

Testimony of William Shobe,
Professor of Public Policy
Director, Center for Economic and Policy Studies
University of Virginia
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I would like to thank the committee for this opportunity to comment on the price of RGGI allowances and what this means for Pennsylvania. I am an economist and have been engaged with emission market design and implementation since 2004, when Virginia held the first-ever auction of emission allowances to raise revenue. I was part of the team that designed the emission allowance auction now used by RGGI and other cap and trade programs across the globe. My research includes many peer-reviewed articles on RGGI, and on the programs in California and the European Union.

In my comments today I want to briefly address four key topics:

- (1) What do we know about the value to Pennsylvania of joining RGGI?
- (2) What do we think of as the “market fundamentals” for RGGI?
- (3) What might be behind the recent increase in RGGI allowances prices?
- (4) What responses, if any, might be appropriate?

Pennsylvania’s entry into RGGI

The Pennsylvania case is interesting because Pennsylvania actually profits by joining RGGI. Being the low cost, low emission-intensity generator, it will gain by selling emission reductions to the rest of RGGI. This is the result in the three key modeling exercises performed on the question of Pennsylvania joining RGGI by ICF, Resources for the Future and the fine group at the Center for Energy Law and Policy at Penn State. Higher allowance prices would only reinforce this result. This benefit from joining RGGI comes before adding in any direct benefits to Pennsylvania of reducing CO₂ and other emissions.

Market fundamentals

In emission markets, the price of emission allowances should, over time, stay close to the long-run cost of abating one additional ton of emissions, referred to by economists as the marginal abatement cost. Since avoided abatement costs is the source of an allowance’s value, those paying more for allowances than avoided abatement costs will eventually lose money. Market prices reflect the expected future value of emissions reductions, hence prices are influenced by changes in technology, fuel costs, demand, and policy at the international, federal, and state levels including changes in the stringency of the cap.

None of the three main modeling exercises used to assess Pennsylvania's RGGI membership give us any obvious reason to believe that the marginal CO₂ abatement cost has risen. If anything it is the opposite, the costs of solar and wind have continued to fall and projected installations have risen. Coal use has continued to be replaced by natural gas. And the costs of advanced generation technologies are falling quickly. And if allowance prices are higher than abatement costs, then Pennsylvania, with its low abatement costs, benefits.

State policies companion to RGGI, such as clean energy standards and energy efficiency goals put a downward pressure on allowance prices. We expect up to 30 gigawatts of Atlantic offshore wind by the mid-2030s. Virginia alone will have 10 Gw of solar installed by 2030. New nuclear, geothermal, biofuels, carbon capture and hydrogen technologies are advancing rapidly. The cost of abating CO₂ will continue to fall.

If the price of allowances has moved up substantially, then either the price has temporarily moved away from the fundamental value or the market's collective estimate of future abatement costs has risen. It is these two possibilities that I will now discuss.

What asset markets like RGGI tell us

Asset markets are forward-looking, meaning that today's prices reflect the expectations that participants have about the future. But markets respond to both short-run and long-run factors, which is why even established markets are subject to lots of volatility. Today's news about tomorrow feeds back to today's prices. And while it is easy to come up with a story that seems consistent with a given move in prices, most asset volatility can't be readily explained, and certainly not predicted. So one must be very careful in assigning causes to short-run asset price changes.

We do know that market participants respond to perceived risk by hedging, that is buying defensively. What are some of the things that might drive short and long run increases in allowance prices?

Pennsylvania and North Carolina joining (and Virginia possibly leaving)

First, there is the potential churning in RGGI membership. Pennsylvania and North Carolina together would double RGGI's cap coverage. Virginia's 2021 emissions were a bit less than its budget in 2021, so Virginia's exit could lead to a modest upward pressure given the state's aggressive decarbonization standard (independent of RGGI). The past experience with New Jersey leaving and re-entering and Virginia entering showed that this need not move allowance prices much, but it may do so.

One possibility is that some Pennsylvania generators may be buying now as a hedge against future possible needs, which would drive prices up in the short run but would not affect long-run fundamentals.

RGGI program review

The RGGI states are now undertaking their periodic program review. In the past, this has led to reductions in the cap when the allowance price was unexpectedly low. In the current case, as more RGGI states enunciate long term decarbonization goals, program review could lead to some defensive buying of allowances as a hedge against a possible lower long run cap.

Perceptions about some fundamentals may have changed

So far I have only talked about short-run deviations of price away from the model estimates of abatement costs. It is possible that market participants have different views about the fundamentals:

1. What if demand growth is faster than forecast?
2. What if energy efficiency measures aren't as effective as expected?
3. Will the costs of new technologies be slower to fall?

Given the known difficulty in harvesting potential energy efficiencies, it would be reasonable to forecast a quicker growth in electricity demand, but it seems unlikely that any resulting increase would have as large an effect on allowance prices as we have observed.

Valuing allowances for reasons other than compliance

It has been suggested that some recent purchases of allowances have been driven by non-compliance entities wishing to hold allowances to comply with “green portfolio” goals or ESG standards. Demand for allowances for reasons other than compliance could, if great enough, raise allowance prices above abatement cost. There is no evidence on this question, but this possibility will certainly be addressed by the RGGI market monitor.

Options for responding to higher prices

What actions might be taken if allowance prices are “uncomfortably high”. The modeling shows two things, (1) RGGI, especially with the cap and invest strategy, is good for the state’s economy and (2) the gains and costs are not distributed equally. This suggests the possibility of a “circuit-breaker” strategy. Up to some level of earnings allowance sales, a substantial share of the proceeds would be dedicated to the “invest” strategy, but above a certain level, the remaining proceeds could be rebated directly to ratepayers. This is just one of a wide variety of options that could be considered.

A comment on leakage

Investments in efficient, lower-emission, natural gas generation in Pennsylvania (and Virginia) has forced emission reductions across the PJM region by driving older coal-fired boilers out of the dispatch merit order in PJM. This has driven dramatic reductions in emission intensity across the entire region. This has resulted in a *negative leakage* of emissions by accelerating retirements in the existing coal fleet. Currently over 3 Gw of coal capacity is in the PJM retirement queue. Pennsylvania joining RGGI will not slow the retirements of coal plants, even at today’s somewhat higher allowance prices. Given recent reductions in PJM emission intensity, earlier emission leakage estimates are likely well on the high side.

Thank you for the chance to offer these observations. I would be happy to answer any questions you may have.