



Inside Energy

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RE: Virginia and RGGI Public Comments to Virginia Air Pollution Control Board

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I conducted a multi-state study, updated for Virginia, which came to the same conclusion as a Congressional Research Center study¹. The dozen year old RGGI program has resulted in no significant additional emission reduction compared to comparison states, but did shift generation and jobs to other states. Virginia electric generation fell 12% in 2022 compared to 2020. Power imports from the regional grid grew from 12% of demand to 30%, and that grid expects power shortages by 2030. In state CO₂ emissions fell by 6.6 million metric tons from 2020 to 2022, but increased electricity imports increased emissions 10.3 million tons elsewhere for a net 3.7 million ton increase. Meanwhile the \$523 million in RGGI revenue will be added to electric bills while in state generators lost \$840 million in electric generation revenue. Over a decade the RGGI could cost Virginia \$25 billion.

Fuel Source	2022 MWh	2020 MWh	Difference	% Change
Coal	3,346,000	3,763,000	(417,000)	-11%
Natural Gas	50,318,000	62,623,000	(12,305,000)	-20%
Petroleum	581,000	231,000	350,000	152%
Other Gases	523,000	557,000	(34,000)	-6%
Total Fossil Fuel	54,768,000	67,174,000	(12,406,000)	-15%
Nuclear	28,197,000	30,140,000	(1,943,000)	-6%
Net Hydro	1,145,000	950,000	195,000	21%
Biomass	3,541,000	1,069,000	2,472,000	231%
Solar	5,079,000	1,371,000	3,708,000	270%
Wind	51,000	0	51,000	
Total Zero CO ₂	37,962,000	33,530,000	4,432,000	13%
Total	90,890,000	103,056,000	(12,166,000)	-12%
Electric Demand	130,108,000	117,254,000	12,854,000	11%
Imports	39,218,000	14,198,000		

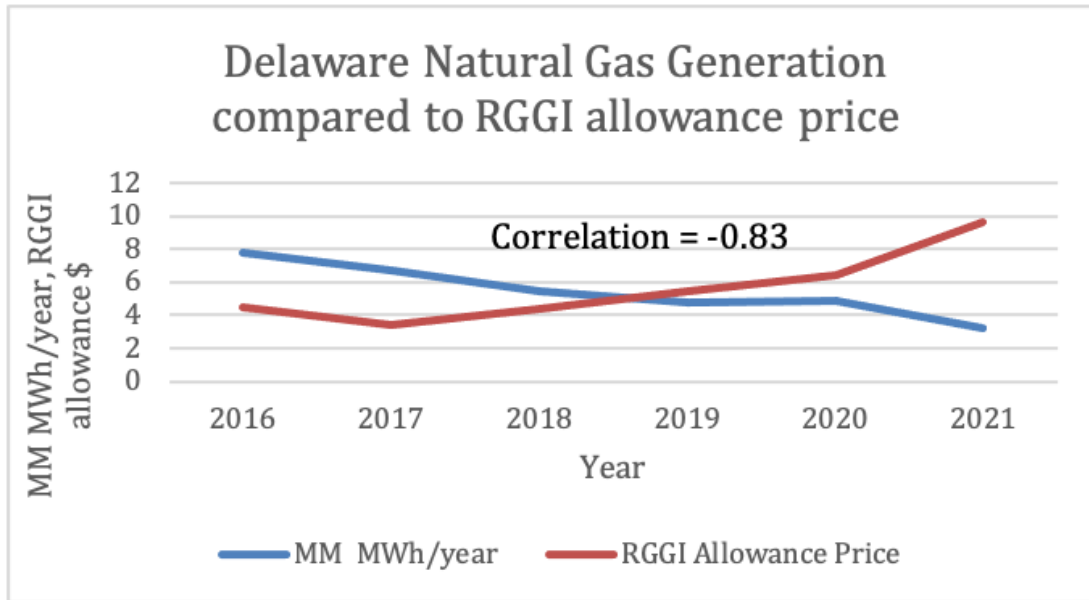
Source: Year to date totals from US EIA Electric Power Monthly²



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Virginia natural gas fired power plant generation fell 20%, losing against regional electric grid bids from non-carbon tax states with 10% lower cost as shown in the following chart.



Source: power use from US EIA detailed state data³, allowance prices from RGGI auction results⁴

Since RGGI auctions began in 2021 CO₂ emissions have actually grown almost 8%, or 2.8 million metric tons as shown in Table 2. Importing power adds cost to cover the greater transmission distances and congestion at key transmission sub-stations, and results in a 10% loss of electricity for Virginia⁷.

Table 2: CO₂ Emissions 2020 to 2022 including Changes in Imported Power, million metric tons

Year	In State Emissions	Imports + Transmission Loss	Total
2020	31.8	5.1 + 0.5	37.4
2022	25.2	14.5 + 1.4	41.1

Sources: US EIA detailed state data 2020, RGGI COATs 2022⁵, PJM Systems mix⁶

The RGGI program requires power plants to buy emission allowances for each ton of CO₂ emissions with allowances purchased in quarterly auctions. Speculators can participate and potentially resell allowances at higher prices. Virginia power plants lost about \$840 million in generation revenue in 2022 (12.2 million lost MWh annualized @ \$69/MWh). The loss of in state generation will continue to rise as RGGI allowance prices rise. A study of the RGGI state of Delaware showed natural gas generation could fall to zero at a \$16/ton allowance price (see graph below). Generation will likely shift out of Virginia much faster than new wind and solar generation can be built. For example natural gas generation fell by 12.3 million MWhs from 2020 to 2022, but solar and wind only increased by 3.8 million MWhs.



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The first question to consider is how Virginia emissions reductions compare to the RGGI states from 2007 to 2019:

- Per capita emissions from Virginia electric power plants fell 46 percent³. RGGI states fell 40 percent after adjusting for the emissions shifted elsewhere by importing more electricity from other states, and industrial business lost to other states
- Total Virginia power plant emissions fell 17.5 million tons⁷, and fell another 1.5 million tons in 2020 before the RGGI auctions started
- The Virginia generation mix changed by reducing coal-fired generation by 42 percentage points⁷ compared to RGGI states 16. Natural gas generation increased by 43 percentage points, 10 in RGGI states. RGGI states added 5 percentage points of zero emission resources, and Virginia saw no change as solar added 4 percentage points replacing the same amount of nuclear and hydropower.

It is no surprise Virginia had a higher rate of reduction in emissions than RGGI states as that was similar to the conclusion of my peer reviewed study published in the Cato Journal, “A Review of the Regional Greenhouse Gas Initiative”¹. RGGI had essentially no impact on emissions reductions compared to five other states who had similar energy policies except for RGGI. Consequently, there will likely be no environmental benefits from Virginia joining RGGI.

Well-paying jobs at the power plants would be lost, and that has secondary impacts on the economy. The direct residential cost of RGGI is currently about \$61/year based on a Dominion Power rate increase request to the utility commission of \$4.64/Megawatt-hour⁸, and an average monthly usage of 1.1 megawatt-hour per month⁹. A large industrial customer using 6,000 Megawatt-hours a month in a utility commission example paid about \$334,000/year in 2022 for RGGI.

Allowance prices averaged \$13.46/ton in 2022 and ended the year at \$13⁴, and resulted in \$128 million in costs added to electric bills. RGGI, Inc. itself shows prices rising to as much as \$24/ton¹⁰ by 2030. RGGI costs may average \$250 million a year through 2030 based on the RGGI upper end forecast, or \$2.5 billion over 10 years. RGGI, Inc. raised \$284 million in RGGI auction revenue which was added to electric bills, and claims to have saved \$112 million on electric bills by investing in energy efficiency, renewable energy, and greenhouse gas abatement¹¹. Our analysis¹ showed the savings estimates are questionable as no robust auditing has been done on the supposed savings, or of how money was spent. For example the RGGI report shows Connecticut invested money, but in actuality the state directed RGGI revenue to its general fund. In any case the supposed savings were insignificant. Energy efficiency and renewable energy savings represented 0.09% of RGGI state electric generation in 2019.

Joining RGGI requires electric generators to reduce CO₂ emissions 65% from 2007 levels, or an additional 13 million tons by 2030. In 2022 coal fired power plants emitted 4.5 million tons of CO₂. Closing those power plants would meet 35% of the emissions goal. Electric generation would fall 3.3 million Megawatt-hours. That is lost power plant generation worth about \$228 million (3.3 million MWh @



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\$69/MWh). Decommissioning costs for those power plants would be about \$325 million¹². Coal production in Virginia would fall about 1.8 million tons a year currently worth \$90 million a year¹³ at \$50/ton.

The balance of the emission reduction would have to come from natural gas fired plants reducing generation by about 19.3 million Megawatt-hours. Lost generation would be worth about \$1,330 million a year by 2030 (19.3 million MWh @ \$69/MWh). Virginia produces enough natural gas to generate 14.7 million megawatt-hours of natural gas that should be worth an average of \$500,000 a year a year by 2030¹³. By 2030 35% of Virginia natural gas generation would have to close with a decommissioning cost of \$83 million¹².

The average annual cost between now and 2030 of lost generation, and lost coal and natural gas production could be as high as \$1.6 billion/year. RGGI expense may be \$250 million a year, and there may be \$400 million in one-time power plant decommissioning cost. Over 10 years RGGI might have a direct cost of \$19 billion. Indirect and induced impacts are calculated using a regional multiplier from the US Bureau of Economic Analysis, which is 1.2983 for utilities¹⁴ may cost \$24.6 billion to reduce emissions by about half.

The costs don't count the impact of lost grid reliability. By cutting reliable power production in Virginia the Commonwealth will count on obtaining more power from the PJM 13 state regional grid which just announced likely power shortfalls by 2030.

Notes:

- 1) Congressional Research Service, "The Regional Greenhouse Gas Initiative: Lessons Learned and Issues for Congress", Jonathan L. Ramseur, May 16, 2017, <https://fas.org/sgp/crs/misc/R41836.pdf>, Cato Journal, "A review of the Regional Greenhouse Gas Initiative", : <https://object.cato.org/sites/cato.org/files/serials/files/cato-journal/2018/2/cato-journal-v38n1-chapter-11.pdf>
- 2) US Energy Information Agency, Electric Power Monthly, [Electric Power Monthly - U.S. Energy Information Administration \(EIA\)](#)
- 3) U.S. Energy Information Agency, "Annual Detailed State Data", <https://www.eia.gov/electricity/data/state/>
- 4) Regional Greenhouse Gas Initiative Auction Results, <https://www.rggi.org/auctions/auction-results>
- 5) RGGI COATS, <https://www.rggi.org/allowance-tracking/rggi-coats>
- 6) PJM Systems Mix by year, <https://gats.pjm-eis.com/gats2/PublicReports/PJMSystemMix>, Metric tons/MWh, 2020 = 0.360, 2022 = 0.369
- 7) Author calculation from Emissions, Generation, Demand, and Capacity charts by State 1990 to 2020, Inside Energy, Lost In Transmission: How Much Electricity Disappears Between A Power Plant And Your Plug? www.insideenergy.org/2015/11/06/lost-in-transmission-how-much-electricity-disappears-between-a-power-plant-and-your-plug/
- 8) Thomas Jefferson Institute, "Youngkin to Withdraw from RGGI, End Carbon Tax", [Youngkin to Withdraw from RGGI, End Carbon Tax | \(jeffersonpolicyjournal.com\)](http://jeffersonpolicyjournal.com)



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- 9) Virginia State Corporation Commission, Carol Meyers cost testimony on Dominion Power Integrated Resource Plan, <https://scc.virginia.gov/docketsearch/DOCS/4p8t01!.PDF>
- 10) DRAFT 2017 Model Rule Policy Scenario Overview Sept. 25, 2017, page 13
https://www.rggi.org/sites/default/files/Uploads/Program-Review/9-25-2017/Draft_IPM_Model_Rule_Results_Overview_09_25_17.pdf
- 11) RGGI, Inc., “The Investment of RGGI proceeds in 2019”, [RGGI Proceeds Report 2019.pdf](#)
- 12) Resources for the Future, “Decommissioning US Power Plants”, Daniel Raimi, Oct. 2017,
<https://media.rff.org/documents/RFF20Rpt20Decommissioning20Power20Plants.pdf> ,Average cost/MW is \$117,000 for coal, \$15,000 for NG,
- 13) US EIA weekly coal production, [Weekly Coal Production by State \(eia.gov\)](#) , coal prices, [Coal prices and outlook - U.S. Energy Information Administration \(EIA\)](#) , natural gas production, [Microsoft Word - table_02.doc \(eia.gov\)](#) Free Energy, “Straight Facts on the environmental impact on coal”, 1100 pounds of coal/MWh, [Straight facts on the environmental impact of coal: CO2 emissions, pollution, land, and water \(freeingenergy.com\)](#)
- 14) U.S. Bureau of Economic Analysis Regional Impact Multiplier System, composite multiplier for indirect impact of utilities is 1.2983, available by subscription service only