



RESOURCES
FOR THE FUTURE

July 11, 2017

To: The Regional Greenhouse Gas Initiative
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Attached please find comments for the benefit of the RGGI states on the potential design of an Emissions Containment Reserve (ECR). We are submitting these comments in response to the invitation for comments on the ECR at the most recent RGGI stakeholder meeting.

We greatly appreciate the opportunity to provide input to RGGI's deliberative process.

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Comments for the Regional Greenhouse Gas Initiative Program Review on the Potential Design of an Emissions Containment Reserve

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Resources for the Future, with colleagues Bill Shobe and Charlie Holt at the University of Virginia, is engaged in a project to examine the possible design of an Emissions Containment Reserve (ECR) for RGGI. The project involves modeling, analysis and laboratory experiments and will culminate in a report to RGGI states and stakeholders.¹ That report will provide an analysis of the design of an ECR, simulation modeling and laboratory experiments to investigate its performance in the context of the RGGI program. It will not offer opinions on specific design features of the potential ECR, such as its price and quantity levels.

However, in presentations and discussions we have been asked our opinion about specific decisions that would need to be made to implement an ECR. **These comments provide an opportunity for us to suggest specific design features of an ECR, including price and quantity levels.** We organize our comments around actual questions that we have been asked in previous stakeholder webinars and in other conversations. We then offer a specific straw proposal for consideration.

1. What might be the relationship between the ECR and the Cost Containment Reserve (CCR)?

We recommend there be no necessary formulaic relationship in the specified quantities of allowances and price levels between the ECR and CCR. We view them as independent.

Nonetheless, the ECR and CCR do have similar design features and there is an advantage to making their implementations symmetric. That is, both have a reserve price in the auction that triggers the availability or decrement of a specific quantity of allowances.

We have described the ECR as a mechanism that would withhold a portion of the supply of allowances from the intended cap if the auction price fell to or below a specified level. It is different from the price floor, which applies to all allowances. However, the ECR and price floor are implemented in the same way, as a reserve price in the auction, but set at different levels.

¹ For background, see the June 14 webinar and background materials at: <http://www.rff.org/events/event/2017-06/emissions-containment-reserve-ecr-rggi-report-analytical-results>.

The CCR is the converse of the ECR in that it identifies a specific quantity of allowances that would enter the market and that are additional to the intended cap. The CCR is implemented in the same way, as a reserve price in the auction associated with that extra quantity of allowances.

While the ECR and CCR are implemented in the same way, they are spoken of differently because of their relation to the cap quantity and the model identified, anticipated allowance price. The ECR is relevant at prices below the anticipated price level, and the CCR is relevant at prices above the anticipated level.

We recommend against a formal relationship between the ECR and CCR because that might imply that allowances that do not sell if the ECR is triggered would be deposited into the reserve for the CCR, and then would re-enter the market if the price rises to the CCR price level. We recommend against this design because the different mechanisms serve different purposes. If there is to be a CCR, it would make additional allowances available whether the ECR has been binding (i.e., triggered) previously or not. Conversely, if the ECR is triggered there is an explicit decision required about what to do with unsold allowances. However, we recommend against the idea that those unsold ECR allowances be deposited in the CCR.

2. What should be done with allowances that do not sell under the ECR?

Allowances that do not sell under the ECR are analogous to allowances that do not sell if the price falls to the price floor. We recommend they be treated in the same way; presumably they would be permanently retired as has occurred previously with unsold allowances under the price floor.

3. Might the ECR anchor bidding behavior and cause auctions to clear at the ECR price step(s) when they otherwise might have cleared at a different price? Might the ECR unintentionally determine the price in the market?

We do not believe the ECR will anchor bidding behavior.

The view has been articulated previously that the CCR had the effect of shaping expectations in the market and bidders anchored to that price level in previous auctions. If bidders are working with poor information about their own marginal costs of emissions reductions or the marginal cost for the market as a whole, it makes sense that they might make an inference based on signals from the RGGI program review and decisions. In that situation, the CCR might be a point of interest. However, the evidence is mixed on whether the CCR has been focal in shaping expectations because there were other important events unfolding with regard to the Clean Power Plan during the last compliance period when the CCR was binding, and the price fell far below the CCR level as these events unfolded.

The literature in economics is not decisive but the idea supported in ongoing research of market bidding behaviors (separate from our ECR research) by our colleagues at the University of Virginia is that price constraints such as a price floor or a CCR might actually tend to repel rather than attract bids. That finding occurs simply because by censoring the range of possible outcomes, the price floor or CCR changes the expected outcome and thereby affects bidding behavior in a way that pushes away from those price limits.

In summary, we do not think the ECR anchors bids. However, if there is concern that the ECR price step might determine the price in the market, then the ECR might be implemented with multiple steps rather

than a single step. Multiple steps would ensure the price does not land on a specific ECR price trigger and should reduce the anchoring effect if it is present.

4. How many allowances should be associated with the ECR?

In one sense the quantity of allowances in the ECR is arbitrary but some guideposts can be identified. We identify two possibilities.

There may be an advantage to apparent symmetry of the ECR and CCR with respect to the quantity of allowances that are in each mechanism. The CCR currently offers a reserve of 10 million tons at its trigger price. For parallelism in our modeling, one of the scenarios we explored had 10 million tons associated with the ECR. This might be a useful approach because it might appear to be a simple extension of the existing program design, adding an ECR to balance the CCR, even though they function independently.

On the other hand, as an outcome of the last program review, in 2016 and through 2020 the annual adjustment to the cap is 21.9 million tons, which is approximately 25 percent of the RGGI cap. That quantity represents a signal of the willingness to constrain supply in order to support the program goals.

The size of the ECR might be related to whether there is a single or multiple steps to the ECR. If there were multiple price steps the ECR could accommodate a larger quantity of allowances without any one price step being likely to determine the market outcome. (A similar reasoning might apply to the CCR. We note that California has two steps in its CCR, rising to high price levels at its top step.)

5. Is the ECR quantity an annual number, and if so does it apply in each auction?

The ECR quantity that we describe is an annual number. The quantity would be divided by four to calculate the quantity that is available in each quarterly auction.

6. How should the price level(s) of the ECR be determined?

We believe the focal point for the ECR could be organized around the midpoint between the price floor and the model-identified, anticipated allowance price, given the modeling results for the intended level of the emissions cap. This midpoint, halfway between the price floor and the anticipated price, provides symmetry and a gradual adjustment to the supply of allowances in the event that prices are lower than expected.

If there are multiple steps in the ECR, they can also be organized around the midpoint between the expected price and the price floor. For example, if there were three steps, they could be one-quarter, one-half and three-quarters of the way between the anticipated price and the price floor.

7. As was mentioned in the ECR webinar, how are the benefits “shared” between the economy and the environment?

RGGI’s emissions cap is determined through a scientifically-informed negotiation among the RGGI states and in the presence of uncertainty about compliance costs. If the price is lower than anticipated, this means the cost of achieving emissions reductions is less than expected. If the RGGI states had known about this price outcome ahead of time, they might have chosen a cap that would achieve more emissions reductions. However, in the absence of the ECR, all the benefit from the advantageous trend in the costs of emissions reductions accrue to compliance entities and electricity consumers without

harvesting any additional environmental benefits. The ECR would lead to some of those benefits being realized as fewer emissions. So in effect the benefits are shared, with a lower price benefiting compliance entities and consumers and fewer emissions benefiting the environment.

If the ECR price step is below the model-identified allowance price, the initial benefits of a falling demand for allowances accrue entirely to compliance entities and consumers because for small changes in the price, before the ECR is triggered, there is no change in the supply of allowances. Then, over some range when allowances associated with the ECR are not sold, all of the incremental benefits of a downward trend in the demand for allowances accrue to the environment with no change in the price of allowances. Then if all of the ECR designated allowances are withheld, the allowance price can fall below the ECR price step and more benefits accrue to economic interests.

A multi-step ECR would achieve more continuous sharing of benefits between the economy and the environment. Over a smaller range initially, benefits would accrue to the compliance entities. Then benefits would accrue to the environment until the ECR at the highest price step is exhausted. Then the allowance price would begin to fall again and compliance entities would benefit until the next price step is achieved, and so on.

8. How should the ECR price level(s) adjust over time?

We recommend that the ECR price level(s) adjust at the same rate (at least) as the price floor, which currently is 2.5% per year. If the ECR does not adjust at this rate, then the distance between the ECR and the price floor would change over time.

It is noteworthy that the allowance price might be expected to grow at a faster rate than 2.5% because of the role of allowance banking, which propagates and adjusts the value of an allowance over time in light of the opportunity cost of holding the allowance as a financial asset (versus buying one at a later point in time). So, in a model the allowance price is predicted to grow at the firm's opportunity cost of capital over time, which is typically represented at around 5% per year, in addition to inflation (which has been about 1% per year recently). Hence, at an annual price floor adjustment of just 2.5% the allowance price might be expected to increase faster than the price floor over time. In order to preserve the relevance of the ECR, the RGGI states might decide that its price triggers grow at 5% per year plus inflation.

9. Does the introduction of an ECR affect what the level of the price floor should be?

We recommend approaching these questions sequentially. First, the RGGI states may want to address the familiar question of a minimum price in the program below which no allowances should sell – that is, the price floor. The RGGI states might want determine the ECR after the price floor is determined because it simplifies and organizes the decision making process. We note that the current price floor has increased only at the rate of inflation and has not increased in real terms since the first auction in 2008.

10. Does the ECR affect whether there should be a bank adjustment, or what the level of the cap should be?

Again, we recommend approaching these questions sequentially. First, the RGGI states may want to determine the intended level of the cap. That may involve an adjustment to account for the size of the

privately held banked allowances. These decisions will influence the model-identified price in the allowance market, which is helpful information in setting the level of the ECR.

With this recommendation in mind, we acknowledge that the ECR provides an opportunity not only for the sharing of benefits of falling prices but also for sharing of risks when it is considered in tandem with the emissions cap. A relatively less stringent emissions cap might be expected to lead to greater emissions and also a lower allowance price, potentially making the ECR more important. RGGI states might harbor greater ambition but might be concerned about potentially unexpectedly high prices. There may be an opportunity for compromise by designing the ECR so that its price trigger is closer to the anticipated price in the market. Previously, we suggested the ECR be centered around the midpoint between the price floor and the model-identified price. But a higher ECR price relative to the model-identified price would make the ECR more likely to be triggered and thereby limit allowance supply. Hence, one can imagine a compromise with a relatively higher ECR price or prices accompanying a relatively less stringent emissions cap.

11. How would the ECR affect the availability of auction revenue for program-related investments?

If the ECR is triggered it will lead to fewer allowances sold but those that sell would have a higher price. In simulation modeling we find a slight increase in revenue that is raised.

12. Transparency and relative simplicity have been virtues of RGGI. What approach to the ECR would yield the most transparent and simplest design?

The ECR adds transparency to RGGI because potential adjustments to the supply of allowances could be anticipated by observers of the market to follow from the path of allowance prices. Currently adjustments occur as part of the program review and with greater consequence and less predictability. Of course, RGGI's administrative program review always remains of central relevance, but the ECR adds predictability for compliance entities about how the program may evolve on a real-time basis as they make compliance decisions, rather than exclusively having to anticipate ex post adjustments at the end of the compliance period in the program review.

The ECR is a simple mechanism and is implemented in a parallel manner to the price floor and the CCR, as we have already discussed. Some observers have suggested that a single step ECR would be simpler because it involves a single rather than multiple steps. However, under an ECR with multiple steps, the price would be less likely to land on any individual step and compliance entities could anticipate a more continuous and gradual adjustment to supply.

13. The ECR sounds like the best thing since sliced bread. What could go wrong?

We have examined the ECR from an analytical and modeling perspective and have not identified potential unintended consequences. With our colleagues at the University of Virginia we have stress-tested the ECR in a laboratory setting. There we found that human subjects were able to understand the market design and make coherent decisions. We did not observe a difference in bidding behavior with respect to collusion, bidding true willingness to pay, or market price formation without or with the ECR. In summary, we believe the ECR is a simple enhancement to the program that helps the RGGI states better accomplish their program goals, with no identified downside risk, assuming the mechanism is implemented properly.

14. What are *do's* and *don'ts* in designing the ECR?

We identify just a few basic issues. One is the implementation of the ECR as a reserve price in the auction. This is the simplest approach and we believe bidding behavior in the auctions will be least affected if the ECR is implemented as part of a regular auction and using a reserve price approach comparable to what is used already for the price floor. Second is how the ECR adjusts over time. For it to remain relevant it should increase over time, at least at the same rate as the price floor although a higher rate can be justified. We have addressed other considerations in these comments that might improve the performance of the ECR, but we have not identified any considerations that would have a negative effect on the market.

15. How would the ECR, as part of the RGGI design, affect the opportunity for other states to trade with or to join RGGI?

The ECR would be implemented in a parallel fashion to the price floor and the CCR, so it does not complicate the implementation of the program for a state considering joining RGGI or participation through other linkage mechanisms. The ECR has the benefit of sharing the benefits of potentially low allowance prices among compliance entities, consumers, and the environment, which may appeal to states interested in participation or linking with the RGGI program.

16. How can the ECR help RGGI to magnify its influence on other states and nations?

RGGI has been a testbed for the design of emissions cap and trade and has had outsized influence in North America and Europe. That influence includes the spreading of the use of an auction and the role of a price floor in the auction. The ECR represents a similarly valuable aspect of program design. The adoption of a well-designed ECR might influence other programs, especially in Europe, where prices are far below anticipated levels. The European trading system has not been able to implement a price floor, despite many proponents for this approach, because of perceived legal constraints. Some argue a price floor would require unanimity of all member states because the price floor might actually determine the price in the market, thereby constituting a tax. The ECR has the feature that it explicitly does not determine the price. If the ECR is triggered, the supply of allowances is reduced, but the price can continue to fall below the ECR level. European policymakers we have talked to are keenly interested in the decision RGGI might make with respect to the ECR because of the precedent it would represent.

A Straw Proposal

We offer a straw proposal for the consideration of the RGGI states. Our working assumption is that the model-identified price under the intended emissions cap is \$8 per ton in 2020. This is the approximate value resulting in our modeling associated with an assumed annual reduction in the cap through 2030 equal to 3.5% of the 2020 cap (excluding the cap adjustment for that year) which was a focal part of the discussion among the RGGI states in 2016. New information and assumptions since 2016 have already made these model results out of date and, indeed, that fact makes a strong case for the ECR. The modeling is always done with underlying uncertainty about the cost of compliance and without complete foresight of future policy and technology developments. Hence, in the face of such uncertainty, we take the dialogue about cap stringency and the associated allowance price identified by the model as a measure of the willingness to accept an expected allowance price among the RGGI states.

We assume the price floor remains as it is currently configured, rising at 2.5% per year, although we do not claim this as our preferred outcome with respect to the price floor. We suggest the ECR rise at a rate that is equal to whatever rate applies to the price floor.

We suggest allowances that do not sell under the ECR are treated in the same way as allowances that do not sell under the price floor. These allowances would be held out of the market until the next scheduled program review, where a decision would be taken by the RGGI states. Previously allowances unsold under the price floor have been permanently retired. We assume the ECR mechanism would be in effect each year.

We propose a three-step ECR be organized around the \$5 midpoint between the model-identified allowance price of \$8 in 2020 and the current price floor of about \$2. This is the price identified in our model representation of choices that were being considered in 2016. The ground keeps shifting in the modeling (making a case for the ECR); we assume the level of effort that is expected will involve a model-identified price of around \$8 in 2020. The important point of reference for the RGGI states is the model-identified price associated with the policy scenario that is ultimately selected for the RGGI design through 2030. That “price” will inform the choice of the ECR price step(s).

We propose that a total of 21.9 million tons per year would be associated with the ECR, distributed in equal shares of 7.3 million tons at price triggers of \$6.50, \$5.00 and \$3.50 in 2020. This aggregate quantity would mirror the size of the annual cap adjustment from 2016 through 2020.