TECHNICAL SUPPORT DOCUMENT

FOR

AMENDMENTS TO COMAR 26.09

MD CO_2 Budget Trading Program

OCTOBER 17, 2018

PREPARED BY:

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Table of Contents

Appendices A-D for this document follow as separate documents.

Appendix A – Stakeholder Meetings
https://www.rggi.org/program-overview-and-design/stakeholder-comments

Appendix B – IPM Modeling Analysis
https://www.rggi.org/sites/default/files/Uploads/Program-Review/9-25-2017/Draft_IPM_Model_Rule_Results_Overview_09_25_17.pdf

Appendix C – REMI Modeling
https://www.rggi.org/sites/default/files/Uploads/Program-Review/12-19-2017/REMI_2017_12_19.pdf

Appendix D – Bill Impact Analysis
https://www.rggi.org/sites/default/files/Uploads/Program-Review/9-25-2017/Customer_Bills_Results_Overview_09_25_17.pdf

I. INTRODUCTION

The purpose of this action is to amend regulations under Code of Maryland Regulations (COMAR) 26.09, Maryland CO_2 Budget Trading Program, with program improvements developed in conjunction with other participating states during the 2016 Comprehensive Regional Greenhouse Gas Initiative (RGGI) Program Review.

The Regional Greenhouse Gas Initiative

The Maryland Healthy Air Act was signed into law on April 6, 2006 and required Maryland to join the Regional Greenhouse Gas Initiative (RGGI) by July 2007. The Department subsequently adopted COMAR 26.09.01 to .03, implementing the "Maryland CO_2 Budget Trading Program", which became effective on July 17, 2008. COMAR 26.09.04 ("Auctions") became effective as a permanent regulation on August 25, 2008.

RGGI is comprised of nine states in the Northeast and Mid-Atlantic regions. These states adopted market-based carbon dioxide (CO_2) cap and trade programs designed to reduce emissions of CO_2, a greenhouse gas, from fossil fuel-fired electricity generators with a nameplate capacity of 25 megawatts or greater. RGGI currently is comprised of Connecticut, Delaware, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, and Maryland. New Jersey discontinued participation after the end of the first compliance period, 2009-2011. Participating RGGI states each require electricity generators to have acquired, through regional auction or secondary market transactions, one CO_2 allowance for every ton of CO_2 emitted over a three-year compliance period. Auction proceeds fund a number of state programs, including energy efficiency programs that result in lower CO_2 emissions through reduced electricity demand. Further, auction proceeds fund renewable energy projects which reduce the amount of CO_2 emissions generated by fossil-fueled electricity generators.

The RGGI program has several unique features unlike other cap and trade programs in the U.S. The allowances are controlled by the states and can be allocated or sold to sources. Most states have opted to auction the allowances to sources through quarterly auctions. Proceeds from the auctions are used to fund energy efficiency programs to reduce demand for electricity and provide a means to lower CO_2 emissions. The states conducted the first quarterly regional auction in September 2008, and the program officially began in January 2009.

RGGI originally set a cap of 188,076,976 tons of CO_2 emissions for the region, based on average 2000 to 2002 CO_2 emissions from eligible electricity generators subject to the program, and Maryland received 37,503,983 CO_2 allowances each year through 2013. After the 2012 Comprehensive RGGI Program Review, changes to the cap resulted in Maryland receiving 20,360,944 CO_2 allowances in 2014. Between 2015 and 2020, Maryland will annually receive 2.5 percent fewer CO_2 allowances as the RGGI cap reduces by 10 percent during that time. Maryland originally set aside 7,388,491 allowances in 4 different set aside accounts to account for special needs or programs, but this number and the number of set aside accounts was reduced through the 2016 Comprehensive Program Review.

Table 1. Maryland CO_2 Allowance Allocation By Year.

Year	Allowances

2018	18,671,045
2019	17,931,922
2020	17,483,623
2021	16,790,271
2022	16,281,475
2023	15,772,679
2024	15,263,882
2025	14,755,086
2026	14,246,290
2027	13,737,494
2028	13,228,698
2029	12,719,902
2030 and each succeeding calendar year	12,211,106

RGGI is composed of individual CO_2 Budget Trading Programs in each RGGI participating state. Each participating state's CO_2 Budget Trading Program is based on the 2008 RGGI Model Rule, which was developed to provide guidance to states as they implemented the RGGI program. RGGI participating states have completed a 2016 Comprehensive Program Review, which is a comprehensive evaluation of program successes, program impacts, the potential for additional reductions, imports and emissions leakage, and offsets.

Amendments to the Model Rule were developed by the RGGI state staff as part of the Program Review. This effort was supported by an extensive regional stakeholder process that engaged the regulated community, environmental non-profits, and other organizations with technical expertise in the design of cap-and-trade programs. Appendix A contains a list of stakeholder meetings regarding the 2016 Comprehensive Program Review.

II. RGGI 2016 COMPREHENSIVE PROGRAM REVIEW

The Cap

The RGGI cap was first established during the period from 2005-2007. The participating states decided upon a generation-based program rather than a consumption-based program because the states had authority to control electric generating sources within their jurisdiction. The initial cap was based on the average of 2000-2002 CO_2 emissions and the initial cap was set at 188,076,976 short tons of CO_2. After a stabilization period, the cap would be reduced starting in 2015 by 2.5 percent each year until 2018 for a 10 percent reduction. When New Jersey left the program after 2011, the end of the first control period, the cap was adjusted to 165,184,246 short tons of CO_2 to remove New Jersey's emissions.

As the states tracked emissions to evaluate reductions, the downward trend in emissions became evident. The drop in allowance sales at the regional auctions also signaled an oversupply of allowances, and so the participating states elected to revise the cap as part of the 2012 Comprehensive Program Review. During the review, the states considered a number of potential caps in short tons of CO_2, but ultimately the cap was set at 91 million short tons of CO_2 (91M). The 91M cap put downward pressure on carbon emissions, while receiving support from a wide variety of stakeholders and many generators.

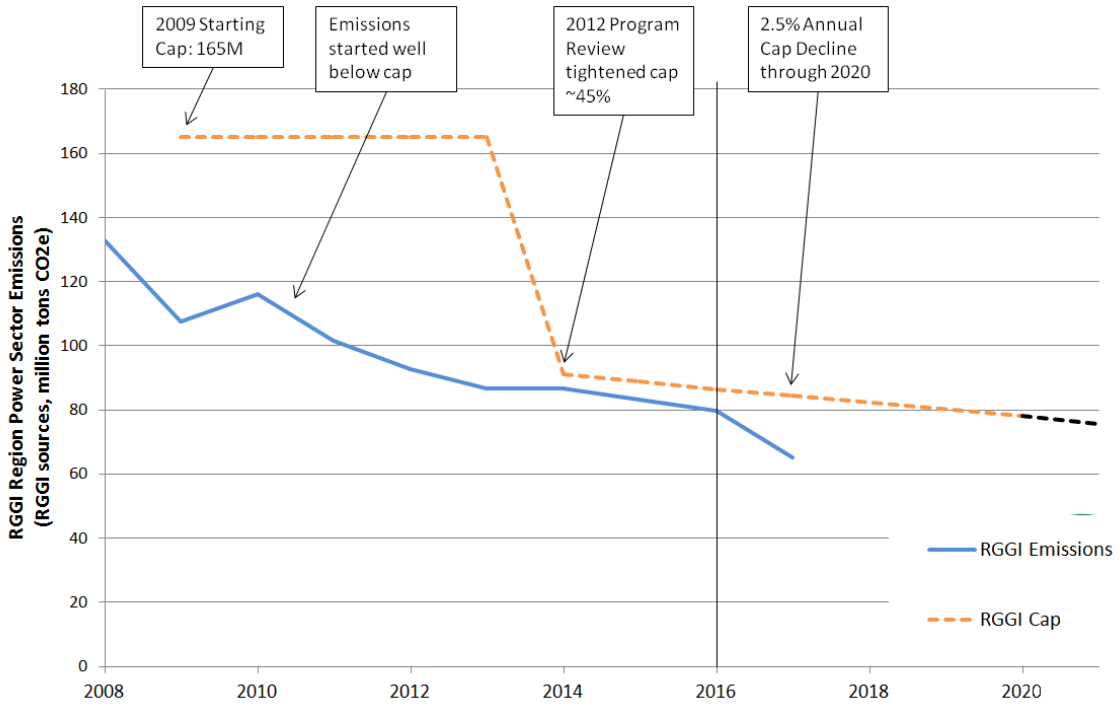

Figure 1. 2012 Program Review Cap Change.

The RGGI program started in 2009. The figure above shows the actual CO_2 emissions from the participating states and the original and revised cap.

After the significant cap reduction made as part of the 2012 Comprehensive Program Review, actual emission levels in all years continue to trend below the level of the 91M cap. Again, the participating states elected to revise the cap as part of the 2016 Comprehensive Program Review. During the review, the states considered a number of potential cap declines that would continue the downward trajectory of the existing cap, including a 25 percent decline, a 30 percent decline, and a 50 percent decline from 2020 to 2030.

The participating states used the Integrated Planning Model (IPM) to model emissions, future demand, new environmental requirements, changing fuel prices, etc. to predict possible emission reductions, allowance prices and demand for allowances at each cap level against a business as usual reference case. A number of cap declines from 20 percent to 50 percent were investigated with the focus moving to lower levels as emissions continued to trend downward. The participating states developed a reference case scenario, carefully considering new generation sources on the way, projections of future demand, announced retirements, new regulatory requirements, and current and expected fuel prices.

The selection of a regional cap of 75,147,784 tons of CO_2 in 2021, which will decline by 2.275 million tons of CO_2 per year thereafter, resulting in a total 30 percent reduction in the regional cap from 2020 to 2030, was a difficult but well thought-out decision.

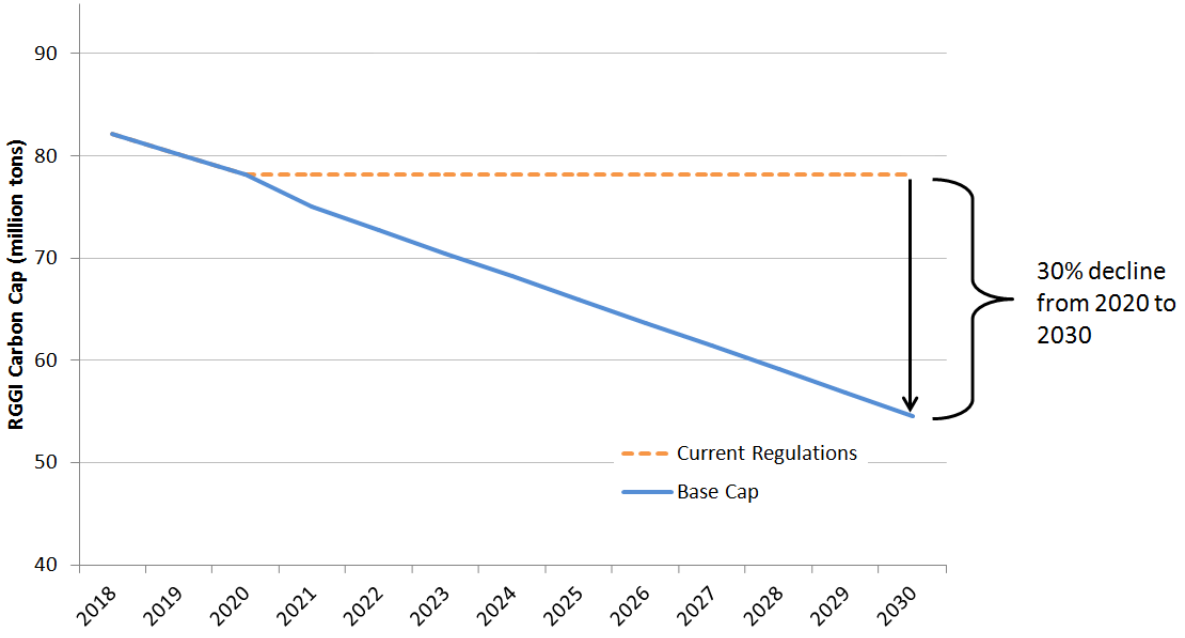

Figure 2. 2016 Program Review Cap Change.

The Cost Containment Reserve (CCR)

The participating states recognized the possibility of price volatility for allowances. To provide flexibility to affected sources, the participating states developed an offset program and allowed sources to use offset allowances for up to 3.3 percent of their compliance obligation. Additionally, if the cost of allowances exceeded certain prices and remained at those levels for extended periods of time, affected sources could purchase greater percentages of offsets in lieu of purchasing higher priced allowances. Under the condition of even higher prices, international offsets could be purchased instead of allowances. The low price for CO_2 allowances during the first two control periods did not encourage the development of a RGGI offset market, as the cost of sequestering a ton of CO_2 through offsets is significantly more expensive than the cost of a RGGI allowance. A second shortcoming to mitigating price volatility through an offset program is the length of time that may be necessary to achieve price relief. A faster, more effective method of reducing price volatility was needed.

During the 2012 Comprehensive Program Review, the participating states explored the option of adding additional allowances to the allocated supply to reduce price increases through a cost containment reserve. If the cost or clearing price of allowances in an auction reaches the trigger level, additional allowances are added to the auction, both increasing the supply and lowering the price. These allowances are in addition to the allowances in the cap and modeling has predicted that this option will be used sparingly, but will lower prices. The participating states feel this option will be more effective at lowering allowance prices than allowing increased amounts of offsets, which will continue to operate as a separate program.

The CCR is more effective when allowances are added to the cap than when the CCR is included under the cap. If the CCR is triggered, the added allowances do raise the cap for that year but

only for that year. The following year the cap returns to its adopted regulatory limit for that year. Emissions from electric generating units do fluctuate due to differences in demand and weather conditions. In an extremely hot or cold year, emissions fluctuations could increase demand for allowances greatly producing price spikes. The CCR helps to lower extreme price spikes.

The 2016 Comprehensive Program Review resulted in additions to Maryland's original allocation of CCR allowances. Maryland initially allocated 1,135,217 CCR allowances for 2014. After review, it was determined that for subsequent years the CCR would be replenished with a sufficient number of allowances to achieve Maryland's 22.6 per cent proportional share of the CCR. Further, beginning in 2021 and each subsequent year thereafter, Maryland will allocate a calculated number of allowances to the CCR as outlined in the following table:

Table 2. Maryland CCR Allocation By Year.

Year	Allowances
2018	2,236,466
2019	2,236,466
2020	2,236,466
2021	1,679,027
2022	1,628,147
2023	1,577,267
2024	1,526,388
2025	1,475,508
2026	1,424,629
2027	1,373,749
2028	1,322,869
2029	1,271,990
2030 and each succeeding calendar year	1,221,110

The CCR allowances are made available immediately in any auction in which demand for allowances at prices above the CCR trigger price exceeds the supply of allowances offered for sale in that auction prior to the addition of any CCR allowances. If the CCR is triggered, the CCR allowances will only be sold at or above the CCR trigger price, and are fully fungible. The CCR Trigger Prices were originally calculated after the 2012 Comprehensive Program Review to be $4 in 2014, $6 in 2015, $8 in 2016, and $10 in 2017.

Following the 2016 Comprehensive Program Review, the CCR trigger prices have been further calculated to include 2018 through 2030. From 2018 to 2020, the CCR trigger price is calculated as 1.025 multiplied by the CCR trigger price from the previous calendar year, rounded to the nearest whole cent. In 2021 the CCR trigger price is calculated to be $13.00. From 2022 to 2030, the CCR trigger price is calculated to be 1.07 multiplied by the CCR trigger price from the previous calendar year, rounded to the nearest whole cent. The calculated values of the CCR trigger prices are outlined in the following table:

Table 3. CCR Trigger Price By Year.

Year	CCR Trigger Price Amount
2018	$10.25
2019	$10.51
2020	$10.77
2021	$13.00

2022	$13.91
2023	$14.88
2024	$15.93
2025	$17.04
2026	$18.23
2027	$19.51
2028	$20.88
2029	$22.34
2030	$23.90

The Emissions Containment Reserve (ECR)

During the 2016 Comprehensive Program Review, the participating states recognized the need for a mechanism that will respond to supply and demand in the market if emission reduction costs are lower than projected. The ECR was therefore created to facilitate this role. States will withhold allowances from circulation to secure additional emissions reductions if prices fall below established trigger prices. Allowances withheld in this way will not be reoffered for sale. Beginning in 2021 and each subsequent year thereafter, Maryland will allocate a calculated number of allowances to the ECR as outlined in the following table:

Table 4. Maryland ECR Allocation By Year.

Year	Allowances
2021	1,679,027
2022	1,628,147
2023	1,577,267
2024	1,526,388
2025	1,475,508
2026	1,424,629
2027	1,373,749
2028	1,322,869
2029	1,271,990
2030 and each succeeding calendar year	1,221,110

The annual ECR allowance withholding limit would be 10 percent of Maryland's budget. The ECR trigger price, the price at which allowances must fall below for the ECR to be utilized, will be $6.00 in 2021 and rise at 7 percent per year, so that the ECR will only trigger if emissions reduction costs are lower than projected. The calculated value of the ECR trigger prices are outlined in the following table:

Table 5. Maryland ECR Trigger Price By Year.

Year	ECR Trigger Price Amount
2021	$6.00
2022	$6.42
2023	$6.87
2024	$7.35
2025	$7.86
2026	$8.42
2027	$9.00
2028	$9.63
2029	$10.31
2030	$11.03

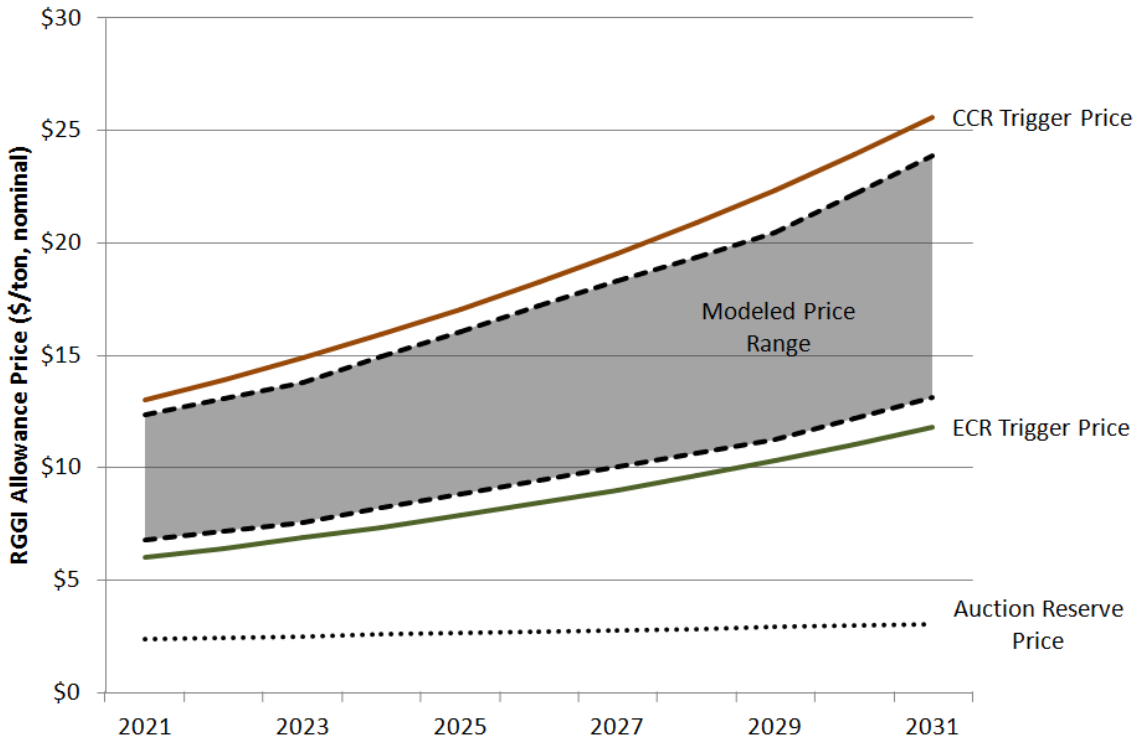

Figure 3. CCR and ECR Price Triggers.

Budget Adjustments

RGGI allows sources to bank allowances in two ways. Sources can use current vintage allowances to satisfy future compliance obligations. The participating states have also auctioned future vintage allowances in the past. These allowances often sell at prices lower than they would in the future.

The participating states addressed potential large banks of allowances through the 2012 Comprehensive Program Review by adjusting how many allowances will be sold through 2020. The participating states further addressed this issue in the 2016 Comprehensive Program Review through one additional, distinct budget adjustment. The private bank of allowances is now addressed through three distinct adjustments to the state budget. The Adjustment for First Control period Banked Allowances is established as 1,863,361 allowances applicable to allocation years 2014 through 2020. The Adjustment for Second Control Period Banked Allowances is established as 3,106,578 allowances applicable to allocation years 2015 through 2020. The newly created Third Adjustment for Banked Allowances adjusts the budget for allocation years 2021 through 2025. The third adjustment timing and algorithm is spelled out in the regulations. This addition helps to create a binding cap in light of the opportunity sources have to accumulate low cost allowances while states implement the regulatory changes needed to establish the lower cap.

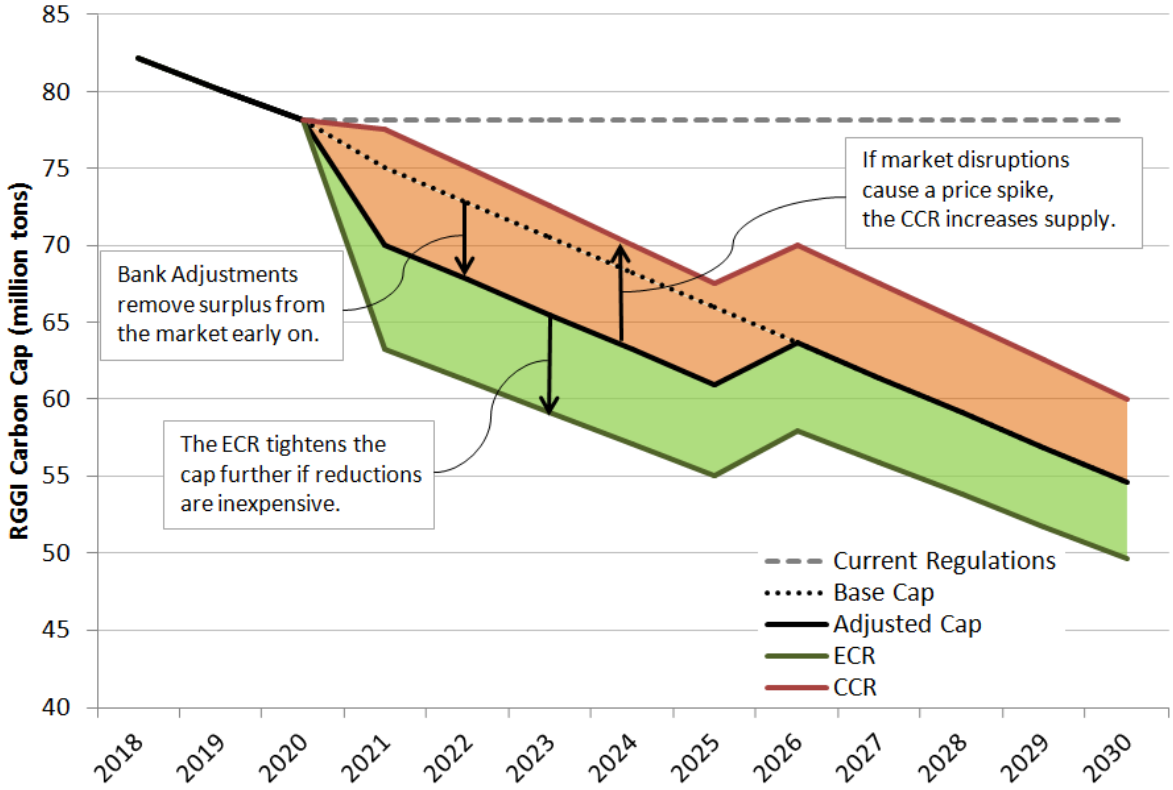

Figure 4. Adaptive Cap.

Offsets

The regulations contain language that eliminates two of the five current offset categories; 1) Reduction in Emissions of Sulfur Hexafluoride (SF_6) due to obsolescence, and 2) Reduction or Avoidance of CO_2 Emissions from Natural Gas, Oil, or Propane End-Use Combustion Due to End-Use Energy Efficiency due to improvements and availability of energy efficiency technologies. While these two offset categories were removed, the three remaining offset categories were maintained and updated. Any awarded offset allowances would remain fully fungible across the participating states.

III. ECONOMIC ANALYSIS

Regional Economic Models Incorporated (REMI)

The participating states conducted economic analysis utilizing the REMI model to determine the overall economic impact on the RGGI region from these changes as shown in Appendix C. These funds will be reinvested into the Maryland economy through energy efficiency, climate change and renewable energy initiatives. Furthermore, the funds will also be used for direct bill pay of low income households. The analyses showed that these changes will result in a positive impact to the economy. As a result of the 30 percent cap decline, between 2017 and 2046 roughly 130,119 job-years will be generated and maintained in the Maryland. Over the same period $9.5 billion in Gross State Product and $6.21 billion in disposable personal income in will be generated.

Cumulative RGGI Results (2017-2046)	
Economic Indicator	**3% Discount Rate***
Total Employment (Job-Years)	130,119
% Change from BAU	0.016%
BAU Level	820,000,000
Gross State Product (Billion Fixed 2015$)	$9.50
% Change from BAU	0.013%
BAU Level	$72,000
Disposable Personal Income (Billion Fixed 2015$)	$6.21
% Change from BAU	0.011%
BAU Level	$55,000

*Employment numbers are undiscounted

Figure 5. Economic Impacts.[1]

Bill Impact Analysis

The participating states conducted economic analysis utilizing the REMI model and Bill Impact analyses shown in Appendix D to determine the effect on electricity prices. These changes will have minimal effect on electricity prices. The monthly residential electricity bill is expected to increase an average of $0.14 from 2017 to 2031 (from achieving the 30 percent decline in the cap from 2020 to 2030) when compared to the reference case. Additionally, the average commercial bill will increase by 0.8 percent annually, and the average industrial energy bill will increase by 0.3 percent annually. (Appendix D includes the complete Maryland specific bill impacts).

[1] Source: RGGI Economic Impact Analysis performed by ICF on behalf of the RGGI states. Available at https://www.rggi.org/program-overview-and-design/program-review.

RGGI Average Monthly Bill Impact for Years 2017-2031

Customer Class	Reference Case Average Monthly Bill ($2015)	Model Rule Policy Scenario Monthly Difference ($2015)	Percent Difference
Residential	$ 54.83	$ 0.14	0.3%
Commercial	$ 322.32	$ 2.69	0.8%
Industrial	$ 3,998.19	$ 13.21	0.3%

Figure 6. Bill Impacts.[2]

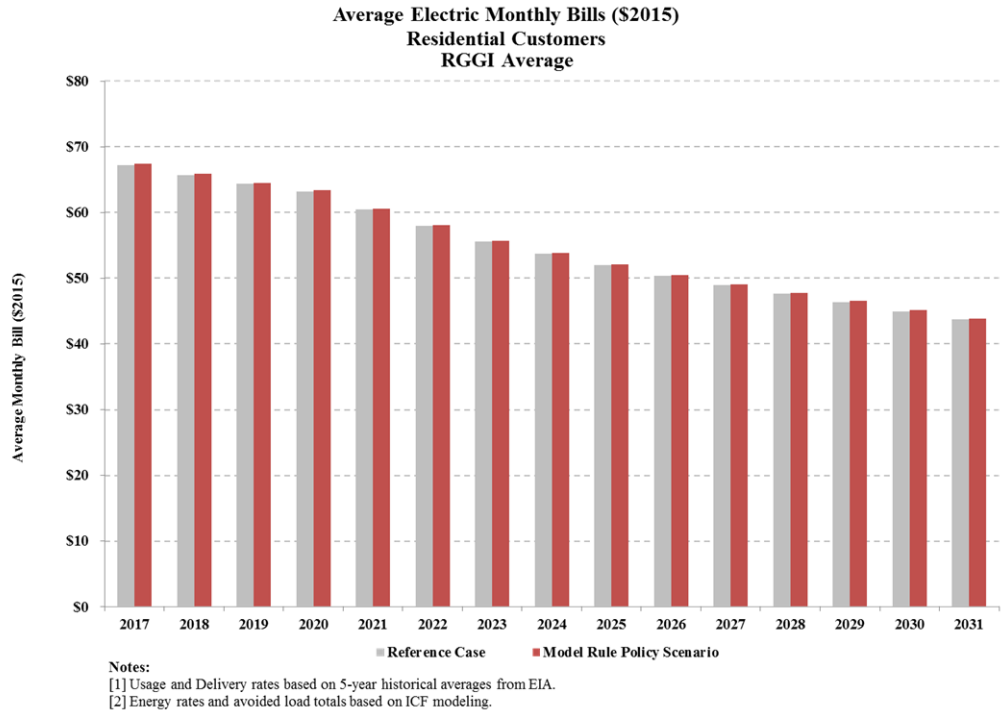

Figure 7. Bill Impacts as Average Monthly Bills ($2015).

[2] Source: RGGI Economic Impact Analysis performed by ICF on behalf of the RGGI states. Available at https://www.rggi.org/program-overview-and-design/program-review.