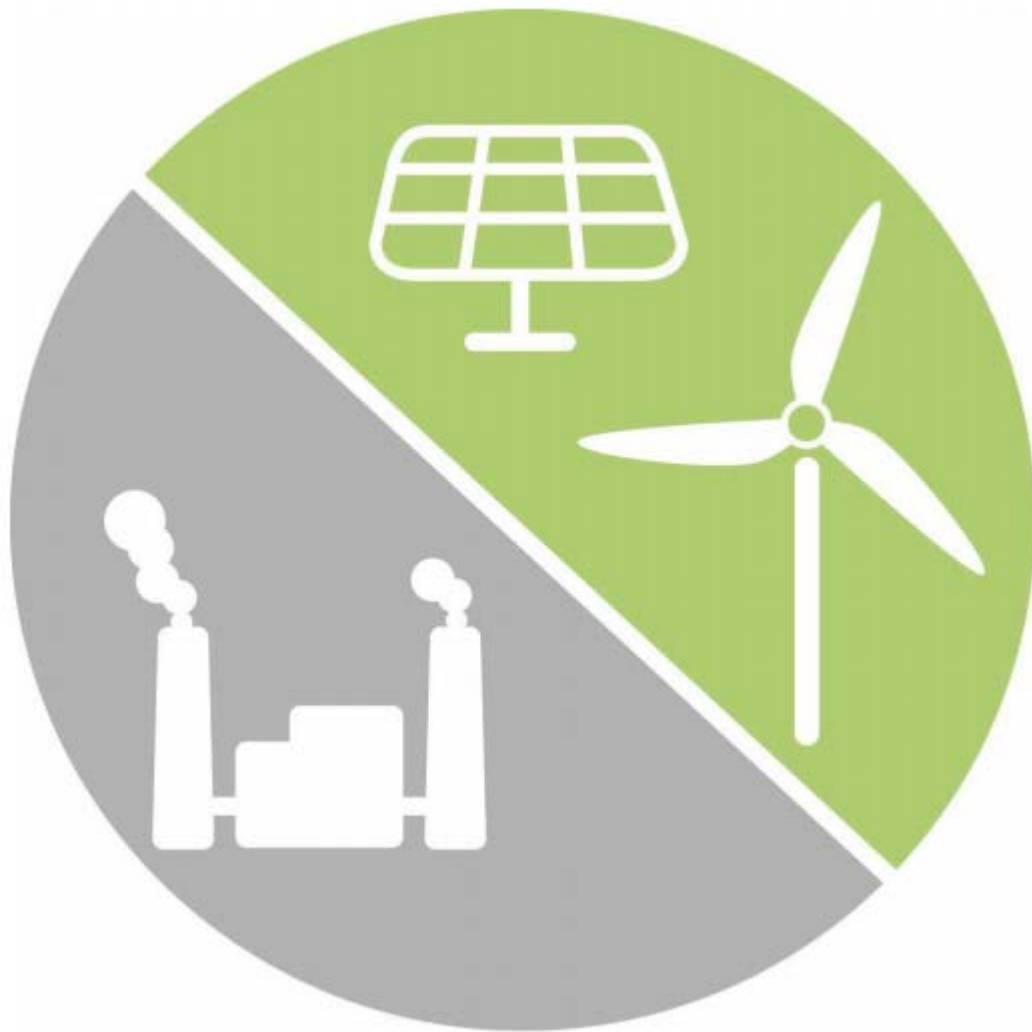


# Regional Greenhouse Gas Initiative Status Report

## Part I: Measuring Success



July 2016



**Acadia  
Center**

Advancing the Clean Energy Future

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## Introduction – An Effective Program

Through seven and a half years of operation, RGGI has helped Northeast and Mid-Atlantic States<sup>1</sup> achieve significant reductions in emissions of carbon dioxide (CO<sub>2</sub>) and other pollutants from the electric power sector. Over the same period RGGI states' economies have outpaced the rest of the country, and electricity prices within the region have fallen, even as prices in other states have increased.

Through reforms considered in the 2016 Program Review, states can build on this success and solidify RGGI's role in achieving state-level climate commitments and requirements of the Environmental Protection Agency's (EPA) Clean Power Plan (CPP).

Factors that have contributed to RGGI's success show no signs of reversing. Fuel-switching, improved energy efficiency, and growing renewable energy output have caused emissions to drop by 37% since RGGI launched.<sup>1</sup> The rate of pollution reductions continues to outpace expectations, with 2015 emissions falling 6% below an emissions cap that was tightened only two years ago.

### Key Facts:

- ◆ 2015 emissions of 83,201,850 tons of CO<sub>2</sub> fell 6.3% below the RGGI cap.
- ◆ Electricity prices across the region have decreased by 3.4% on average since RGGI took effect, while electricity prices in other states have increased by 7.2%.
- ◆ Since RGGI launched member states have reduced emissions by 16% more than other states and seen 3.6% more economic growth.
- ◆ Electric sector trends responsible for low emissions — including increasing generation from renewables and natural gas, and growing investments in energy efficiency — show no signs of reversing.
- ◆ Reforms decided during the 2016 Program Review will determine whether RGGI continues to succeed.

More broadly, RGGI has achieved its initial goals. Power generators have incorporated RGGI requirements into normal business operations, and the electric sector as a whole has adapted to the shifting economics of different generation sources while continuing to provide a reliable supply of electricity. Requiring electric generators to pay for disposing CO<sub>2</sub> in the atmosphere has led the market to incorporate the cost of pollution into planning decisions, while at the same time raising revenue for states to reinvest in clean energy and consumer programs that drive additional emissions reductions and economic growth.

RGGI states' experience reducing emissions faster and at lower cost than anticipated comes at an important time as states work to chart RGGI's course into the future, and as other states consider implementing market-based climate policy to comply with the CPP. Part I of this Status Report focuses on: 1) key trends since RGGI's launch, 2) electric sector drivers, 3) economic trends, and 4) the status of the RGGI market.

Part II of the Status Report focusing on key decisions that RGGI states face in the 2016 Program Review will be released shortly.

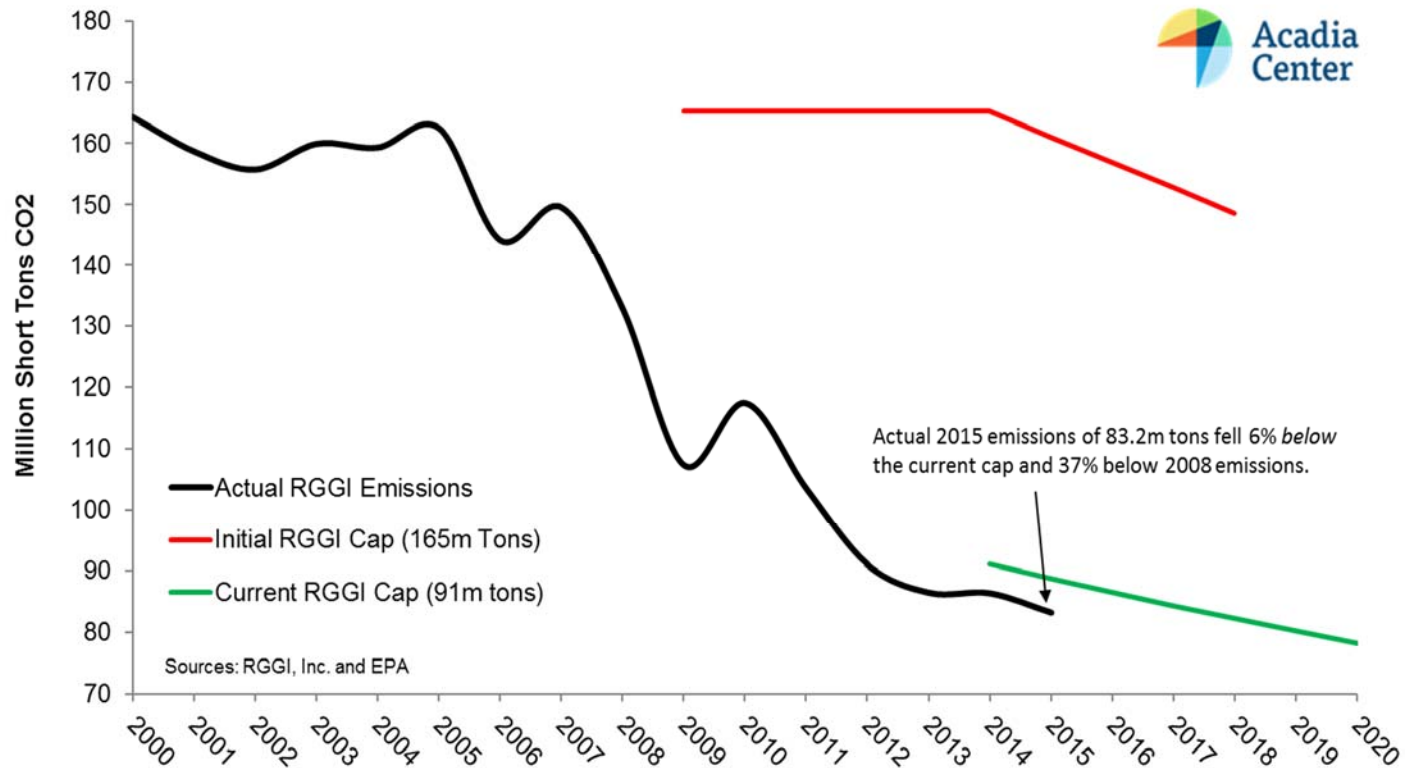
<sup>1</sup> Analysis in this report covers the participating RGGI states: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. [Footnotes elaborate on points within this report, whereas endnotes cite references and provide detailed analytic methodologies where relevant.]

## 1. Key Trends

### 1.1 Emissions Reductions

Emissions in 2015 continued the downward trend of recent years. CO<sub>2</sub> emissions from the power plants covered by RGGI totaled 83,201,850 short tons of CO<sub>2</sub> in 2015, which was 6.3% below the 2015 emissions cap of 88,725,000 tons, and 37% below emissions levels in 2008, the year before RGGI started.<sup>ii</sup>

Figure 1: RGGI Caps and Actual Emissions

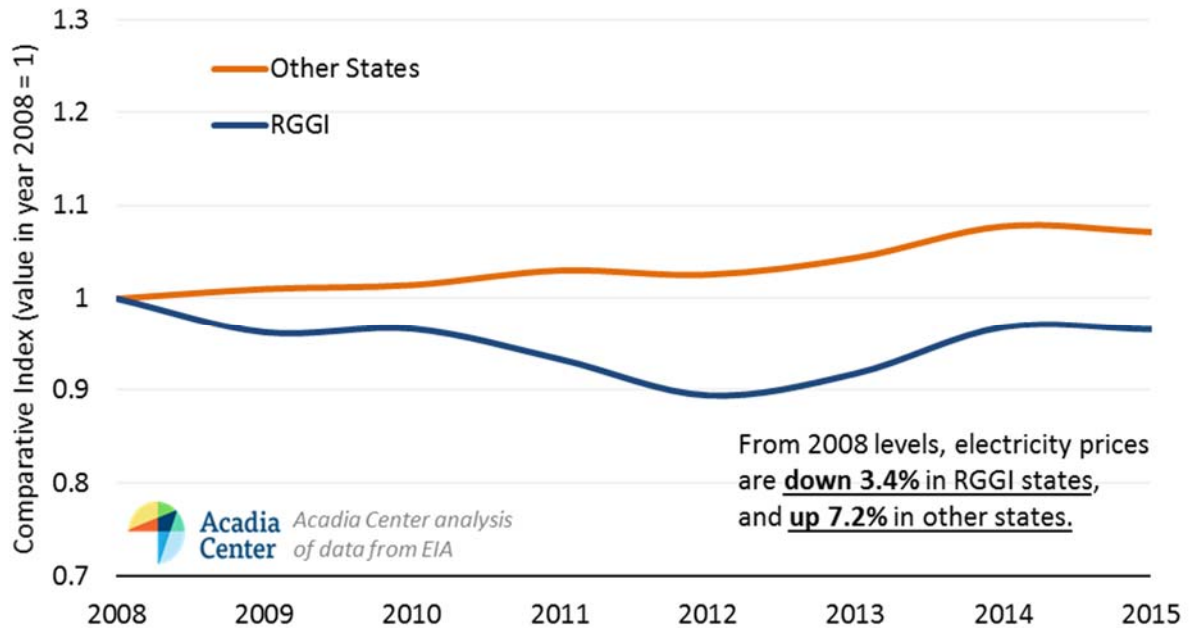


### 1.2 Electricity Prices

Electricity prices are lower than they were before RGGI took effect. Comparing retail electricity prices from 2008 (before RGGI's launch) to 2015 shows that prices have dropped by 3.4% across the region.<sup>iii</sup> While RGGI's direct impact on electricity prices (and other trends described in this report) is difficult to isolate from other factors, it is evident that the program has not caused electricity prices to increase above 2008 levels.<sup>iv</sup> Due to higher natural gas prices in recent years, electricity prices have increased in both the RGGI region and the rest of the country. Nonetheless, RGGI states are faring better than the rest of the country on electricity price trends. As shown in Figure 1, while RGGI's electricity prices remain lower than they were in 2008, the rest of the country<sup>2</sup> has experienced a 7.2% increase in retail electricity prices over the same period.

<sup>2</sup> The "rest of the country" excludes California, which, like the RGGI states, has implemented a cap-and-trade program to reduce CO<sub>2</sub> emissions.

Figure 1: Volume-Weighted Electricity Prices, 2008 to 2015 (Cents/kWh)



### 1.3 Health Impacts

The decline in carbon dioxide emissions from power plants in the RGGI region has been accompanied by reductions in hazardous pollutants that threaten public health. Emissions of sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), and mercury (Hg) are all down significantly since the program began. Both SO<sub>2</sub> and NO<sub>x</sub> can trigger asthma attacks and difficulty breathing, and NO<sub>x</sub> can increase the risk of developing infectious disease.<sup>v</sup> SO<sub>2</sub> and NO<sub>x</sub> also react in the air to form more dangerous pollutants, including ground level ozone — which increases susceptibility to respiratory illnesses like pneumonia and bronchitis — and particulate matter — which is breathed deep into the lungs and can cause or contribute to heart attacks, stroke, and increases the risk of premature death in infants, young children, and adults.<sup>vi</sup> Mercury deposited in waterways and accumulated in seafood has adverse neurological and reproductive impacts.<sup>vii</sup>

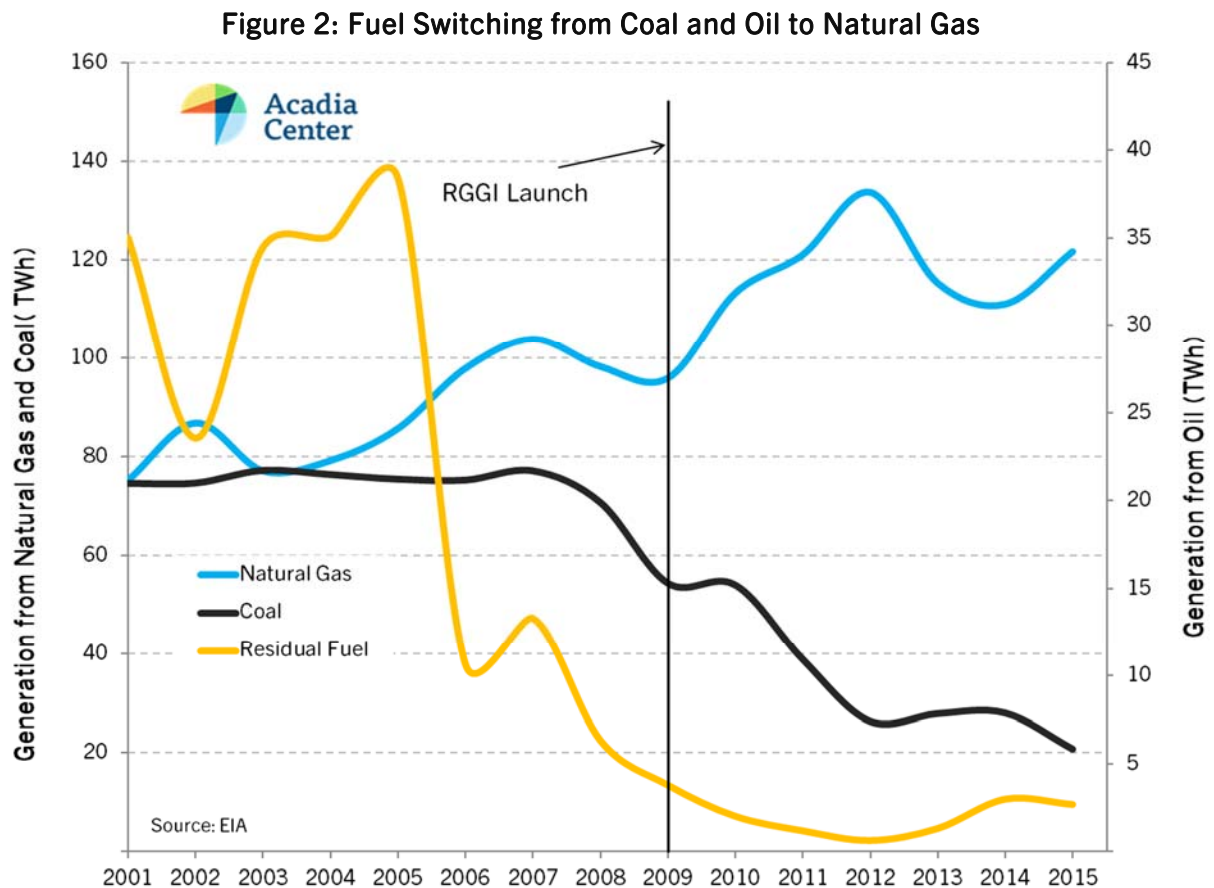
Reductions in hazardous emissions were driven by a combination of broader electric sector trends described in this report and regulations specific to hazardous pollutants, but RGGI has contributed to reducing hazardous emissions. Power plants that emit large quantities of pollutants like SO<sub>2</sub>, NO<sub>x</sub>, and mercury also emit large quantities of CO<sub>2</sub>. Requiring these plants to pay for CO<sub>2</sub> emissions makes dirtier plants less economically viable in comparison to cleaner generating sources. Thus, while market-based programs like RGGI allow for flexibility in achieving emission-reduction targets for CO<sub>2</sub>, they also support existing controls for hazardous pollutants. In Acadia Center's 2015 report we estimate that regional reductions in SO<sub>2</sub> and NO<sub>x</sub> since RGGI's launch accounted for over \$10 billion in health benefits.<sup>viii</sup>

## 2. Electric Sector Drivers

Electric sector carbon dioxide emissions are determined by two main factors: 1) the source of electricity and 2) how much electricity is consumed. In the RGGI, carbon-intensive coal and oil generation are being displaced by generation from natural gas and renewables, and energy efficiency investments are constraining consumption.

### 2.1 Fossil Generation

Electric generation from fossil fuels is increasingly shifting to lower-priced natural gas. The relative prices of natural gas, residual fuel (oil), and coal in the RGGI region determine which fuels are used to generate power. Since 2008, when RGGI took effect, generation has decreased dramatically from residual fuel (-58%) and coal (-71%), while natural gas generation increased (+24%). This fuel switching from coal and oil to natural gas has had a significant impact on emissions, as natural gas emits 44% less carbon than coal and 33% less carbon than fuel oil<sup>x</sup> and natural gas plants are more efficient.<sup>3</sup>



<sup>3</sup> Note that direct stack emissions from natural gas are much lower than stack emissions from coal and oil, but there is increasing concern about upstream GHG and other pollution from natural gas, which needs to be quantified and regulated.

During recent cold winters when building heating consumes the majority of the natural gas supply, some RGGI states — particularly in New England — have increased utilization of coal and oil. However, with emissions continuing to fall below the new cap, it appears that the temporary uptick in oil and coal generation in the winters of 2013/2014 and 2014/2015 is not increasing emissions significantly.<sup>4</sup>

### RGGI and Natural Gas

Concerns about overreliance on natural gas and about the environmental impacts of extracting, processing, and transporting natural gas have raised important questions about how RGGI interacts with other energy and environmental priorities. Due to their higher carbon-intensity, coal- and oil-fired power plants have to purchase more RGGI allowances than natural-gas-fired generators. However, gas generators still have to purchase allowances for emissions, creating a financial incentive to reduce natural gas combustion and benefitting non-emitting energy.

Furthermore, reinvesting revenue from the sale of emissions allowances in energy efficiency reduces direct consumption of natural gas in buildings and reduces power plant consumption of natural gas to generate electricity. Thermal efficiency programs funded by RGGI through 2013 saved 2.9 trillion BTU and are projected to save 49 trillion BTU over their (typically 10-year) measure lifetimes.<sup>vi</sup> Based on the latest data, if only half of these savings are from natural gas,<sup>5</sup> this would translate into approximately 1.45 million cubic feet (MMcf) of avoided natural gas demand through 2012, and 24.4 MMcf in lifetime savings. Electric efficiency programs avoid demand for electricity and the need to burn natural gas at power plants. With natural gas used to generate 44% of electricity in the RGGI region in 2012 (EIA), electricity savings of 928,000 MWh<sup>vi</sup> avoided the combustion of an additional 409 MMcf of natural gas at power plants. Over their lifetimes these electric efficiency investments will avoid the consumption of an additional 3,750 MMcf of natural gas.<sup>x</sup>

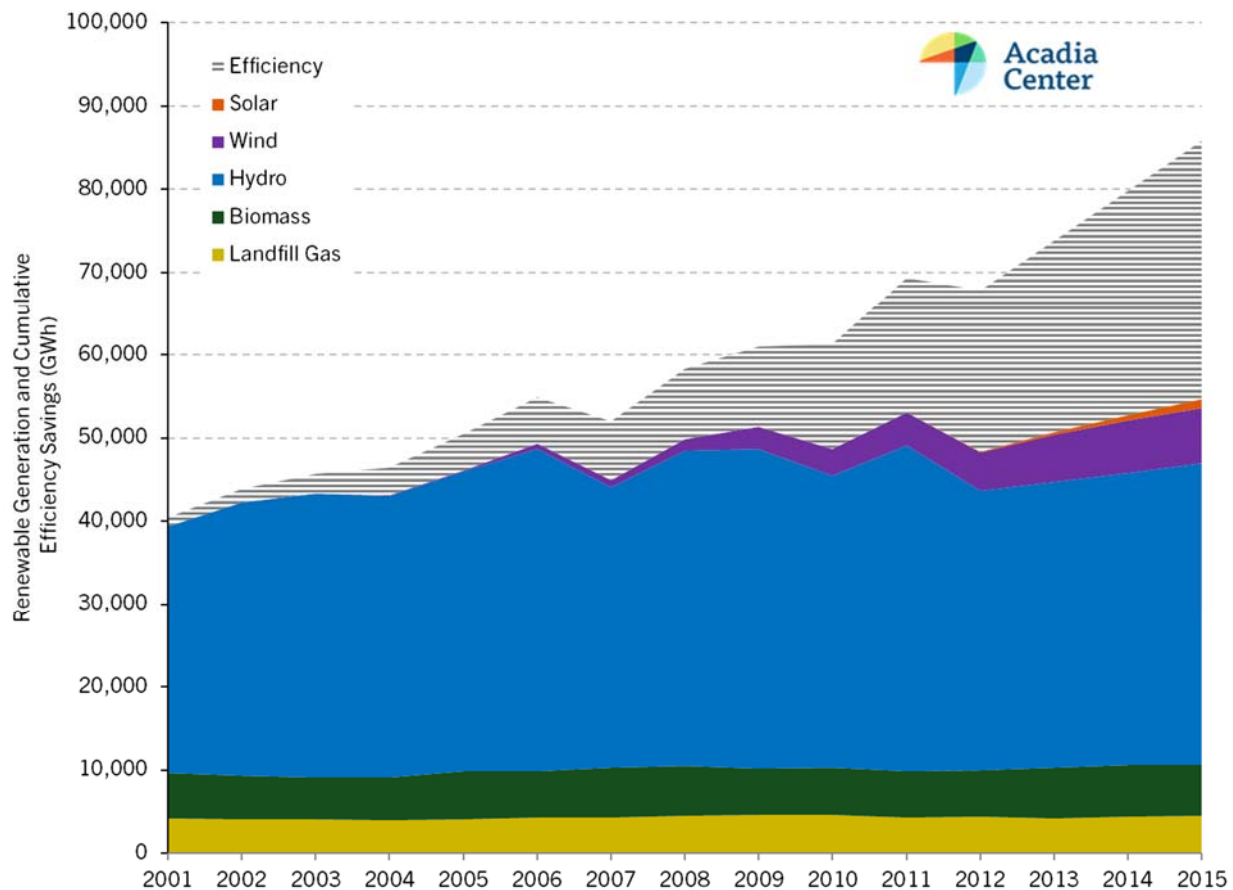
## 2.2 Energy Efficiency and Non-Emitting Generation

Energy efficiency programs are reducing demand for electricity across the region, while electricity is increasingly being supplied by non-emitting energy sources. State data shows that energy efficiency programs in RGGI states have saved a cumulative total of 22,684 GWh of electricity since RGGI launched.<sup>xi</sup> During the same period renewable energy generation — led by hydroelectricity, as well as landfill gas, biomass, and wind — has increased by 4,822 GWh in RGGI states, according to EIA.

<sup>4</sup> Additional natural gas pipeline capacity (the Algonquin Incremental Market expansion) will deliver 345 million cubic feet of natural gas into New England in 2016, and increasing investment in demand side solutions (natural gas and electric energy efficiency, demand-response, combined heat and power) and additional electric imports are likely to alleviate problems caused by overreliance on natural gas, and reduce the need for oil and coal generation during winter peaks.

<sup>5</sup> Division of thermal savings between natural gas and other fuels not available, but efficiency programs in a number of RGGI states are fuel-blind, or mingle use of revenue.

Figure 3: Increasing Role of Energy Efficiency and Renewable Generation



Both energy efficiency and non-emitting generation are projected to continue increasing in the years ahead. In the nine RGGI states, budgets for electric efficiency programs grew from \$575 million in 2008 to \$1.9 billion in 2015, an increase of 230%.<sup>xiii</sup> Escalating annual electricity savings requirements in eight of the nine RGGI states will require increasing investments in future years.<sup>xiii</sup> Renewable generation is also projected to continue increasing nationwide according to EIA,<sup>xiv</sup> and all nine RGGI states have Renewable Portfolio Standards that require electric utilities to procure increasing quantities of renewable electricity.<sup>xv</sup>

It is worth noting that with the exception of steady, incremental growth in wind capacity and modest natural gas additions, the decline in electric sector emissions has occurred without the addition of significant new capacity or capital expenditures. This low-cost transition to lower regional emissions indicates that reducing emissions can be far more cost-effective than commonly assumed.

Going forward, many of the RGGI states are increasing commitments to clean energy. Connecticut, Rhode Island, and Massachusetts are procuring significant quantities of hydroelectricity and renewable energy through a joint procurement,<sup>xvi</sup> and soon-to-be-enacted legislation in Massachusetts will require additional procurements of hydroelectricity, offshore wind, and other renewables equivalent to approximately 15%-20% of New England's electric consumption.<sup>xvii</sup> New York has committed to a 50% renewable energy supply by 2030, and Rhode Island recently adopted a 40% renewable energy requirement by 2035.<sup>xviii</sup>



### 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<sub>2</sub>), 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<sup>xix</sup>) 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.<sup>xx</sup> These savings create over \$2.76 billion in net economic gains and 28,500 job-years of employment.<sup>6</sup>

#### 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<sup>xxi</sup>).

Over the same period, emissions in the RGGI region dropped by 30% versus 14% in other states.<sup>7</sup>

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

	Economic Growth	CO <sub>2</sub> Emissions
RGGI States	+24.9%	-30%
Rest of the Country	+21.3%	-14%
RGGI vs. Others	<b>+3.6%</b>	<b>-16%</b>

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.

<sup>6</sup> 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.

<sup>7</sup> 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<sub>2</sub> emissions in 2008 were 139 million tons, while the initial cap for the nine currently participating states<sup>8</sup> 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.<sup>9</sup> 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.<sup>xxii</sup> This large bank suppressed allowance prices and removed the prospect of market scarcity.

### 4.2 Price Controls

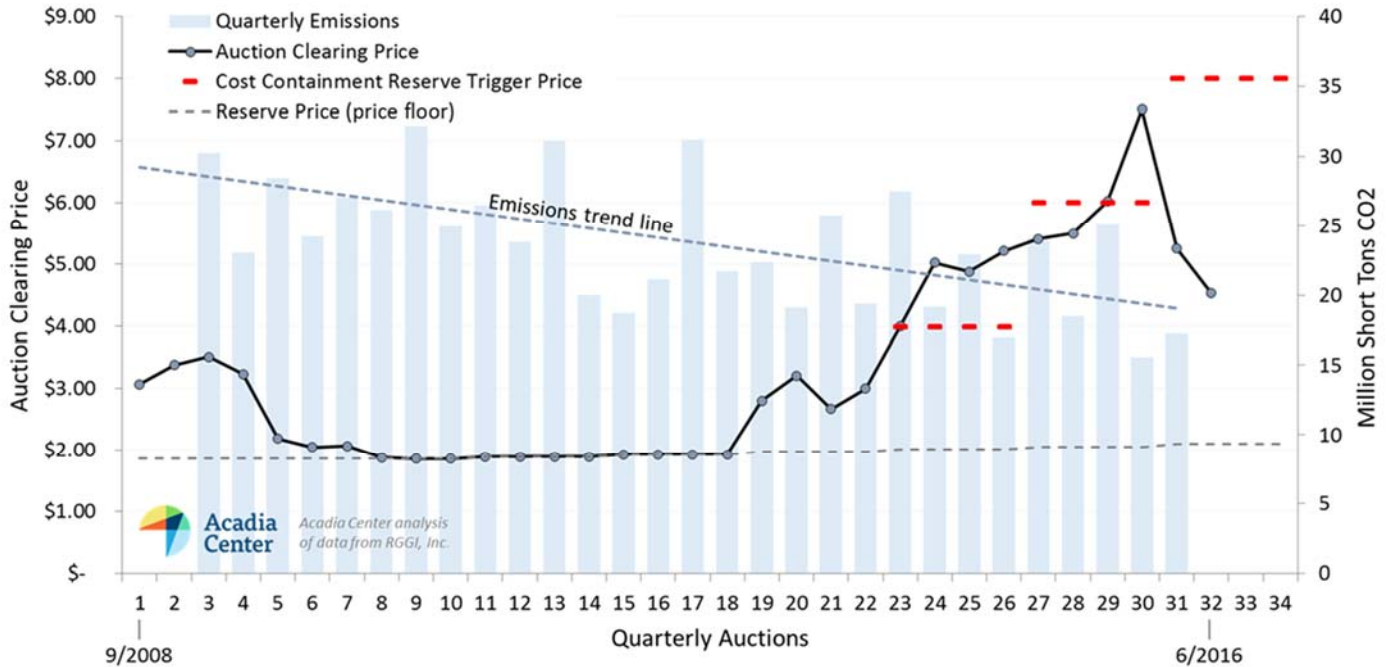
RGGI currently employs price controls to contain allowance prices within predetermined ranges. The price floor (dashed gray line in Figure 9) represents the minimum price at which allowances can be sold at auctions; beginning at \$1.86 in 2009 and rising gradually to \$2.10 in 2016. Under the oversupplied 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.<sup>xxiii</sup>

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 9). 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,<sup>xxiv</sup> undermining the CCR's stated purpose.

<sup>8</sup> New Jersey participated in RGGI from 2009 to 2011 but is excluded from this analysis.

<sup>9</sup> 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](https://sites.nicholasinstitute.duke.edu/environmentaleconomics/files/2014/05/RGGI_final.pdf)

Figure 4: 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.<sup>10</sup> 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.<sup>11</sup>

<sup>10</sup> 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](https://www.rggi.org/docs/Market/MM_2013_Annual_Report.pdf)

<sup>11</sup> 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<sub>2</sub>)

	2014	2015	2016	2017	2018	2019	2020	Total
<b>RGGI Cap</b>	91	88.7	86.5	84.3	82.2	80.2	78.2	591.2
<b>RGGI Adjusted Cap</b>	82.8	66.8	64.6	62.5	60.3	58.3	56.3	451.6
<b>Adjustment</b>	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 9, 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%.<sup>xxv</sup> 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<sub>2</sub> 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

- <sup>i</sup> 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](https://rggi-coats.org/eats/rggi/index.cfm?fuseaction=search.rggi_summary_report_input&clearfuseattribs=true)
- <sup>ii</sup> Cap levels and emissions from RGGI, Inc., at: <http://rggi.org/>
- <sup>iii</sup> 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.
- <sup>iv</sup> 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.
- <sup>v</sup> *American Lung Association Energy Policy Development: Electricity Generation Background Document*, 2011, <http://www.lung.org/healthy-air/outdoor/resources/electricity-generation.pdf>
- <sup>vi</sup> Id.
- <sup>vii</sup> 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>
- <sup>viii</sup> 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](http://acadiacenter.org/wp-content/uploads/2015/07/Appendix_Monetized-Benefits-of-Avoided-Emissions.pdf)
- <sup>ix</sup> Carbon emissions factors for natural gas (117.0 lbs CO<sub>2</sub>/MMBtu), residual fuel oil (173.7 lbs CO<sub>2</sub>/MMBtu) and coal (210.0 lbs CO<sub>2</sub>/MMBtu) from EIA: [www.eia.doe.gov/oiaf/1605/excel/Fuel%20Emission%20Factors.xls](http://www.eia.doe.gov/oiaf/1605/excel/Fuel%20Emission%20Factors.xls)
- <sup>x</sup> 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>).
- <sup>xi</sup> 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.
- <sup>xii</sup> 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](https://library.cee1.org/sites/default/files/library/12670/CEE_2015_AIR_Tables_March_2015.pdf)
- <sup>xiii</sup> See American Council for an Energy Efficient Economy (ACEEE) for information on state efficiency programs: <http://aceee.org/sector/state-policy>
- <sup>xiv</sup> EIA, 2014, *Annual Energy Outlook 2014: Early Release Overview*, Available at: <http://www.eia.gov/forecasts/aco/>
- <sup>xv</sup> 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](http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm)
- <sup>xvi</sup> 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.
- <sup>xvii</sup> 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 31<sup>st</sup>.
- <sup>xviii</sup> See: [http://www.rilin.state.nh.us/pressrelease/layouts/RIL\\_PressRelease.ListStructure/Forms/DisplayForm.aspx?List=c8baae31-3c10-431c-8dcd-9d8bbe21ce3e9&ID=12090&Web=2bab1515-0dce-4176-a2f8-8d4beebdf488](http://www.rilin.state.nh.us/pressrelease/layouts/RIL_PressRelease.ListStructure/Forms/DisplayForm.aspx?List=c8baae31-3c10-431c-8dcd-9d8bbe21ce3e9&ID=12090&Web=2bab1515-0dce-4176-a2f8-8d4beebdf488)
- <sup>xix</sup> 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](http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_july_2015.pdf)
- <sup>xx</sup> Id.
- <sup>xxi</sup> 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>
- <sup>xxii</sup> Potomac Economics, *Annual Report on the Market for RGGI CO<sub>2</sub> Allowances: 2013*, available at: [https://www.rrgi.org/docs/Market/MM\\_2013\\_Annual\\_Report.pdf](https://www.rrgi.org/docs/Market/MM_2013_Annual_Report.pdf)
- <sup>xxiii</sup> For more information on RGGI auction results, see: [http://www.rrgi.org/market/co2\\_auctions/results](http://www.rrgi.org/market/co2_auctions/results)
- <sup>xxiv</sup> Comments of Judith Schröter, Lead Analyst US Carbon & Offset Markets, ICIS, at April 29<sup>th</sup> learning session put on by the Collaborative for RGGI Progress.
- <sup>xxv</sup> [http://www.rrgi.org/market/co2\\_auctions/results](http://www.rrgi.org/market/co2_auctions/results)