



# Regional Greenhouse Gas Initiative

## *A Successful Carbon Pricing Program*

### Overview

The Regional Greenhouse Gas Initiative (RGGI) is the first mandatory greenhouse gas (GHG) emissions cap-and-trade system in North America. The program has been in place since 2009 and regulates fossil fuel-powered electric generating plants in nine Northeast and mid-Atlantic states.<sup>i</sup> The RGGI region had a combined Gross Domestic Product (GDP) of approximately \$2.6 trillion in 2012—four times that of Ontario and almost 50% more than the entire Canadian economy in the same year.<sup>i</sup>

RGGI is a market-based approach that requires fossil fuel-fired electric power generators with a capacity of 25 MW or greater to purchase pollution permits (called ‘allowances’) from a supply that declines over time. At the end of each three-year compliance period regulated entities must have allowances equivalent to each ton of carbon dioxide (CO<sub>2</sub>) emitted. Allowances are auctioned instead of provided to polluters for free, and revenue collected is re-invested in programs that benefit consumers. Power generators that reduce emissions purchase fewer allowances, thus reducing allowance prices and consumer costs.

After five plus years of successful operation, RGGI has demonstrated the viability of a carbon pricing program to reduce CO<sub>2</sub> emissions and other dangerous pollutants while generating economic benefits and broad support in the participating jurisdictions.<sup>ii</sup>

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<sup>i</sup> Participating RGGI states include: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. New Jersey stopped participating in RGGI after 2011, but the withdrawal has been overturned in court and New Jersey may rejoin the program. Ontario, Québec, New Brunswick, and Pennsylvania are observers to the RGGI program.

## Key Results & Trends

1. **Significant Emissions Reductions**—CO<sub>2</sub> emissions in the RGGI region were capped at 2009 levels from 2009-2014 and then set to decline by 2.5% per year to 10% below 2009 levels by 2019. Fuel switching, improved energy efficiency and growing renewable energy output have caused emissions to drop by 18% since RGGI was launched, demonstrating that emissions can be reduced faster than originally assumed.<sup>iii</sup> The RGGI program was reviewed in 2012 and the cap has been reset as of 2014—from 165 million tons to 91 million tons—to reflect actual emissions levels, but already emissions in 2013 were 4.9% lower than the new, more stringent cap (see Figure 1 on pg. 5).
  2. **Decoupling of Emissions & Economic Growth**—As the regional economy has become less energy-intensive and efficiency investment have increased, the relationship between economic growth and emissions has been broken. Emissions in RGGI states have declined faster than in other states, even as economic growth in the region has outpaced growth in non-RGGI states. In fact, emissions in the region dropped 2.7 times faster than the rest of the country since RGGI was established, even as RGGI states' economies have grown 2.5 times faster than other states.<sup>iv</sup>
  3. **Declining Electricity Prices**—Contrary to expectations, electricity prices have declined since RGGI took effect. Comparing average retail electricity prices from 2008 (before RGGI's launch) to 2013 shows that prices dropped by 2% to 14% in states other than Vermont,<sup>2</sup> and prices have dropped by 8% on average across the region.<sup>v</sup> During the same 2008-2013 period electricity prices in non-RGGI states increased by 6%.<sup>vi</sup>
  4. **Spurring Economic Growth**—RGGI has generated significant economic benefits for participating states. By selling allowances, RGGI states raise revenue that is reinvested in energy efficiency, renewable energy, and other consumer benefit programs. The majority of program revenue (65% though 2012<sup>vii</sup>) has been invested in energy efficiency programs that reduce demand for energy, generate direct benefits for participating consumers, and reduce the overall cost of the cap-and-trade program. Depending on the state, the clean energy programs take the form of grants to low-income and other consumers, businesses, and communities; revolving loan funds; investment in research and development; etc.
- RGGI has also generated economy-wide benefits by creating local clean energy jobs, reducing expenditures on imported fossil fuels, boosting consumer spending on goods and services, and improving the competitiveness of industry through efficiency improvements. As of July 2014, the states have raised \$1.75 billion in revenue, which has been reinvested in energy efficiency and other programs that will add over \$2.4 billion in net value and generate 23,000 job-years of employment over 10 years.<sup>viii</sup> The recent strengthening of RGGI's cap is projected to bring states an additional \$4 billion in revenue, \$8.7 billion in economic growth, and 132,000 job years of employment.<sup>ix</sup>
5. **Improving Public Health**—The decline in CO<sub>2</sub> emissions from power plants in the RGGI region has been accompanied by an even more significant decline in hazardous pollutants that threaten public health. Emissions of sulfur dioxide (SO<sub>2</sub>), nitrogen oxide (NO<sub>x</sub>), and mercury (Hg) are all down significantly, and will drop even more under the new RGGI cap. In monetary terms, the reduction in hazardous emissions from 2009 to 2013 translates into \$10.4 billion in health care savings for SO<sub>2</sub> and NO<sub>x</sub> alone, and further reductions in hazardous emissions under the new RGGI cap will lead to an additional \$1.6 billion in health-related savings through 2020.<sup>x</sup>

<sup>2</sup> VT buys more of its power through long-term contracts than other states in the region, which has stabilized prices, but means that VT is insulated from wholesale price trends, which have recently decreased power prices in the region.

## Industry & Community Beneficiaries

By establishing a price on carbon and collecting revenue from polluters through quarterly regional CO<sub>2</sub> allowance auctions administered by RGGI, Inc. and monitored by a third party, states have been able to re-invest in households, local industry, and communities, which is one of the key reasons the program continues to enjoy broad support.<sup>3</sup> The following examples profile only a few of the many companies and institutions that have directly benefited from the RGGI program.

### New England Clean Energy Council (NECEC)

NECEC is a regional non-profit organization representing clean energy companies and entrepreneurs throughout New England and the Northeast U.S. through programs and initiatives that help clean energy businesses at all stages of development to access the resources they need to grow.<sup>i</sup>

The NECEC is the lead voice for hundreds of clean energy companies across New England, influencing the energy policy agenda and growing the clean energy economy. The NECEC Institute leads programs across the Northeast that support Innovation and Entrepreneurship, Cluster and Economic Development, and Workforce Development.

NECEC's combined mission is to accelerate the region's clean energy economy to global leadership by building an active community of stakeholders and a world-class cluster of clean energy companies.

In Massachusetts alone there were approximately 5,550 clean energy firms and 80,000 clean energy workers in 2013. The employment growth rate in the clean energy industry from 2012 to 2013 was 11.8%.<sup>ii</sup>

The NECEC has consistently supported the RGGI program; seeing it as a means of establishing regulatory certainty and key tool for advancing the clean energy economy in the region.

<sup>i</sup> <http://www.cleanenergycouncil.org/>

<sup>ii</sup> <http://www.masscec.com/>

“ Programs like RGGI present strong evidence that aggressive actions on climate and clean energy can result in significant economic growth, job creation, cleaner energy deployed in the region, and an improved environment. ”

~Peter Rothstein, NECEC President

<sup>3</sup>For example, during the 2012 Program Review approximately 250 businesses and community groups signed a joint letter encouraging states to support and strengthening the RGGI program ([www.rggi.org/docs/ProgramReview/SC122011\\_Joint-Business-Program-Reform.pdf](http://www.rggi.org/docs/ProgramReview/SC122011_Joint-Business-Program-Reform.pdf)). During the same process electric companies and environmental NGOs came together to support RGGI and provide joint comments on how to constructively move the Program Review forward ([http://www.rggi.org/docs/Joint\\_Modeling\\_Comments.pdf](http://www.rggi.org/docs/Joint_Modeling_Comments.pdf)).

## Madison Paper Industries

Madison Paper is a papermaking company that employs 220 people in Maine. The company received two RGGI-funded grants from Efficiency Maine Trust's Large Project Fund totalling over \$1 million, which allowed it to complete two major energy savings projects.<sup>i</sup>

The first project a white water heat recovery system reduces the steam required in its papermaking process, saving approximately 538,800 gallons of No. 6 fuel oil and \$911,100 per year. The second project new pressurized grinding stones reduces the energy needed in the wood grinding process, saving 18.5 million kWh and \$1.4 million per year.

To complete these energy savings upgrades Madison Paper hired numerous local contractors, and with the over \$2 million in projected annual savings the company has retained full-time jobs at the mill and will continue to support other jobs and economic growth in the state.

<sup>i</sup> <http://www.nrcm.org/documents/MadisonPaperCaseStudy.pdf>

<sup>ii</sup> Ibid.

“With the assistance from RGGI-funded grants we have been able to pursue these energy-savings projects in the current difficult business climate.”

~Joe Clark, Reliability Engineer

## Massachusetts Green Communities Program

The Massachusetts Department of Energy Resources' Green Communities Division helps municipalities maximize energy efficiency in public buildings and generate clean energy from renewable sources. Since 2010, it has awarded more than \$33 million to cities and towns from the sale of RGGI allowances.<sup>i</sup>

These grants support projects in schools, municipal buildings, and municipal light plants, and include LED lighting upgrades, town hall and fire station weatherization, and installation of more efficient boilers. These projects and grants to fund energy managers in designated Green Communities and other municipalities are reducing energy bills and greenhouse gas emissions.

“Green Communities grants help Massachusetts cities and towns invest in projects that cut municipal energy use. Supporting local clean energy projects that move us toward energy independence while locking in long-term savings for local taxpayers and reducing greenhouse gas emissions is a great use of RGGI auction proceeds.”

~DOER Acting Commissioner Lusardi

<sup>i</sup> See <http://www.mass.gov/eea/pr-2014/patrick-administration-awards-green-communities-grants.html>; and <http://www.mass.gov/eea/docs/doer/green-communities/grant-program/map-summary-green-communities.pdf>



## Foss Manufacturing Company

The Foss Manufacturing Company of Hampton, New Hampshire received \$750,000 in RGGI revenue from the NH Business Finance Authority's (BFA) Business Energy Conservation Revolving Loan Fund (RLF).

Manufacturing of non-woven fabrics is powered by on-site generation, making the company ineligible for utility energy efficiency incentives. The loan helped finance upgrades to motors, lighting, and other measures that are projected to save \$750,000 annually, allowing for quick repayment to the BFA--which will repurpose funds to assist other companies--and ongoing savings for Foss, which has hired 200 workers since closing the loan.

New Hampshire's RLF (approximately \$5 million lent to date<sup>ii</sup>) is funded exclusively through RGGI allowance auction proceeds. In addition to Foss Manufacturing, the program has supported: Canam Steel Corporation, Shelburne Plastics, Warwick Mills, Vitex (an aluminum extruder), Ragged Mountain Resort, Smuttynose Brewing, and the Androscoggin Valley Hospital.<sup>iii</sup>

<sup>i</sup> [www.rggi.org/docs/Documents/2011-Investment-Report.pdf](http://www.rggi.org/docs/Documents/2011-Investment-Report.pdf)

<sup>ii</sup> [www.puc.nh.gov/Sustainable%20Energy/GHGERF/2010GrantAwards/BFA%202013%20Q1%20Report.pdf](http://www.puc.nh.gov/Sustainable%20Energy/GHGERF/2010GrantAwards/BFA%202013%20Q1%20Report.pdf)

<sup>iii</sup> [www.analysisgroup.com/uploadedFiles/Publishing/Articles/Economic\\_Impact\\_RGGI\\_Appendix.pdf](http://www.analysisgroup.com/uploadedFiles/Publishing/Articles/Economic_Impact_RGGI_Appendix.pdf)

“ In just two months, we saw a \$40,000 reduction in our energy bill, and we expect the investment to save an average of \$750,000 over three years. The savings have given us the opportunity to invest in our employees and grow our company.<sup>i</sup> ”

~AJ Nassar, CEO of Foss Manufacturing

## Maine Wild Blueberry Company

The Maine Wild Blueberry Company was the recipient of a \$300,000 grant from Efficiency Maine's Large Project Fund, which was funded exclusively using RGGI allowance proceeds.

A significant amount of energy is used in the company's facility to freeze, store, and defrost the blueberries. The grant was used to partially fund a \$900,000 project to upgrade the refrigeration equipment from multiple Freon-based units to a single ammonia system.

The Maine Wild Blueberries Company's electricity bills prior to receiving the RGGI-funded grant were approximately \$268,000 per year.<sup>i</sup> Efficiency Maine estimates that the company will pay approximately

\$97,000 per year as a result of energy efficiency upgrades. This translates into annual savings of \$171,000 and a project payback period of 3.5 years.

<sup>i</sup> <http://www.efficiencymaine.com/docs/Maine-Wild-Blueberry-Company.pdf>

<sup>ii</sup> *ibid.*

“ While our new equipment generates good energy savings, Efficiency Maine's incentive was a 'make-or-break' factor in our payback calculation, and our decision to make this new investment in Washington County.<sup>ii</sup> ”

~Joe Comeau, Engineer

## Solar Liberty

Solar Liberty of New York state was founded in 2003 and was recognized by Inc. magazine as one of the fastest growing private companies in 2008 (92 in the country and 5th among energy companies). It is currently one of the largest solar installers in N.Y.<sup>i</sup>

In 2010, Solar Liberty installed 126 solar photovoltaic (PV) panels on the gymnasium roof of the Cayuga Community College in Auburn, N.Y. The system is expected to generate 26,844 kWh of electricity per year and reduce CO2 emissions by 280 tons over 25 years. Annual electric bill savings are approximately \$3,600. RGGI proceeds were used to fund half of the total program costs.<sup>ii</sup>

Carbon pricing and the proceeds from the sale of RGGI allowances are driving demand for clean energy projects like the installation at Cayuga Community College, which in turn supports the clean tech sector and local companies like Solar Liberty.

As of March 2014, \$45.5 million (of the \$625 million collected in NY) in RGGI funds have been used to install 128 solar PV systems under NYSEERDA's solar PV programs, and 1,588 solar PV systems under the Long Island Power Authority's Solar Pioneer and Solar Entrepreneur programs.<sup>iii</sup> These systems are

expected to generate over 16,000 MWh per year, and help companies like Solar Liberty expand the clean energy sector in New York.

“ RGGI funds, as part of the NYSEERDA/ NY-Sun program, have been pivotal in moving the PV sector forward in New York State. New York is a leading state for solar jobs, and is only improving. Solar Liberty is proud to have played a major role in this growth with over 1,000 installations across New York State and continued job growth for over 10 years. ”

~Adam Rizzo, President

<sup>i</sup> <http://www.solarliberty.com/>

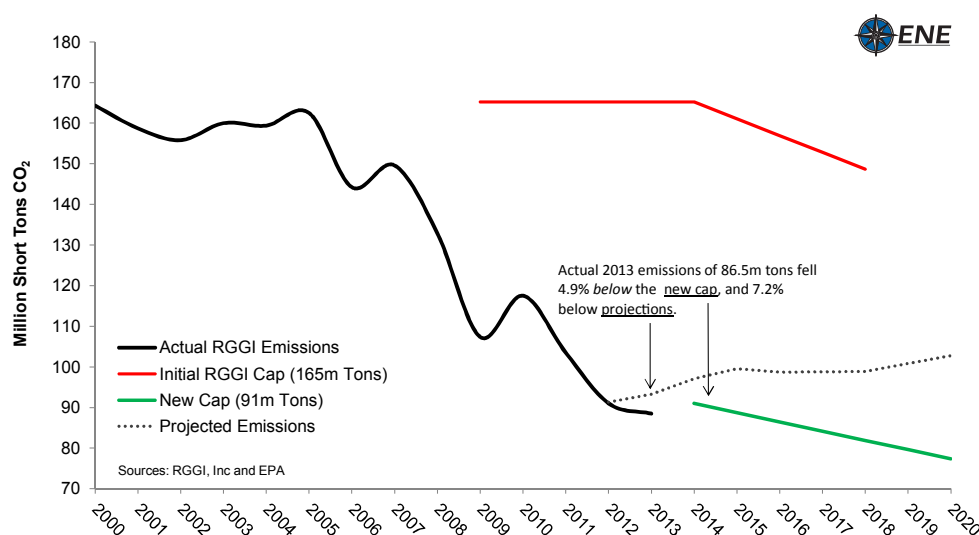
<sup>ii</sup> [http://www.analysisgroup.com/uploadedFiles/Publishing/Articles/Economic\\_Impact\\_RGGI\\_Appendix.pdf](http://www.analysisgroup.com/uploadedFiles/Publishing/Articles/Economic_Impact_RGGI_Appendix.pdf)

<sup>iii</sup> New York's RGGI-Funded Programs Status Report, Quarter Ending March 31, 2014; <http://www.nyserda.ny.gov/Energy-and-the-Environment/Regional-Greenhouse-Gas-Initiative/Evaluations-of-Funds.aspx>

# Going Forward

1. **RGGI Program Review**—The RGGI Memorandum of Understanding requires the states to conduct a joint review of the RGGI program on a periodic basis. The 2012 Program Review resulted in significant updates, most importantly a reduction in the regional emissions cap to reflect the significant and structural decline in emissions since the initial cap was established. At the conclusion of the Program Review states agreed to reduce the regional emissions cap from 165 million tons to 91 million tons, ensuring that the program will continue to drive reduction in carbon pollution (see Figure 1). The next Program Review will occur in 2016. The requirement to review performance and ability to make adjustment based on the most up-to-date information has proven to be a key program design element. The RGGI cap reduction and other changes took effect in 2014.

**Figure 1: Actual Regional CO<sub>2</sub> Emissions Compared to the Initial and Adjusted RGGI Cap**



2. **EPA Regulations**—On June 2nd, 2014 the US Environmental Protection Agency (EPA) released draft regulations that will require all fifty states to implement GHG reduction programs for existing power plants by the end of the decade. Legal experts believe that the inherent flexibility under 111(d) of the Clean Air Act (under which EPA would regulate) and EPA's historic deference to effective state-proposed solutions will allow RGGI to serve as a means of complying with federal requirements.<sup>xi</sup> Modest revisions to RGGI may be required to make RGGI's targets match EPA requirements, but no fundamental changes will be required.<sup>4</sup>
3. **Linking Programs**—As states develop plans to comply with new EPA carbon regulations, cap and trade presents an attractive model that is flexible, administratively-straightforward, and capable of reducing emissions at lowest cost. Other states could build on RGGI's successful model by establishing their own state or regional markets or join the RGGI program, which some states are already considering. Provinces may also look to RGGI to expand their carbon markets. Ontario, Québec, and New Brunswick are official observers to the RGGI program, and recently Québec has signaled an interest in sharing information and potentially linking its cap-and-trade program with RGGI. While RGGI is currently an electric sector-only program, this should not be a barrier to linking with jurisdictions that implement economy-wide cap-and-trade programs.

<sup>4</sup> ENE believes that modest revisions to RGGI's structure may be required in order for EPA to determine that the program will deliver intended emissions reductions in the near and long term. Specifically, RGGI's cap will have to be extended from 2020 to 2030, and the allowance reserve and cap decline mechanisms may require revisions. The legal viability of offsets is not yet clear. For more information see: [http://www.env-ne.org/public/resources/ENE\\_RGGI-EPA\\_Clean\\_Power\\_Plan\\_06262014\\_Final.pdf](http://www.env-ne.org/public/resources/ENE_RGGI-EPA_Clean_Power_Plan_06262014_Final.pdf)

## Endnotes

- <sup>i</sup> See GDP by state: [http://lwd.dol.state.nj.us/labor/lpa/industry/gsp/gsp\\_index.html](http://lwd.dol.state.nj.us/labor/lpa/industry/gsp/gsp_index.html); GDP for Canada and Ontario: <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ15-eng.htm>; exchange rate of 1.040 (IRS' 2012 avg.)
- <sup>ii</sup> For additional information on the RGGI program and the key trends and results to date see ENE's The Regional Greenhouse Gas Initiative: Performance To-Date and the Path Ahead, available at: [http://www.env-ne.org/public/resources/ENE\\_RGGI\\_Report\\_140523\\_Final3.pdf](http://www.env-ne.org/public/resources/ENE_RGGI_Report_140523_Final3.pdf)
- <sup>iii</sup> ENE 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>iv</sup> From 2008 (the year before RGGI took effect) to 2013, RGGI emissions dropped 32% and emissions in the electric sector in other states dropped by 12%. Over the same period RGGI states' economies grew by 4.8% compared to 1.9% in other states, based on economic indicators from the Federal Reserve Bank of Philadelphia (<http://www.philadelphiafed.org/research-and-data/regional-economy/indexes/coincident/>) weighted by gross state product ([http://www.bea.gov/newsreleases/regional/gdp\\_state/2013/xls/gsp0613.xls](http://www.bea.gov/newsreleases/regional/gdp_state/2013/xls/gsp0613.xls)).
- <sup>v</sup> Energy Information Administration (EIA) 826 Dataset, <http://www.eia.gov/electricity/data/eia826/>
- <sup>vi</sup> Ibid.
- <sup>vii</sup> RGGI, Inc., 2014, Regional Investment of RGGI CO2 Allowance Proceeds, 2012, available at: <http://rggi.org/docs/Documents/2012-Investment-Report.pdf>
- <sup>viii</sup> Calculation of economic benefits draws on economic multipliers from the IMPLAN model, inferred from the 2011 Analysis Group report The Economic Impacts of the Regional Greenhouse Gas Initiative on Ten Northeast and Mid-Atlantic States ([www.analysis-group.com/RGGI.aspx](http://www.analysis-group.com/RGGI.aspx)) and assumes spending of auction revenue according to existing state plans (catalogued in ENE Auction Tracker, at: [www.env-ne.org/resources/detail/rggi-auction-tracker](http://www.env-ne.org/resources/detail/rggi-auction-tracker)).
- <sup>ix</sup> Economic modeling of new RGGI cap by REMI, Inc., available at: [http://rggi.org/docs/ProgramReview/REMI%2091%20Cap%20Bank%20MR\\_2013\\_06\\_03.pdf](http://rggi.org/docs/ProgramReview/REMI%2091%20Cap%20Bank%20MR_2013_06_03.pdf)
- <sup>x</sup> The monetized health benefits of avoided SO<sub>2</sub> and NO<sub>x</sub> emissions were approximated using EPA's sector-based benefit per ton estimates of PM2.5 precursors. SO<sub>2</sub> and NO<sub>x</sub> emissions reductions data to-date (2009-2013) are from EPA's Clean Air Markets Division (<http://www.epa.gov/airmarket/emissions/>). Projected emissions reductions (2014-2020) are from IPM Electricity Sector Modeling Results prepared by ICF International for RGGI, Inc. ([http://rggi.org/docs/ProgramReview/February11/Results\\_91\\_Cap\\_Alt\\_Bank\\_MR.xls](http://rggi.org/docs/ProgramReview/February11/Results_91_Cap_Alt_Bank_MR.xls)). Emissions data covers RGGI regulated units for the nine states currently in RGGI. Approximate monetized health benefits were calculated by multiplying the to-date and projected emissions reductions by sector-based PM2.5-related benefit per ton (BPT) estimates. The EPA provides several reduced-form tools for calculating PM2.5-related health benefits, including updated versions of the BPT tables (<http://www.epa.gov/airquality/benmap/sabpt.html>) published in Characterizing the PM2.5-related health benefits of emission reductions for 17 industrial, area and mobile emission sectors across the U.S. (Fann, Baker and Fulcher, 2012) (<http://www.sciencedirect.com/science/article/pii/S0160412012001985>). The methodology is detailed in the Technical Support Document, Estimating the Benefit per Ton of Reducing PM2.5 Precursors from 17 Sectors ([http://www.epa.gov/airquality/benmap/models/Source\\_Apportionment\\_BPT\\_TSD\\_1\\_31\\_13.pdf](http://www.epa.gov/airquality/benmap/models/Source_Apportionment_BPT_TSD_1_31_13.pdf)). Fann, Baker and Fulcher (2012) assess the incidence of PM2.5-related deaths and illnesses, including non-fatal heart attacks, hospital admissions, emergency department visits, respiratory symptoms, cases of acute bronchitis, cases of aggravated asthma, and lost work days. For this analysis, we used the 2016 BPT estimates for SO<sub>2</sub> and NO<sub>x</sub> for Electricity Generating Units. These values are national estimates in 2010 dollars, which were adjusted to 2013 dollars. The sector-based BPT estimates are based on the Krewski et al. (2009) PM2.5 mortality risk estimate and reflect a 3% discount rate. The 2016 estimates use emissions, population and income growth projections for 2016, and use baseline mortality incidence rate projections for 2015 (best available data). The resulting health benefits offer a simplified quantification of the avoided health impacts of SO<sub>2</sub> and NO<sub>x</sub> emissions, but should not be interpreted as a substitute for more detailed, comprehensive analyses of the per-ton benefits of reducing SO<sub>2</sub> and NO<sub>x</sub> emissions in the RGGI region. For more on the limitations of this simplified approach, see Economic value of U.S. fossil fuel electricity health impacts (Machol and Rizk, 2013) (<http://www.sciencedirect.com/science/article/pii/S0160412012000542>).
- <sup>xi</sup> Section 111(d) of the Clean Air Act allows sufficient flexibility for states to utilize programs like RGGI (see Litz et. al. What's Ahead for Power Plants and Industry? Using the Clean Air Act to Reduce Greenhouse Gas Emissions, Building on Existing Regional Programs, available at: [http://pdf.wri.org/working\\_papers/whats\\_ahed\\_for\\_power\\_plants\\_and\\_industry.pdf](http://pdf.wri.org/working_papers/whats_ahed_for_power_plants_and_industry.pdf); and Wannier et. al. Prevailing Academic View on Compliance Flexibility under § 111 of the Clean Air Act, available at: <http://www.rff.org/RFF/Documents/RFF-DP-11-29.pdf>).



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