3. Economic Trends

3.1 Economic Impacts

RGGI has generated significant economic benefits for states participating in the program. By selling allowances (permits to emit CO_2), RGGI states raise revenue to reinvest in energy efficiency, renewable energy, and other consumer programs that increase economic activity in participating states. The majority of program revenue (59% during the second control period, 2012 to 2014[xix]) has been invested in energy efficiency programs that reduce consumers' bills and reduce demand for power. Lower power demand means fewer emissions from power plants, and less money leaving the region to pay for imported fossil fuels. Energy bill savings increase consumer spending, benefiting businesses that offer goods and services in the region. Independent macroeconomic analysis has found that programs supported with revenue raised over RGGI's first six years of operation will generate over $1.56 billion in energy bill savings.[xx] These savings create over $2.76 billion in net economic gains and 28,500 job-years of employment.[6]

3.2 Economic Growth and Emissions

As efficiency investments have increased and the regional economy has become less energy-intensive, RGGI states have experienced economic growth even as emissions have declined. While similar trends are seen across the country, RGGI's states have outpaced other states on emissions reductions and economic growth. From 2008 to 2015, RGGI states' economies grew by 24.9% versus 21.3% in states that do not regulate or put a price on carbon emissions (this group of 40 "other states" does not include California, which has outpaced national growth since capping GHG emissions[xxi]).

Over the same period, emissions in the RGGI region dropped by 30% versus 14% in other states.[7]

Table 1: Change in Economic Growth and Emissions, 2008 to 2015

	Economic Growth	CO_2 Emissions
RGGI States	+24.9%	-30%
Rest of the Country	+21.3%	-14%
RGGI vs. Others	**+3.6%**	**-16%**

Electricity demand has historically been tied to economic growth, with electricity consumption and related emissions increasing during periods of economic expansion and decreasing in economic downturns. This correlation has broken in the RGGI region and appears to be mirrored—slightly less dramatically—at the national level, demonstrating that emissions reductions can be achieved at the same time as economic growth.

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[6] These figures are based on the combined findings from two separate reports from the Analysis Group, the first of which covered impacts from 2009 through the first half of 2011 (New Jersey employment and net economic impacts have been excluded from this analysis), the second report covering 2012 to 2014. As a result, the combined benefits included above only account for five and a half years of revenue reinvestment, rather than the full six years from 2009 to 2014.

[7] In order to compare emissions in the RGGI states to emissions in the rest of the country, the emissions measured in this section are from EIA Form 826. This represents a broader range of emissions sources than those covered by RGGI, which explains the difference in reported RGGI emissions here versus elsewhere in this report.

4. RGGI Market

Since the first RGGI allowance auction in September of 2008, the RGGI market has functioned effectively, through both highs and lows. Through nearly eight years of operation, market trends have largely been driven by four factors: 1) declining emissions and allowance oversupply, 2) price controls, 3) policy interventions, and 4) the Clean Power Plan.

4.1 Allowance Oversupply

Emissions reductions have outpaced expectations since RGGI's launch, creating allowance oversupply. Regional CO_2 emissions in 2008 were 139 million tons, while the initial cap for the nine currently participating states[8] was set at 165 million tons per year from 2009 through 2014. This initial oversupply was a result of a combination of electric sector trends already discussed in this report, conservative emissions projections, and actions taken by compliance entities in anticipation of RGGI implementation.[9] With emissions falling significantly below the cap in RGGI's early years (2008 to 2013) market participants bought tens of millions of low-priced allowances each year to be banked for future use. By the end of 2013, 140 million tons of these surplus allowances had been accrued.[xxii] This large bank suppressed allowance prices and removed the prospect of market scarcity.

4.2 Price Controls

RGGI currently employs price controls to contain allowance prices within predetermined ranges. The price floor (dashed gray line in Figure 5) represents the minimum price at which allowances can be sold at auctions; beginning at $1.86 in 2009 and rising gradually to $2.10 in 2016. Under the oversupplied cap from 2009 through 2012, the price floor preserved the value of RGGI allowances by preventing additional declines in allowance prices or sales and ensuring that surplus allowances were withheld from the market. As a result, 176 million allowances went unsold during this period.[xxiii]

During the 2012 program review, the RGGI states chose to implement a cost containment reserve (CCR), to dampen allowance prices during periods of extraordinary circumstances. Beginning in 2014, the CCR provided additional allowances available for purchase when price thresholds are met (dashed red lines in Figure 5). While the CCR was designed to protect market participants and ratepayers from extreme and unexpected spikes in demand, CCR allowances have been purchased in 2014 and 2015 under what appear to be normal market conditions. Emissions fell below the cap level in both of these years and a substantial allowance surplus ensured that there would be no near-term scarcity, yet all of the available CCR allowances were purchased (five million in 2014, ten million in 2015). As a result, the CCR has effectively inflated the RGGI cap by 15 million tons. Exacerbating this problem is the fact that the lure of additional allowances seems to put *upward* pressure on auction clearing prices,[xxiv] undermining the CCR's stated purpose.

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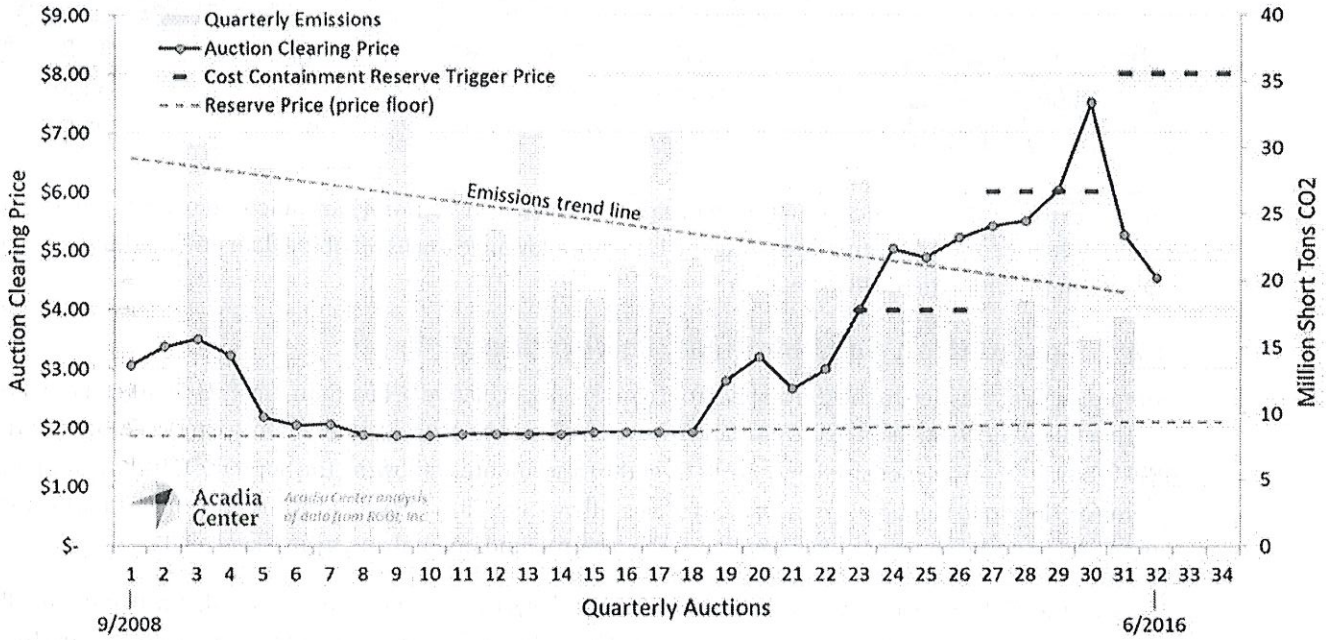
[8] New Jersey participated in RGGI from 2009 to 2011 but is excluded from this analysis.

[9] Nicholas Institute for Environment Policy Solutions, Duke University. 2015. *Why Have Greenhouse Gas Emissions in RGGI States Declined? An Econometric Attribution to Economic, Energy Market, and Policy Factors.* Available at: https://sites.nicholasinstitute.duke.edu/environmentaleconomics/files/2014/05/RGGI_final.pdf

Figure 5: RGGI Auction Results and Price Controls



4.3 Policy Interventions

As a result of the 2012 program review, the RGGI states made two effective changes to improve the function of the market. First, and most notably, states decided to reduce the 2014 cap by 45%, from 165 million tons to 91 million tons, with annual cap declines of 2.5% through 2020. The second major policy intervention was the decision to adjust the cap for banked allowances. As discussed earlier, the RGGI cap far exceeded RGGI emissions in the program's early years, resulting in the accumulation of a 140-million-ton allowance surplus by the end of 2013.[10] In order to prevent this bank of allowances from undermining the program's future environmental performance, the RGGI states developed a novel solution: gradually eliminate the allowance surplus by adjusting future cap levels downward. As shown in Table 3, the cumulative cap level from 2014 through 2020 was adjusted downward by 139.6 million tons, corresponding to the quantity of the allowance surplus.[11]

[10] Potomac Economics, *Annual Report on the Market for RGGI CO2 Allowances: 2013*, available at: https://www.rggi.org/docs/Market/MM_2013_Annual_Report.pdf

[11] This adjustment was conducted in two steps; one adjustment to account for allowances banked during the first control period (2009 to 2011) and a second adjustment for the second control period (2012 to 2014). For more information, see: https://www.rggi.org/docs/SCPIABA.pdf

Table 2: RGGI Cap and Adjusted Cap Levels (million short tons CO_2)

	2014	2015	2016	2017	2018	2019	2020	Total
RGGI Cap	91	88.7	86.5	84.3	82.2	80.2	78.2	591.2
RGGI Adjusted Cap	82.8	66.8	64.6	62.5	60.3	58.3	56.3	451.6
Adjustment	8.2	21.9	21.9	21.9	21.9	21.9	21.9	139.6

These two policy changes were announced in early 2013, between auction 18 and auction 19. As shown in Figure 5, these steps made the program more stringent, bringing allowance prices off of the floor and marking the most significant transition in the RGGI market.

4.4 Speculation and the Clean Power Plan

Announcements related to the CPP appear to have driven speculative behavior in the RGGI market. From the first auction following the release of the draft CPP (Auction 24 in June of 2014), to Auction 30 in December of 2015, RGGI allowance prices increased by 49%.[xxv] Over the three months following the Supreme Court's stay of the CPP (from Auction 30 to Auction 31), allowances prices fell by 30%. These dramatic swings in prices occurred in the absence of material changes in RGGI policy or the region's fundamental energy market trends.

Whether the CPP is struck down by the courts or, more likely, implemented and enforced, it will undoubtedly impact the supply and demand dynamics in the RGGI market. RGGI states retain wide discretion in how they will comply with the CPP and interact with other markets that emerge. The decisions made by the RGGI states regarding future cap levels and provisions surrounding trading with other states will ultimately define the RGGI market's future.

5. Conclusion

RGGI has successfully demonstrated the viability of a market-based program to reduce CO_2 emissions from the power sector while generating benefits for participating states. Trends that have contributed to emissions reductions — fuel-switching, improved energy efficiency, and increases in renewables — show no sign of reversing in the RGGI region, suggesting that additional emissions reductions are achievable.

RGGI's experience has disproven the concerns most frequently associated with capping emissions from the power sector. Emissions have declined rapidly, far more dramatically than projected, without stifling economic growth. RGGI's reinvestment model has benefited the regional economy and increased employment. The region now pays lower electricity prices than before the program began.

In this context RGGI states will be charting the course for RGGI's future. Part II of this RGGI Status Report will focus on decisions the RGGI states face as part of the 2016 Program Review, considering RGGI's role in achieving states' broader climate commitments and complying with EPA's Clean Power Plan.

Endnotes

[i] Acadia Center analysis of emissions data from RGGI, Inc., at: https://rggi-coats.org/eats/rggi/index.cfm?fuseaction=search.rggi_summary_report_input&clearfuseattribs=true

[ii] Cap levels and emissions from RGGI, Inc., at: http://rggi.org/

[iii] Energy Information Administration (EIA), Form 826, http://www.eia.gov/electricity/data/eia826/. The volume-weighted average shown in Table 1 is a product of each state's electricity price multiplied by electric load in the given year.

[iv] VT buys more power through long term contracts than other states in the region. This approach has stabilized prices, but means that VT is insulated from wholesale price trends, which have recently decreased power prices in other states in the region. It is worth noting that Vermont's RGGI revenue supports thermal efficiency programs for customers using propane, fuel oil, and natural gas. While thermal efficiency programs generate greater cost and GHG savings than electricity programs in Vermont, electric price suppression is not as significant as in other states that direct RGGI revenue to electric efficiency programs. NH is also more dependent on long term contracts, though not to the same extent as VT, and NH directs the majority of auction revenue to rebates, which do not suppress electric prices.

[v] *American Lung Association Energy Policy Development: Electricity Generation Background Document*, 2011, http://www.lung.org/healthy-air/outdoor/resources/electricity-generation.pdf

[vi] Id.

[vii] EPA, 1997, *Characterization of Human Health and Wildlife Risks from Mercury Exposure in the United States*, http://www.epa.gov/ttn/oarpg/t3/reports/volume7.pdf

[viii] This analysis draws on emissions information from EPA Air Program Markets Data and EPA's benefit-per-ton metrics for specific pollutants. For more information, see: http://acadiacenter.org/wp-content/uploads/2015/07/Appendix_Monetized-Benefits-of-Avoided-Emissions.pdf

[ix] Carbon emissions factors for natural gas (117.0 lbs CO_2/MMBtu), residual fuel oil (173.7 lbs CO_2/MMBtu) and coal (210.0 lbs CO_2/MMBtu) from EIA: www.eia.doe.gov/oiaf/1605/excel/Fuel%20Emission%20Factors.xls

[x] Gas savings from electric efficiency programs assumes EIA average natural gas power plant efficiency of 1mcf/MWh (http://www.eia.gov/tools/faqs/faq.cfm?id=667&t=2).

[xi] Data for 2015 energy efficiency savings in Delaware, Maryland and New York was not available at the time of writing this report, so 2015 savings were assumed to be equal to 2014 savings in those three states.

[xii] Electric efficiency program budgets from the Consortium for Energy Efficiency, from *2015 State of the Efficiency Program Industry*, available at: https://library.cee1.org/sites/default/files/library/12670/CEE_2015_AIR_Tables_March_2015.pdf

[xiii] See American Council for an Energy Efficient Economy (ACEEE) for information on state efficiency programs: http://aceee.org/sector/state-policy

[xiv] EIA, 2014, *Annual Energy Outlook 2014: Early Release Overview*, Available at: http://www.eia.gov/forecasts/aeo/

[xv] For additional information on State Renewable Energy Portfolios see the Department of Energy's EERE State Activities & Partnerships, Available at: http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm

[xvi] Results from the "Clean Energy RFP" (https://cleanenergyrfp.com/) are anticipated later this summer, and could include up to 600MW-1000MW of hydroelectricity and other renewable energy.

[xvii] H4385 (https://malegislature.gov/Bills/189/Senate/H4385) requires 9.45TWh of hydroelectric procurement and 1,200MW of offshore wind capacity, and S2400 (https://malegislature.gov/Bills/189/Senate/S2400) requires 12.45TWh of procurement for hydroelectricity and other renewables, and 2,000MW of offshore wind capacity. Passage of a final bill is anticipated by the end of the Massachusetts legislative session on July 31st.

[xviii] See: http://www.rilin.state.ri.us/pressrelease/_layouts/RIL.PressRelease.ListStructure/Forms/DisplayForm.aspx?List=c8baae31-3c10-431c-8dcd-9dbbe21ce3e9&ID=12090&Web=2bab1515-0dcc-4176-a2f8-8d4beebdf488

[xix] Analysis Group, 2015, *The Economic Impacts of the Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States*, available at: http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_july_2015.pdf

[xx] Id.

[xxi] As detailed in the Environmental Defense Fund's recent report, *Carbon Market California: A Comprehensive Analysis of the Golden State's Cap-and-Trade Program*, California has experienced significant economic benefits resulting from AB 32, and GDP growth in the state outpaced the national average in 2011, 2012, and 2013: http://www.edf.org/sites/default/files/content/carbon-market-california-year_two.pdf

[xxii] Potomac Economics, *Annual Report on the Market for RGGI CO2 Allowances: 2013*, available at: https://www.rggi.org/docs/Market/MM_2013_Annual_Report.pdf

[xxiii] For more information on RGGI auction results, see: http://www.rggi.org/market/co2_auctions/results

[xxiv] Comments of Judith Schröter, Lead Analyst US Carbon & Offset Markets, ICIS, at April 29th learning session put on by the Collaborative for RGGI Progress.

[xxv] http://www.rggi.org/market/co2_auctions/results