially, for the purposes of the cap-and-trade program, states would treat imported power in the same fashion as power generated within the RGGI region. Legal responsibility for the emissions associated with imported power would lie with the load-serving entity (LSE) within the RGGI region that has purchased and delivered the power to in-region customers. Supervision of LSEs for this purpose could be done in each state by the same agencies that supervise implementation of Renewable Portfolio Standards and other power portfolio attributes (usually the state utility regulatory commission) or it could be assigned to the air agency implementing other aspects of RGGI.

5. Essential Elements of, and Reasoning behind, the Proposal

The key features of the proposed approach are:

a. The initial caps and goals for the RGGI region (and individual states, if applicable) should be set at levels that include the emission associated with historic imports on the same basis and timeframe as historic in-region generation. Treating imports as sources is compatible with a supply-side cap-and-trade system that focuses mainly on capping emissions from sources located physically within the RGGI region.
b. Allocation of carbon credits to all sources would treat an LSE that is importing power on the same basis as a RGGI-region generator that is generating power. LSEs would receive allocations adequate to cover their imports to the same degree that generators receive allocations to cover their historic generation. (For example, if allocations are on a MWH-output basis, it should be the same for both imports and in-region generators; if allocations are on a rolling-average basis, LSEs would be treated the same as other sources for their imports).
c. On an ongoing basis, the RGGI model rule should require any LSE using imported power to serve customers within a RGGI state to hold allowances equal to the emissions caused to be generated by producing that power. Some LSEs may need to buy carbon credits to match their import contributions. LSEs that reduce their carbon contribution by reducing imports from high-emitting sources will have allowances to sell.
d. Conceptually, imported power is treated as though it were being generated at the LSE's delivery location or metering point. The regulated entity for the purposes of this aspect of the RGGI program would be the LSE – either the distribution company for standard offer or franchise service or the competitive supplier, depending on the situation in each state. These are state-jurisdictional entities within the RGGI region.

Motivation and causation are irrelevant. Sometimes conversations on leakage turn to ideas of causation—e.g., if RGGI did not "cause" the new imports or emissions to occur, then the RGGI program needn't find a way to manage them. This is just plain inconsistent with the idea of a

sector cap. Remember that imports are on-sector activities, not off-sector activities outside of the cap system where additionality is important to consider.

By way of analogy, suppose someone suggested giving offset credits for in-region energy efficiency or renewables on the ground that RGGI has "caused" some additional EE or RE to occur. We would all say that this would lead to double counting unless the cap were actually reduced and the associated credits retired. Importantly, our answer would be the same for ALL EE and RE in the region, including both "RGGI-inspired" and "independent" resource additions. In other words, we would not care if the EE or RE in question were "caused" by RGGI or not—either way, it is not entitled to offset credits. Under a cap, tons are tons, and we don't have to try to read into the hearts and minds of the emitters and reducers in order to measure them.

Similarly for imports. The tons associated with imports either go up or go down, and we can measure this. We don't have to know the reasons, or the motivations of the buyers and sellers, (or, more obliquely, of the system operators who amend congestion policies and capacity rules), in order to measure changes in imports. It doesn't matter *why* leakage happens, only *if* it happens.[2]

Conclusion: ignoring leakage unless it is found to be "caused" by RGGI is inconsistent with cap-and-trade fundamentals, and it allows double counting. Besides, causation is almost impossible to determine and, therefore, as a practical matter, should not be the basis for a regulatory mechanism.

States can avoid even the appearance of commerce clause discrimination by adopting a Rule that requires carbon credit retirements for all power purchased by LSEs. A few months ago I suggested that states should require LSEs to hold and retire allowances for imports, which would parallel the obligations on generators. Since credits are tradable in an open market, this is non-discriminatory, even though power sources are treated a little differently. NRDC and Pace have done good legal work on this, pointing out that the case law on tax equivalence could logically be extended to this new realm, but this has not yet happened. After studying those cases and memos, I now think we can avoid the "equivalence" debate by handling imports in a manner similar to state treatment of RPSs. We should consider a rule that would require LSEs to ensure, as a part of their power acquisition/sale duties, that their **entire** power supply is covered by retired allowances. RGGI units could certify that they are complying by being part of the RGGI program, but for imports either the generator, marketer, or LSE would have to acquire and certify that it has delivered the credits. Just as with RPSs, all power is covered in the same way. And it's not really any harder than doing imports alone.

4. Assigning Carbon Attributes to Imports

[2] Note: If RGGI's goal is to reduce emissions to a level that is X% below *that which it would have otherwise been (including imports)*, then, in an effort to determine a baseline, everybody can spend the next decade arguing over what imports would have been, and where they would have come from. Although this is not a useful way to approach the problem, even here we would have to track and measure imports against that projected baseline in order to employ a cap system, and here again, "causation" would be beside the point.

Determining the carbon contribution of power generated outside of a capped region is not as straightforward as it might seem. A rule that assigns carbon attributes solely on the basis of power units *assigned to a sale* in a bilateral contract will likely understate the actual contribution caused by the sales in question. This is because it would be advantageous to sellers to contractually assign clean power to export sales into RGGI, while increasing carbon-intensive power assigned to the non-RGGI sales, without necessarily improving the generator's emission profile at all. As policymakers setting standards for green pricing programs and renewable portfolio standards have learned, it is relatively easy to "greenwash" power sales when not all sales are subject to the regulation in question. RPS and green power rules have already been developed to address this problem, so power sector regulators have some experience dealing with the issue. The following rules should provide a more accurate basis for assigning carbon responsibility to imports:

a. As a general matter, imports should be deemed to have the characteristics of the average of all power generated in the exporting control area. Alternatives to this rule can be discussed: they include using a larger region as the exporting region (e.g., the entire power pool rather than the control area) or assuming the import was generated at the margin of all generation in the exporting region. For imports from PJM, it might make sense to use the weighted average emissions of all PJM units located *outside* of New Jersey.
b. One exception to the "average emissions" rule can be permitted: attributes can be tied to bilateral contracts when the generation is (a) "new and incremental" in the exporting region, and (b) sold through a bilateral contract to a RGGI LSE. While this rule could apply to any incremental generation, it would probably be invoked only to encourage creation of new clean resources outside of the RGGI region. (Rules of this sort have been used for both RPS and green power programs.)
c. Spot market sales must also be addressed, especially those that will occur on a routine basis among entities within PJM on both sides of the RGGI-region boundary. The simplest way to deal with such spot purchases is to assign them a pro-rata fraction of all spot-market imports in each hour, and to assign to those imports the average system characteristics of the PJM region as a whole (or better yet, of the exporting non-RGGI half).
d. The RTOs within the RGGI region would need to calculate and track emissions associated with imports into their systems, and provide those data to state regulators supervising the cap-and-trade system.

5. Legal Issues

Do states within the RGGI region have the necessary authority to extend a cap-and-trade system to imports? There are at least three legal questions involved:

First, does the proposal impermissibly burden interstate commerce and violate the commerce clause of the US constitution?

As a general matter, states can impose police power restrictions on goods and services in interstate commerce when state regulation serves a legitimate state interest, and does not discriminate against out-of-state commerce. This proposal, like renewable portfolio standards and green pricing rules, seems to satisfy those tests.

Matters of "legitimate" local concern to states, e.g., "to protect the health and safety of its citizens and the integrity of its natural resources," are sufficient. *Maine v. Taylor*, 106 S.Ct. 2440, 2454 (1986). Reducing CO_2 emissions will provide both environmental and public health benefits to RGGI states and it is reasonably necessary to include imported power within the cap in order to achieve these reductions.

As for discrimination, a cap-and-trade system that does NOT include imports actually discriminates—in favor of imports *against* locally-generated power. By treating imports as sources on the same basis as RGGI-region power, the proposal is non-discriminatory in intent and effect. In order to have a non-discriminatory effect, however, it is important that the initial cap and allocation be set so as to include imported sources from the outset, on the same basis as in-region sources. Moreover, there is no pre-set limit on imports; import-related carbon and in-region carbon can be traded on an even basis, and the ratio of local generation to imports can change freely over time.

Second, is state jurisdiction preempted by FERC under the Federal Power Act?

Electric power transmission and wholesale power transactions are FERC jurisdictional under the FPA. In the absence of a FERC rule that would address the carbon content of RGGI-region imports (a fair assumption), it is important to structure the RGGI model rule so that the regulation here is not a restriction on transmission or on wholesale transactions *per se*. For this reason the proposal is structured as a requirement on LSEs, and then only on their sales to ultimate customers within the RGGI region. It is not a restriction on transmission or on wholesale sales into the region. A power transaction might, for example, pass through a variety of middlemen before it is sold to ultimate customers. The carbon credit requirement only applies to the last (retail) seller to retail customers in the RGGI region. That sale is state-jurisdictional. The extensive legal analysis supporting RPS and many other state requirements on retail sales would apply here.

And third, do individual states have the authority needed to manage the carbon content of imported power purchased by regulated LSEs?[3]

Legal research is needed to answer this question for individual states. First, state law should be examined to determine whether state environmental regulators could impose these restrictions on LSEs as a necessary component of a source-based regulatory scheme. If this is not possible in

[3] Whether states can extend their regulatory schemes to include carbon under the Clean Air Act and relevant state law is not addressed here. This is a basic proposition of the RGGI program, and has been researched elsewhere. The question here is whether, in a supply-side cap-and-trade system, carbon caps could be extended to cover imports as an additional category of sources.

particular states, state law should be examined to determine whether state PUCs would have that authority, either on their own or as regulatory partners with state environmental agencies.

As a general matter, the authority of PUCs to regulate retail sales in the public good is quite broad. Treating imports as sources under a broad carbon management plan could be found to serve economic, environmental, and reliability purposes (e.g., it is not in the interest of any state to create a regulatory environment that discriminates against local generation in favor of long-distance imports). Moreover, even in states where the independent environmental jurisdiction of the PUC has been limited, it may be possible for the PUC to assist environmental regulators to implement a comprehensive management plan. These issues will require careful state-by-state review.

6. About Power Supply and RGGI Modeling

Adoption of this proposal would bring greater certainty to RGGI and its impacts, by eliminating "leakage" (which would then not have to be estimated) and by reducing the dynamic that would alter historic power flows and trading relationships due to differential treatment of in-region and out-of-region sources. RGGI should consider a modeling run to evaluate these and other effects of this proposal.

Appendix: Technical Details and Questions

1. New England's region-wide Generation Information System (GIS) *already* tracks CO_2 from imports (from surrounding regions). This system distinguishes between "system energy" and "unit energy" but every MWh has attributes assigned to it. If a generator does not supply unit data, it gets a proxy value from the state environmental regulator, based on average system characteristics. NY, Quebec, and New Brunswick imports that are not unit-assigned are assigned system averages. We believe imports from PJM get PJM averages, too, but we need to check this.

2. Question: is there a sufficient level of rigor in tracking attributes for imports, as compared to in-region sources? Answer: yes, it's *sufficient for the purpose*. System average is what we want and this we can get. Could we get rigorous unit data for out-of-region units? Maybe, but because of the greenwashing problem, we don't really want to focus on unit-specific information anyway.

3. Argument FOR doing this: any system that gives generators in PA a reason to urge PA to stay out of RGGI is going to undermine RGGI's goal of system expansion. Why give out-of-region generators an advantage to stay out? If PA were to join RGGI without leakage control, PA generators are doubly harmed: first they lose the historic advantage of *selling into RGGI* without needing allowances, and second they would face competition from units in Ohio PJM West, *who could sell into PA* without needing the allowances that PA generators would now need.

4. Q: will adoption of this system impair a national program? NO. As "imports" are diminished due to an expanding footprint, the need for the import rule goes away, but the rule does not get in the way of anything good.

5. Issue: PJM spot sales. The question is can we track those coming from plants in RGGI vs. those not in RGGI? Answer: the PJM GATS (Generation Attribute Tracking System) program now under development can do this, but we would need to code individual plants as either "in" or "out" of RGGI to separate them.

6. How does this affect the well-being of a generating company operating in the RGGI region? In-region generators ought to support this proposal, since it eliminates unfair competition from outside generators. How about gains/losses to LSEs? How would the gains flow, and to whom?

7. Q: with more sources in the program, will the marginal cost of carbon reduction be lower? Economic theory would predict that a larger pool of resources will create a more liquid allowance market and create new opportunities for reductions, which could lower the total cost of reduction (real reduction that is, not reductions taken back by imports). Is this true, and would it amount to much?

8. How would PUCs treat the allowances to LSEs and how would LSEs be likely to hold/use/or trade them?

9. What is the baseline for imported power today? What is the percentage of sales that we are talking about at the start? We think it may be 10% or so in NY and NE, but we don't know about PJM in/PJM out.

10. LSEs will be affected by the rules for setting the baseline for allowances (e.g., if someone had a good nuclear year in the base year and did not import much, the LSE might then have to buy allowances to get by in a more normal year). Does this suggest using a multi-year average for this part of the program? I don't think we want to allow a different baseline calculation method for imports as compared to in-region generation, but this will be a topic of discussion.

11. Legal issues: PSEG, Pace, and NRDC are looking into legal issues in each state. We need to collect this info and add it to this memo.

12. Leakage predictions vary. Connecticut found very high rates. New York says they think it will be lower. ICF studies will probably show big swings due to assumptions about unknowns like future power line upgrades. One advantage of this approach is that it takes the issue off the table—one less thing to predict and debate.

13. One more recent thought: The proposal states that RGGI or individual states should begin with a cap or allocation that includes imports on the same basis as local generation, which is logical. However, it would also be possible for a RGGI state to implement this proposal without changing the RGGI cap level, or even its own allocation, by treating imports as a form of offsets, but offsets that could run in either the negative or positive direction: an "import balancing account." In this stripped-down version, an LSE could earn offsets by reducing imports from the baseline, and could be required to purchase credits for any increase from the baseline. No need to create a bigger cap, just measure and tag *net changes* in annual imports for a state or for an LSE.

Given the locked-in approach to RGGI at this point, this is likely the best way to get a handle on imports now.