

The Virginia NEWS LETTER

The Regional Greenhouse Gas Initiative: How Virginia is Limiting its Carbon Emissions

by William Shobe

There's been a change in the air in Virginia. Thanks to a regulation approved by the Virginia Air Pollution Control Board in October 2018, limits have been established on carbon-dioxide (CO₂) emissions—a major contributor to global warming—from electric power plants in the Commonwealth. This new regulation takes effect in the first half of 2019, and on January 1, 2020, Virginia will become the first state in the South to join the group of states that have already moved to limit their emissions of carbon dioxide.

Following an executive order signed by Governor Terry McAuliffe in June of 2016, an advisory committee recommended that Virginia establish a cap on CO₂ emissions and allow trading of emission allowances under that cap.¹ The committee also recommended that this cap-and-trade program be linkable with similar programs in other states. In May of 2017, McAuliffe directed the Virginia Department of Environmental Quality (DEQ) to develop such a program.² DEQ ultimately published a draft regulation establishing a cap-and-trade program that would link to the successful nine-state program known as the Regional Greenhouse Gas Initiative (RGGI).³

To put this program in context, the greenhouse gas (GHG) reductions promised by Virginia and the rest of RGGI will 1) exceed the reductions that would have taken place under the Obama Administration's proposed Clean Power Plan and 2) satisfy the demands that the Paris Climate Accord would have placed on the electricity sector.



William Shobe

Virginia's participation in RGGI will not only result in substantial reductions in GHG emissions but, maybe more importantly, will signal the likely expansion of commitments among other states to limit their GHG emissions. For a moderate, business-friendly state like Virginia to show its willingness to cooperate in addressing climate change signals that this issue is a key policy concern among the states and the businesses they hope to attract. There is reason to believe that Virginia may be on the leading edge of increasing efforts by states to limit GHG emissions and that we may see more states joining RGGI in the future.

How the RGGI Cap-and-Trade Program Works

Cap-and-trade emission-reduction programs are market-friendly tools for alleviating problems that society has determined to be detrimental. Ultimately, the purpose of these programs is to impose a price on resources that are being overused because they lack ownership and control. Ownership is the key to efficient allocation of other commodities provided by the economy, so it shouldn't surprise us that a commodity lacking ownership will be overused. Cap-and-trade programs use the same market forces that are used for commodities like shoes and soda, but, in this case, to limit dangerous emissions at the lowest cost.

The cap on emissions is implemented by creating emission allowances up to the level of the cap. These allowances, once in the hands of emitters,



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may be bought and sold like any other commodity. They may be used now or saved for later. This trade in allowances establishes a price for emissions just like trade in pork bellies results in a price for that product, through voluntary exchange. As an alternative, the regulator could accomplish the same thing by setting a tax on emissions; but cap-and-trade markets have been the more popular option ever since the ideas for these approaches were developed in the 1950s and 1960s. In fact, Virginia power plants have already operated under two earlier, and very successful, cap-and-trade programs for reducing damaging acid rain and fine particulate pollution.⁴

The new cap requires all covered emission sources to retire one allowance for each ton of CO₂ emissions. Only enough allowances to cover the cap on emissions are made available. For existing RGGI states, allowances are sold at quarterly auctions. All bidders end up paying the same price for allowances; the closing price is the price of the first bid that isn't filled. Then, emitters and traders can buy and sell to each other. Emitters must retire enough allowances to cover their emissions or are subject to heavy penalties. All covered emitters must have continuous emission-monitoring equipment to enforce this restriction.

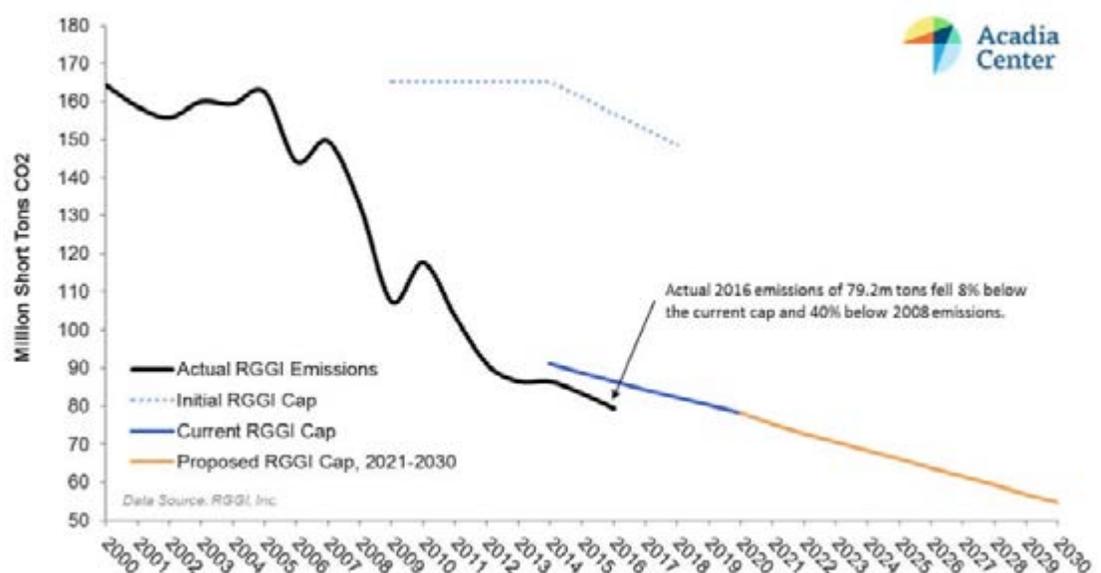
The RGGI quarterly auction has raised just over \$3 billion in revenues for the RGGI states in the first ten years of auctions. Most of this money has been used for other energy-related activities, like energy retrofits to homes and incentives for renewable energy; but some of the revenue has also been used to cover general state expenditures, thereby reducing the need for other taxes.

For the nine current RGGI-member states, the cap has fallen from 165 million tons of CO₂ per year in 2009 to 82 million tons in 2018 and will fall to 78 million tons in 2020. These reductions have been achieved at a very modest cost. Allowances are currently priced around \$4.50 per ton of CO₂, or about one tenth of the proposed appropriate tax rate on national CO₂ emissions. **Figure 1** shows the RGGI cap as well as the actual emissions. The original cap became effective in 2009. The cap was adjusted downward by about 50 percent from the 2014 compliance year, because reductions far outpaced the declining cap and because allowance prices were much lower than expected.⁵

Cap-and-trade programs provide emitting firms with maximum flexibility in achieving the reductions, keeping compliance costs relatively low. Since allowances can be traded, firms with low-cost emission reduction would rather reduce their emissions than buy allowances. Conversely, firms with high costs would rather buy allowances than reduce emissions. Emitters can also spread compliance costs over a number of years by banking unused allowances for use in years when prices would otherwise be high. This helps equalize costs and reduces the short-run risk for emitters.

The RGGI program also has some features to protect against excess volatility in the price of allowances. These include a high-price trigger for the release of additional allowances from a *Price Containment Reserve* in the case of a sharp run-up in prices, and, at the low end, a reserve price in the auctions.⁶

Figure 1: RGGI Emissions and Cap



Virginia's RGGI Rule

The DEQ, in its original draft rule published on January 8, 2018, did a creditable job of translating the standard RGGI rule to Virginia circumstances. The agency had to thread a policy needle in an area where it had little expertise or prior experience. It had to create a program that was acceptable to the existing RGGI states but that accommodated some important differences between Virginia and these states.

All the RGGI states, except Vermont, have deregulated electricity generation, meaning the prices that generators charge for their electricity are set in competitive markets. In Virginia, most electricity is generated by private firms whose rates are regulated to guarantee a 10 percent rate of return on their capital investments. This difference has important implications for certain design choices in establishing a cap-and-trade program. Under old-style rate regulation, like that used in Virginia, any costs associated with generation, such as fuel costs or, in the present case, emission allowances, are passed on to electricity ratepayers. For firms in the rest of the RGGI states, in order to remain competitive, only a portion of the costs of allowances can be passed on to consumers. Since Virginia allowance costs would be passed straight through, charging for allowances would have a noticeable effect on prices and, more importantly, would disproportionately affect the lower-income population.

Charging for allowances in Virginia would also tend to push some energy generation into other states not part of RGGI. Because Virginia belongs to a much larger electricity market, higher generation costs here would cause some emission production to leak into the non-capped states in our electricity-transmission region.

To reduce the effect of allowance costs on electricity prices, DEQ made a set of important design choices unique within RGGI. First, allowances will not be sold to generators, but, rather, will be granted for free. This choice eliminated the need for a legislative change and allowed the governor to adopt the program under existing legal authority.⁷ This choice also is important to ensure that generators will not be able to raise rates to cover these freely granted allowances. Second, DEQ chose to grant allowances to generators on the basis of the previous year's generation, rather than on past emissions. This *output-based* allocation of allowances acts as a reduction in the cost of clean generation while causing an increase in the cost of dirty generation. The most important effect of this feature is that it reduces (or maybe

even eliminates) the shift of electricity generation into areas not covered by the cap.

Granting free allowances creates a minor problem with the way these allowances are valued by the market. Since Virginia emissions will make up about one third of all RGGI emissions, the granting of free allowances would leave a large share of allowances outside of the market's price-discovery process.

In response, DEQ required that before any generator could use its allowances, the generator had to consign allowances to auction and then buy back what it needed through the same auction. This consignment sale, similar to selling old clothes at consignment shops, greatly improves the liquidity of the RGGI market and helps reveal the true value of the allowances freely granted. Since generators receive the revenue from selling their free allowances, they are not disadvantaged by consigning the allowances. If they need more than their free allotment, the net costs will be passed on to the ratepayers. On the other hand, if the generators don't need their full allotment, ratepayers will receive the excess.

Dominion Power, which stayed mostly on the sidelines in the development of the cap-and-trade rule, claimed in its 2018 Integrated Resource Plan that Virginia's joining RGGI would actually be worse for the environment than having no cap. It argued that the program would raise generation costs and cause substantial amounts of electricity generation to move to states outside RGGI. However, this assumption ignores the unique features of DEQ's rule, which grant free allowances based on energy output rather than past emissions. When these features are included, modeling shows that output-based allocation of allowances has a strong effect on reducing emissions leakage and could even cause reverse leakage in some circumstances.

Draft Regulation Adjustments

The version of the RGGI rule presented by the DEQ to the Air Pollution Control Board was a revision of an initial draft published for public comment earlier in 2018. The revised draft makes a number of small, technical changes and two substantive ones.

First, DEQ has removed industrial generators from coverage under the rule. Industrial generators produce and sell some electricity incidental to their industrial processes. Removing industrial generators makes the rule consistent with the treatment of industrial generators within the rest of RGGI.⁸

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The most significant change DEQ made was to reduce the proposed cap. The original draft proposed a cap of either 33 or 34 million tons of CO₂ per year, a choice based on modeling provided by the consulting firm, ICF. DEQ provided ICF with certain assumptions to be used in the modeling exercise. For example, DEQ assumed high future natural gas prices; high rates of growth in electricity demand (higher than even Dominion Energy had forecast); and essentially zero solar energy and wind generation for Virginia, ignoring the large amount of planned solar expansion already announced. The combined effect of these modeling mistakes was an inflated proposed emissions cap. Public comment on these points, along with a negative response from RGGI itself, prompted DEQ to carry out additional modeling based on more realistic assumptions.

After using the corrected modeling, DEQ's new proposal to the Air Pollution Control Board contains a cap of 28 million tons of CO₂ per year. This five- to six-million-ton reduction brings Virginia's level of emission-reduction efforts much more in line with those of the other RGGI states. It also reflects a desire to bring about genuine reductions in emissions below those that would have occurred without the cap.

Effect on Electricity Prices

DEQ designed the cap on CO₂ emissions to minimize the effect on electricity prices. The granting of free allowances based on past emissions means that ratepayers will not be paying for the allowances themselves. There is *no* emission

tax imposed on ratepayers. The only increase in electricity rates would result from the shift in production from coal to natural gas, nuclear, and renewables—a shift encouraged by RGGI. Virginia utilities are already making this change because it is now cheaper to generate electricity with natural gas and renewables than with coal. Insofar as the cap is binding, it will result in an incremental shift toward low-emitting and non-emitting sources of electricity.

The use of Virginia's coal-fired power plants has plummeted over the past five years, and a number of plants are slated for closure or mothballing regardless of whether Virginia caps its CO₂ emissions. Furthermore, the savings in health costs from burning less coal in Virginia make up for any small changes in generation costs. Since these pollution-related health costs tend to fall more heavily on lower-income families, the reduction in emissions has a progressive effect.

Virginia as the New Vanguard

In 2020, Virginia will formally join RGGI demonstrating that 1) a politically moderate, business-friendly state can consider a cap on emissions to be in its own interest and 2) having a regulated electric utility industry is no bar to joining RGGI. DEQ has found a way to solve this puzzle, and, in fact, has become a source of information and encouragement for other states making the effort to reduce their GHG emission. With Virginia showing the way, a path is clear for other states to become a part of RGGI.

ABOUT THE AUTHOR

William Shobe directs the Center for Economic and Policy Studies at UVA's Weldon Cooper Center for Public Service and is a professor of public policy at the Batten School for Leadership and Public Policy. He also teaches a class in environmental economics in the economics department. This year, Shobe was appointed as an inaugural University Sustainability Fellow. His current research includes emission-market and auction design, environmental federalism, and Virginia electricity-demand forecasting. Another project involves improving outcomes in India's electricity sector. In 2007, he worked on the team that designed the carbon-allowance auctions for the Regional Greenhouse Gas Initiative. In 2000, Shobe received a Fulbright Fellowship in environmental economics and policy. Before joining UVA, Shobe worked at the Virginia Department of Planning & Budget, where he coordinated state-expenditure forecasts and the economic analysis of state regulations. Prior to that, he taught economics at the University of North Carolina at Greensboro.

Endnotes

- 1 Executive Order 57, June 28, 2016.
- 2 Executive Directive 11, May 16, 2017.
- 3 RGGI comprises the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island and Vermont. New Jersey was one of the original members but Governor Christie pulled the state out of RGGI in anticipation of his seeking the Republican nomination for president. New Jersey is now in the process of rejoining RGGI.
- 4 Cap-and-trade programs have been used successfully to reduce sulphur-dioxide emissions and nitrogen oxide emissions from power plants. Credible estimates place the cost savings achieved by using cap and trade, rather than less market-friendly regulations, to be in the billions of dollars.
- 5 Approximately 23 million tons per year of the reduction were due to New Jersey leaving RGGI in 2012 (not shown on graph). New Jersey's emissions will be added back into the cap, once it rejoins RGGI in 2019. An additional, temporary cap reduction of 20 million tons per year is currently in place to account for the large bank of unused allowances carried over from the previous periods with the much higher cap. See RGGI Emissions Fell Again in 2016. (<https://acadia-center.org/rggi-emissions-fell-again-in-2016/>).
- 6 Starting in 2020, the RGGI market will have a novel feature that retires some allowances from the auction if the price is unexpectedly low, but still above the reserve. This *Emission Containment Reserve* could retire as much as 10 percent of the RGGI allowances if prices trend much lower than policy makers expect. The price and emission reserves will have no effect if the market stays within the bounds suggested by the economic models of the electricity sector. Otherwise the resources will work to modulate large price swings.
- 7 <https://www.oag.state.va.us/files/Opinions/2017/17-010-Toscana-carbon-pollution-%20for-issuance.pdf>
- 8 Industrial sources are not placed under the cap because they are thought to be more likely to relocate outside of the cap. This change was not essential in Virginia's case. Since emitters are receiving free allowances, Virginia industrial generators are not at increased risk of moving because of the cap. In fact, if these firms have inexpensive ways of reducing their emissions, the granting of free allowances could be something of a windfall.

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