TECHNICAL SUPPORT DOCUMENT

FOR

AMENDMENTS TO COMAR 26.09

MD CO_2 Budget Trading Program

JULY 26, 2013

PREPARED BY:

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

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 2012 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 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. Maryland receives 37,503,983 CO_2 allowances each year through 2013. Under the proposed amendments, Maryland will receive 20,360,944 CO_2 allowances in 2014. Between 2015 and 2020, Maryland will annually receive 2 ½ percent fewer CO_2 allowances as the RGGI cap reduces by 10 percent during that time. Maryland has set aside 7,388,491 allowances in 4 different set aside accounts to account for special needs or programs.

Year	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Allowances	**20,360,944**	**19,844,420**	**19,340,810**	**18,849,790**	**18,371,045**	**17,904,269**	**17,449,162**

RGGI has completed its first control period, 2009-2011. The regional auctions generated almost a billion dollars in revenue for the states during this time. These funds were used to provide funding for energy efficiency and renewable energy programs, rebates to ratepayers, bill payment for low income ratepayers and general fund relief.

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 2012 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 2012 Comprehensive Review.

Carbon dioxide emissions in the RGGI region have declined substantially. One factor contributing to the decrease in regional emissions has been a shift in use of natural gas over coal and oil for fuel at electricity generators due to a significant decrease in the price of natural gas. Another factor is an economic downturn that began in late 2008. As electric generating companies acquired CO_2 allowances equal to their emissions, some CO_2 allowances offered at the regional auctions were not sold. Maryland regulations allow these allowances to be offered for sale at a subsequent auction or to be retired. With demand for allowances through the auction smaller than the amount of allowances offered, the participating states held the unsold allowances until the end of the first compliance period. This allowed the states to determine whether demand existed for the allowances or whether retirement would provide the best environmental benefit. The states determined that the unsold allowances should be retired and retired 102,631,137 allowances. Maryland retired 19,794,971 unsold allowances.

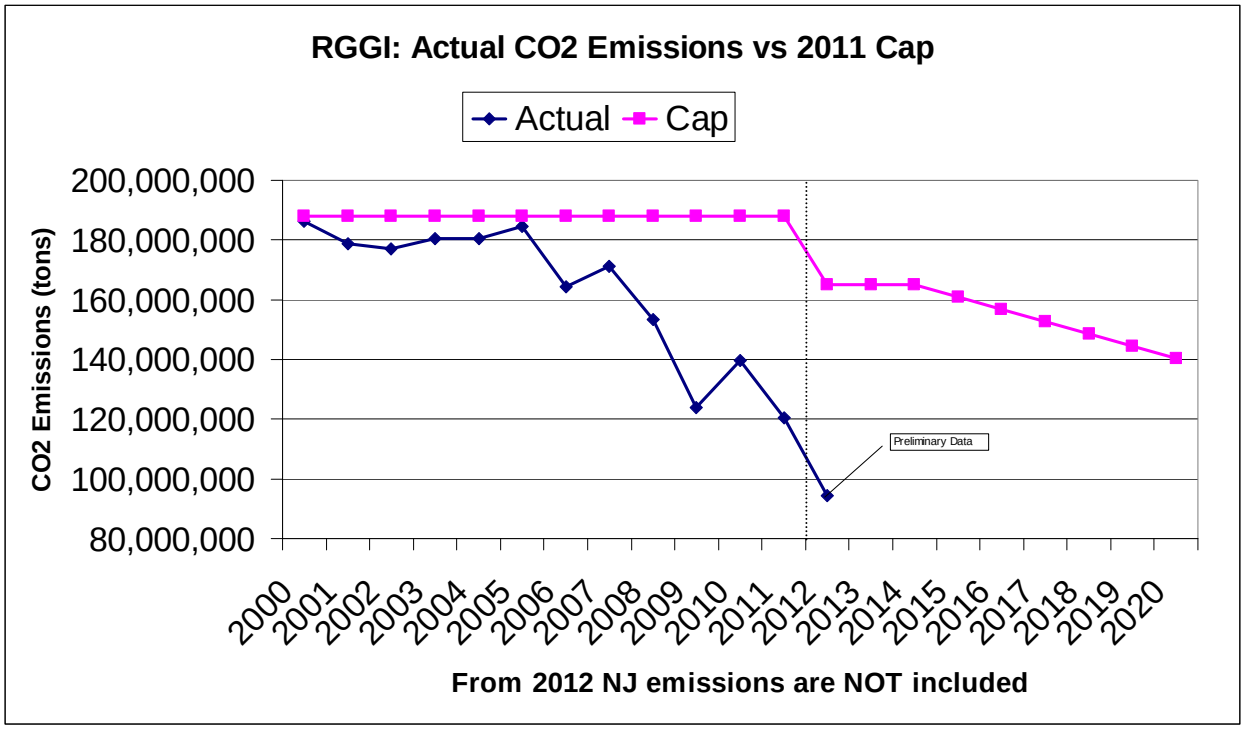
The Regional Greenhouse Gas Initiative is included in the Greenhouse Gas Reduction Plan and provides funding for many of the efficiency programs implemented by the Maryland Energy Administration such as Empower Maryland. CO_2 emission reductions from these proposed amendments will provide 3.6 million metric tons of additional reductions for the Greenhouse Gas Reduction Act Plan.

II. RGGI 2012 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% each year until 2018 for a 10% 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.

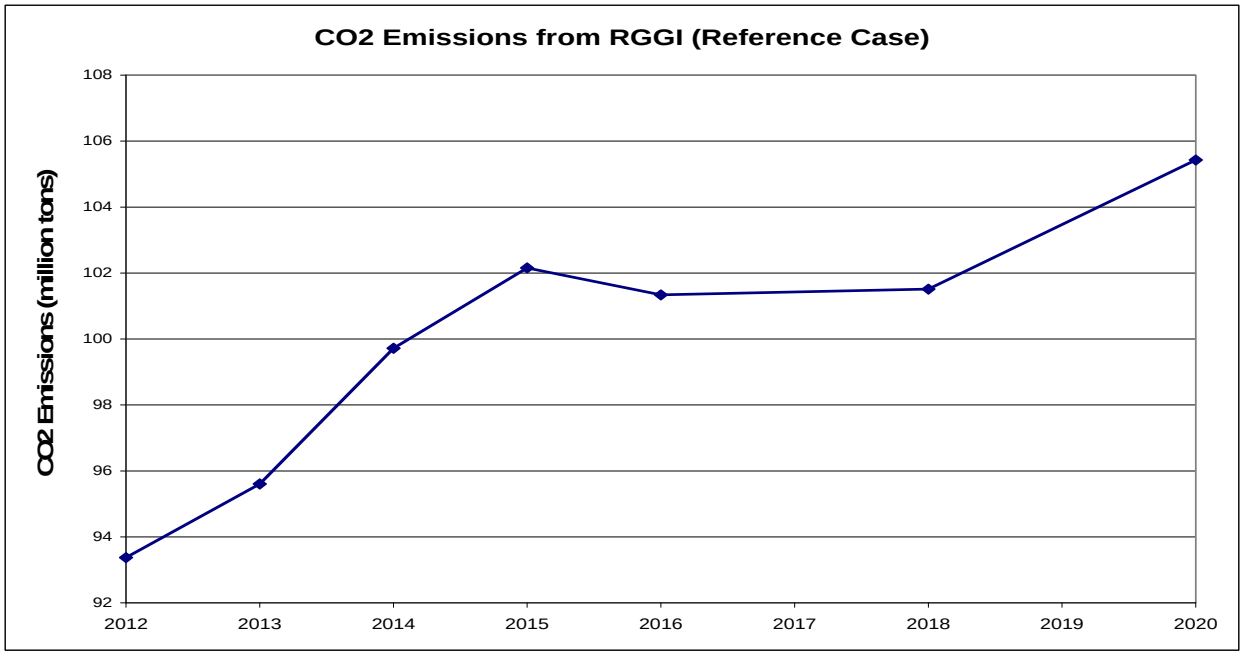


The RGGI program started in 2009. The figure above shows the actual CO_2 emissions from the participating states and the first control period cap. As the states tracked emissions to evaluate reductions, the downward trend in emissions became evident. The drop in allowance sales at the regional auctions also signaled an oversupply of allowances. 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: 106 million tons (106M), 97 million tons (97M), and 91 million tons (91M). The 106M cap was based on the annual average of emissions from the first control period. The 97M cap was based on the projected reference case emissions for 2014, and the 91M cap was based on actual 2012 estimated emissions.

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 levels from 120 million– 91 million short tons of CO_2 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 results of the modeling show that at the 106M, the RGGI cap is not binding or is not binding well into the future. It does not create a scarcity of allowances and allows sources to operate without considering controls. Also, allowance prices remain at the reserve price, and reductions, if any, are small compared to the reference case. For the 97M and 91M cases, the cap becomes binding.



The selection of a cap at the 91 million short tons of CO_2 (91M) level was a difficult but well thought-out decision. Based on current emissions and projected growth, the 91M will put downward pressure on carbon emissions, but not in a radical way. The selected cap received support from a wide variety stakeholders, even many generators.

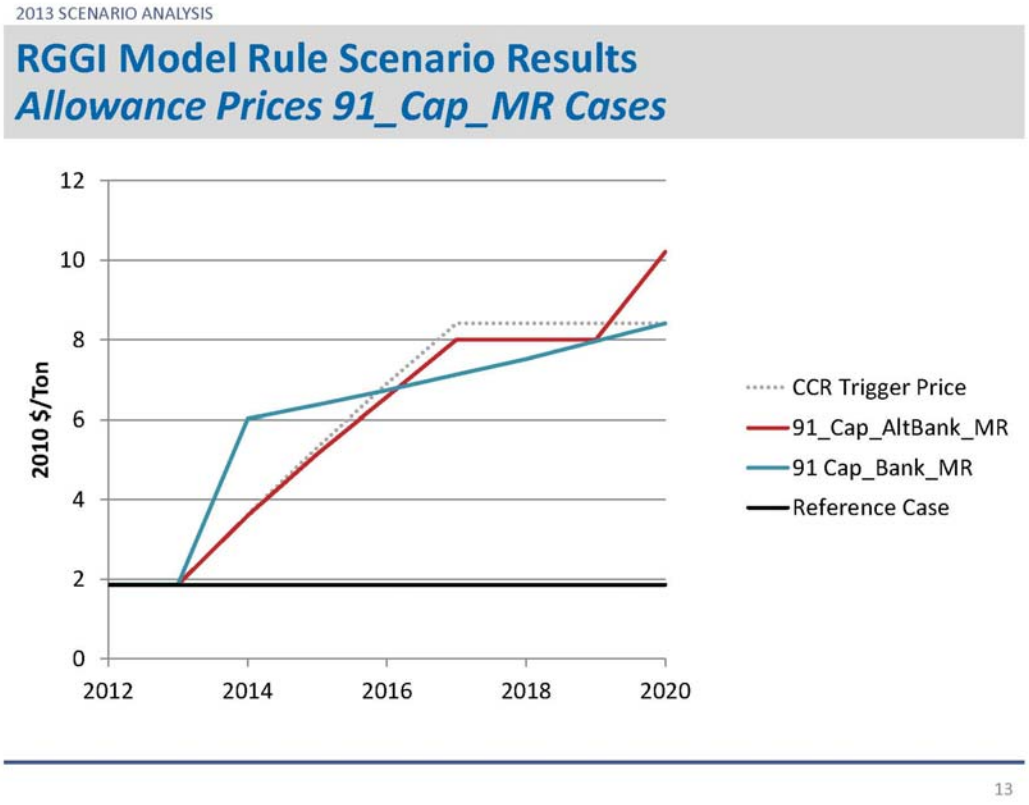
The Cost Containment Reserve (CCR)

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% 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 control period did not encourage the development of a RGGI offset market, as the cost of sequestering a ton of CO_2 through offsets is more in the range of $7-$12 or more as opposed to the $1.98 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 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 91 million allowances in the cap, with 5 million allowances available for the CCR in 2014 and ten million allowances per year available after 2014. In subsequent years, the CCR will be replenished as needed to maintain the withdrawal limit. 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.



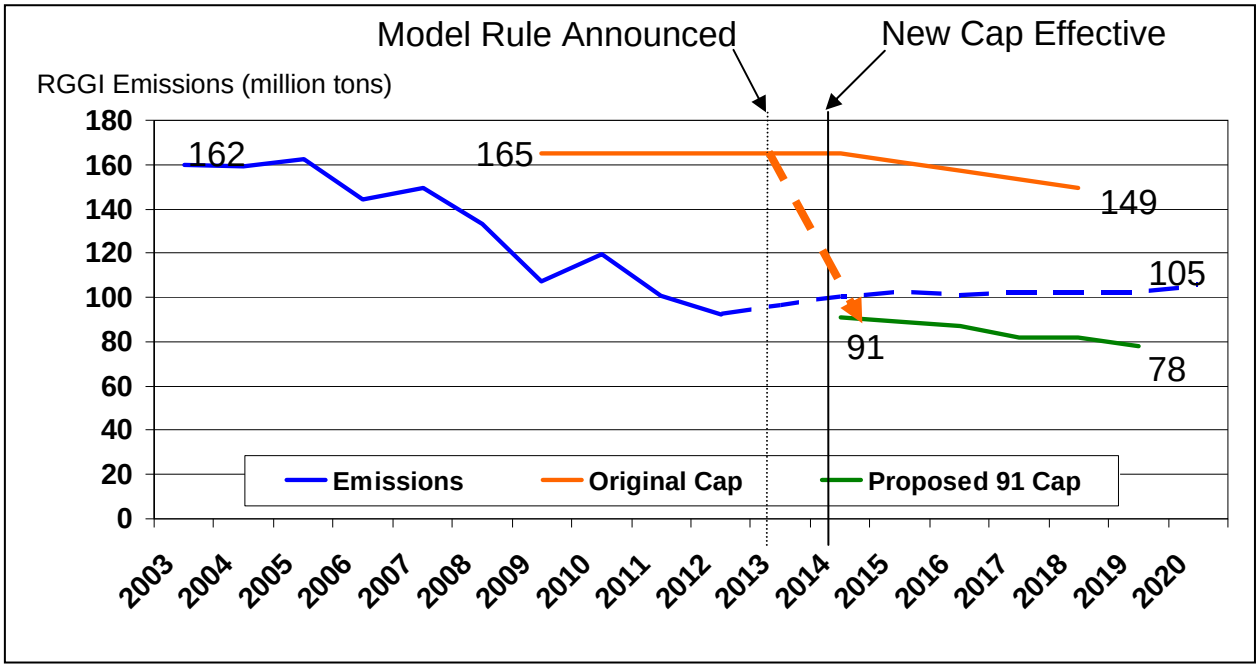
The CCR allowances would be made available immediately in any auction in which demand for allowances at prices above the CCR trigger price exceeds the supply of allowances offered for sale in that auction prior to the addition of any CCR allowances. If the CCR is triggered, the

CCR allowances will only be sold at or above the CCR trigger price. The CCR Trigger Prices are $4 in 2014, $6 in 2015, $8 in 2016, and $10 in 2017. Each year after 2017, the CCR trigger price will increase by 2.5%. Allowances from the CCR would be fully fungible.

The Adjustments for Banked Allowances

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 significant changes proposed through the 2012 Comprehensive Program Review necessitate regulatory changes for all states and legislative changes for some. For most participating states these changes will take almost a year to complete and longer for others. The lag between the announcement of the proposed changes and the adoption of the regulatory changes needed to implement the changes allows regulated sources and speculators the opportunity to purchase large quantities of allowances at minimal prices. The results of Auction 19, and later Auction 20, demonstrate sources and speculators alike will take advantage of this situation. Demand for allowances was 2.5 times the supply and the allowance price rose above the reserve price for the first time in almost three years. The graph below illustrates the differences in allowances offered, current emissions and the proposed cap. Close to 115 million allowances could be stockpiled during this interim time and the allowances utilized to offset the reductions in the cap. To buffer the proposed new cap against such activity, the participating states will calculate the surplus allowances held by the private sector and reduce the sale of allowances to use up the surplus allowances over a seven year period.



States are addressing the potential large bank of allowances through adjusting how many allowances will be sold between now and 2020. The private bank of allowances is addressed through two distinct adjustments to the state budget. The First Control Period Interim Adjustment for Banked Allowances (first adjustment), adjusts the budget for 100 percent of the first control period private bank of allowances (vintages 2009, 2010, & 2011) held by market participants as of the end of the first control period, that are in addition to the total quantity of first control period emissions. The first adjustment timing and algorithm is spelled out in the regulations and is made over the 7 year period 2014-2020.

The Second Control Period Interim Adjustment for Banked Allowances (second adjustment), adjusts the budget for 100 percent of the 2012 and 2013 vintage allowances held by market participants as of the end of 2013, that are in addition to the total quantity of 2012 and 2013 emissions. The second adjustment timing and algorithm is spelled out in the regulations and is made over the 6 year period 2015-2020 after the actual size of the 2012 and 2013 vintage private bank is determined. This change 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.

Year	Base Budget	First Comp Period Adjustment	2012-2013 Adjustment	Net Budget
2014	20,360,944	1,524,434	0	18,836,510
2015	19,844,420	1,524,434	2,573,158	15,746,829
2016	19,340,810	1,524,434	2,573,158	15,243,218
2017	18,849,790	1,524,434	2,573,158	14,752,198
2018	18,371,045	1,524,434	2,573,158	14,273,453
2019	17,904,269	1,524,434	2,573,158	13,806,677
2020	17,449,162	1,524,434	2,573,158	13,351,570

Reserve Price

The regulations simplify the reserve price calculation. The reserve price is set at $2.00 in 2014 and increases by 2.5 percent each year thereafter. The Consumer Price Index is eliminated as well as the current market reserve price. The Long Term Contract Price is defined in the same manner as the reserve price.

Interim Control Periods

The participating states provided for a three year compliance period before sources were expected to surrender allowances equal to their CO_2 emissions under the original program concepts. The three year period allowed flexibility for the sources to budget for the purchase of allowances in case of unforeseen high demand periods due to weather extremes. The concept has worked well but through the review, the participating states decided to add interim compliance periods.

The regulations create "interim control periods" defined as each of the first two calendar years of each three-year control period and "Excess Interim Emissions," defined as any emissions (multiplied by 0.50) over the amount of allowances held at the end of each Interim Control Period. The regulations include a new general requirement for sources to hold allowances to cover 50% of emissions for each Interim Control Period, subject to the existing true-up process and a March 1 deadline. The final compliance true-up at the end of the three-year control period will continue to require sources to hold allowances to cover 100% of the emissions for the three years. The allowances already deducted to meet each of the two annual Interim Control Period obligations will be subtracted from the three-year compliance true-up obligation.

Each ton of Excess Interim Emissions will be considered a violation, subject to the ordinary existing enforcement provisions of the relevant agency on an annual basis. There will *not* be a "treble damages" provision for Excess Interim Emissions. The existing "treble damages" provision, for any excess emissions at the end of the three-year control period, will remain unchanged.

The participating states deleted existing triggers, "market settling period", and other regulatory terms related to the potential to extend the control period to four years. These changes simplify the program and ensure that sources are keeping up with their compliance obligations.

Offset Trigger Mechanisms

The regulations delete the existing offset price triggers that raise the allowable percentage of offsets and that allow the use of international CO_2 emission credit retirements. The allowable offset percentage would remain at 3.3%, and only those offset credits that satisfy all regulatory requirements for a specific project category (including any new categories added) may be used for compliance. These changes are consistent with the decision to add a CCR mechanism and address the need for cost control in a much more transparent and predictable way. These changes help to dampen price volatility through increasing supply when prices are rising quickly.

Forestry Offset

The regulations contain language that provides a new offset category known as "Sequestration of carbon due to reforestation, improved forest management or avoided conversion" that States may adopt in lieu of the existing Afforestation category.

A RGGI U.S. Forests Offset Protocol has been developed, based mainly on the California Air Resources Board (CARB) U.S. Forests Offset Protocol, to include:

- Improved Forest Management;
- Avoided Conversion; and
- Reforestation (which would replace the existing RGGI Afforestation category type).

Wherever possible, the Model Rule intentionally stays consistent with the (CARB) to leverage work done by CARB and the Climate Action Reserve (CAR), because the CARB program is expected to support a domestic supply of these offsets, and to provide consistency.

The RGGI protocol uses a discounting approach, instead of the buffer account approach used by CARB, to address reversals and ensure permanence. Forestry projects that have generated credits in a voluntary offset program would be permitted to transfer to the RGGI program, assuming that they meet all other RGGI requirements and there is no double-counting. The general additionality requirements for existing RGGI offset categories have not changed. This protocol provides a better option for offsets in Maryland.

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. The lowered cap will generate additional funds from the sale of allowances. It is estimated that an additional $810 million per year will be raised from the sale of the allowances and that MEA will be responsible for the administration of those additional revenues.

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 91M cap, a net average of roughly 269 jobs will be generated and maintained in the Maryland economy each year. Over the period of 2012-2020 there will be an additional $155.2 million in Net State Product and $217.2 million in real personal income[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 decrease an average of $1.24 dollars for the reporting period (from lowering the cap to 91 million) when compared to the 165 million cap. However, the average commercial bill will increase by 0.3% annually, and the average industrial energy bill will increase by 0.4% annually. (Appendix D includes the complete Maryland specific bill impacts).

[1] The economic impacts of lowering the cap to 91 million is provided by RGGI Inc. The estimated benefits are generated by accounting for the full life cycle benefits of the energy efficiency improvements and investments into renewable energy. The total net benefits are then calculated for the years 2012 through 2020.

TECHNICAL SUPPORT DOCUMENT FOR AMENDMENTS TO COMAR 26.09 MD CO_2 Budget Trading Program

JULY 26, 2013

APPENDIX A: STAKEHOLDER MEETINGS

RGGI Stakeholder Meetings

- February 11, 2013 – Webinar
  - Updated Model Rule, Updated Forest Protocol
- January 8, 2013 – Webinar
  - Presentation: ICF - Analysis of IPM Potential Scenarios, Presentation: Analysis Group – Economic Analysis of IPM Potential Scenarios
- November 28, 2012 – Webinar
  - Presentation: 2012 Proposed IPM Scenarios, Presentation: REMI Economic Analysis of RGGI IPM Potential Scenarios
- November 20, 2012 – Boston, MA
  - Presentation: Program Review and IPM Potential Scenarios, Draft Model Rule Summary, Preliminary Draft U.S. Forests Offset Protocol
- October 18, 2012 – Webinar
  - Presentation: Program Design Concepts
- August 13, 2012 – Webinar
  - Presentation: IPM Reference Case and Sensitivity Results
- July 12, 2012 – Webinar
  - Presentation: IPM Reference Case and Sensitivity Assumptions
- March 20, 2012 - New York, NY
  - IPM Electricity Sector Modeling Results, Presentation: IPM Electricity Sector Modeling, Presentation: REMI Macroeconomic Modeling
- January 24, 2012 – New York, NY
- October 11, 2011 – New York, NY
- September 19, 2011 – New York, NY
- November 12, 2010 – New York, NY
- September 13, 2010 – New York, NY

TECHNICAL SUPPORT DOCUMENT FOR AMENDMENTS TO COMAR 26.09 MD CO_2 Budget Trading Program

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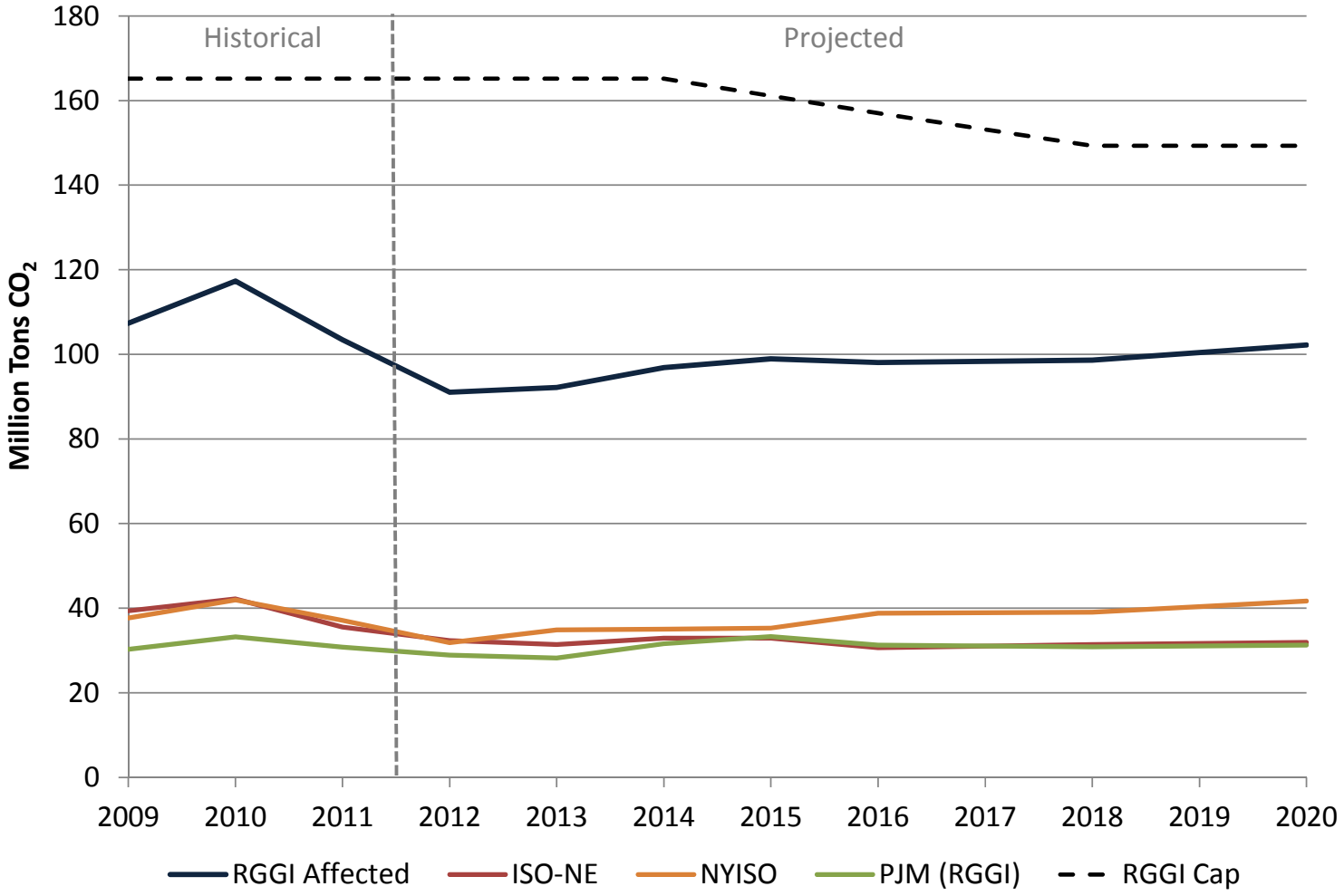
APPENDIX B: IPM MODELING ANALYSIS

RGGI IPM Analysis: Amended Model Rule

February 8, 2013

RGGI Model Rule Scenario Analysis
Reference Case Recap

- The chart shows historical and projected CO_2 emissions for the RGGI states and by ISO.



RGGI Model Rule Scenario Analysis

Scenario Assumptions – 91 Cap_Bank_MR & 91 Cap_AltBank_MR

Scenario Name	Cost Containment Reserve (CCR)	CCR Price Triggers (Nominal $)	Results of Interim Adjustment for Banked Allowances	2012-2013 Projected Banked Allowances	First Control Period Banked Allowances
91 Cap_Bank_MR	**2014:** Up to 5M allowances **2015–2020:** Up to 10 M allowances annually	**2014:** $4.00 (2014$) **2015:** $6.00 (2015$) **2016:** $8.00 (2016$) **2017: $**10.00 (2017$) **2018-2020**- Increased 2.5% annually	**2014:** 84 M Tons **2015:** 70 M Tons **2020:** 62 M Tons	68 M allowances	47 M allowances
91 Cap_Alt Bank_MR	**2014:** Up to 5M allowances **2015–2020:** Up to 10 M allowances annually	**2014:** $4.00 (2014$) **2015:** $6.00 (2015$) **2016:** $8.00 (2016$) **2017: $**10.00 (2017$) **2018-2020**- Increased 2.5% annually	**2014:** 84 M Tons **2015:** 70 M Tons **2020:** 62 M Tons	68 M allowances	47 M allowances

RGGI Model Rule Scenario Analysis

Scenario Assumptions – 91_Cap_Bank_MR & 91_Cap_AltBank_MR

Interim Adjustment for Banked Allowances

- For the modeling, we assume the projected 2009-2013 private bank of allowances is 115 M, an estimated 47 M first control bank and projected bank for 2012 and 2013.
- The modeling assumes that market participants do not bank allowances in 2012.
- The modeling assumes in 2013 that the market is aware of program changes and assumes 100% banking of available allowances.
- To correspond with the amended Model Rule the adjustment for the 47M first control bank is spread across 2014-2020 and the adjustment for the projected bank for 2012 and 2013 is spread across 2015-2020.

	2014	2015	2016	2017	2018*	2019	2020
91 Cap_Bank_MR	91	89	87	82	82	82	78
Interim Adjustment for Banked Allowances	84	70	68	64	64	64	62
91 Cap_Alt Bank_MR	91	89	87	82	82	82	78
Interim Adjustment for Banked Allowances	84	70	68	64	64	64	62

* The 2018 model run year is representative of 2017-2019. The averaged 2018 input represents the policy (same as current policy) of a 2.5% per year reduction to the cap.

RGGI Model Rule Scenario Analysis

Scenario Assumptions – Alternate Banking: 91_Cap_AltBank_MR

- The IPM model has perfect foresight.
- To examine different assumptions for how market participants might use banked allowances for compliance purposes, the states proposed alternate banking usage assumptions.
- The alternate banking assumes that market participants make decisions related to use of banked allowances for compliance on a shorter time horizon than projected by IPM using perfect foresight.
- Alternate banking scenarios were developed for the 91 Model Rule scenario.
- For this scenario, approximately two-thirds of the banked allowances are assumed to be used during 2014-17 (the end of the first control period after the change to the cap) and the other one-third are used thereafter.

RGGI Model Rule Scenario Analysis
Scenario Assumptions

- Model run years are 2012, 2013, 2014, 2015, 2016, 2018 (representing 2017-2019), 2020.

- Offsets can be used to meet 3.3% of a compliance obligation. Offset expansion triggers (stage one $7 and stage two $10 and international) have been removed.

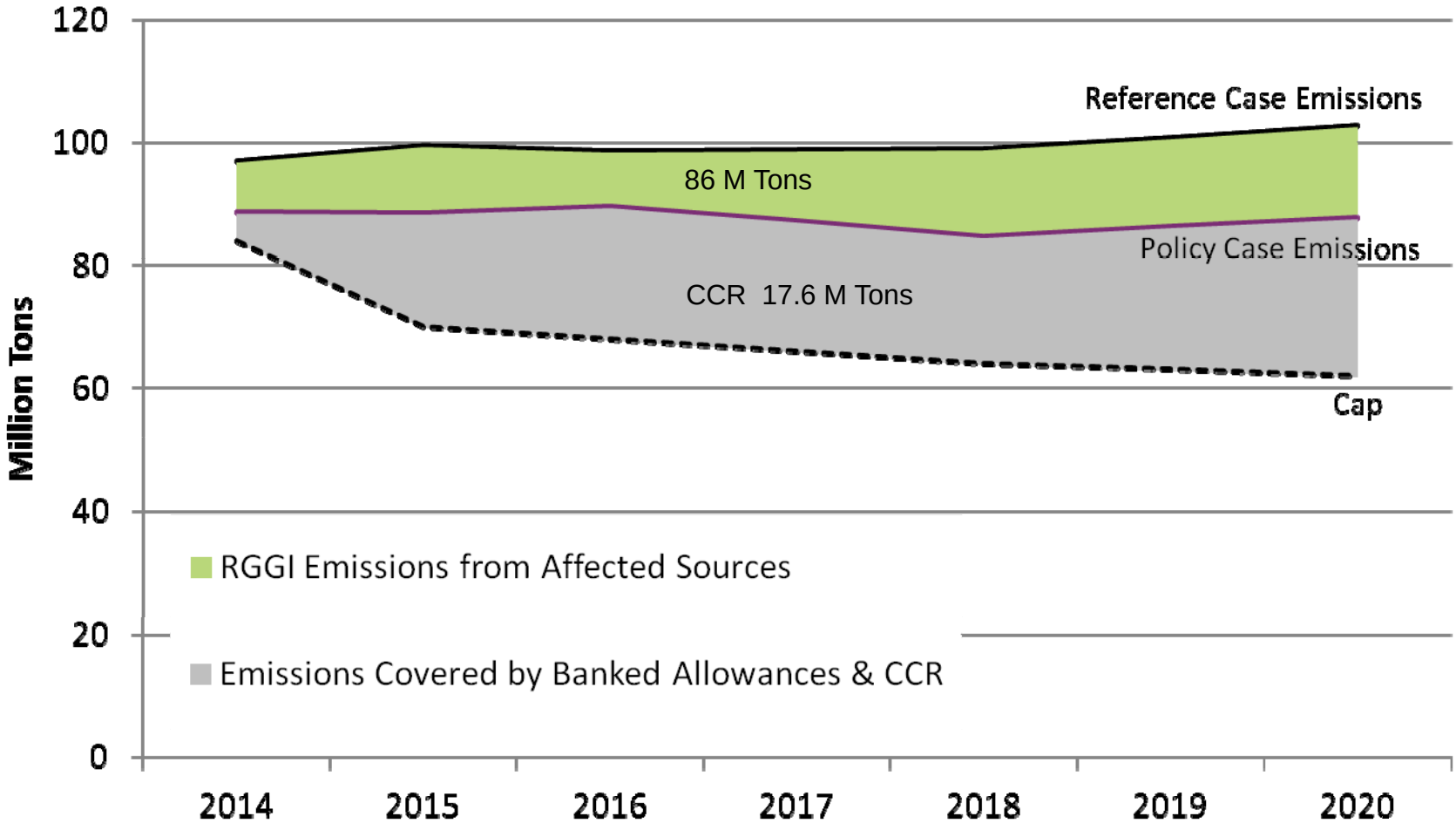
RESULTS

RGGI Model Rule Scenario Results

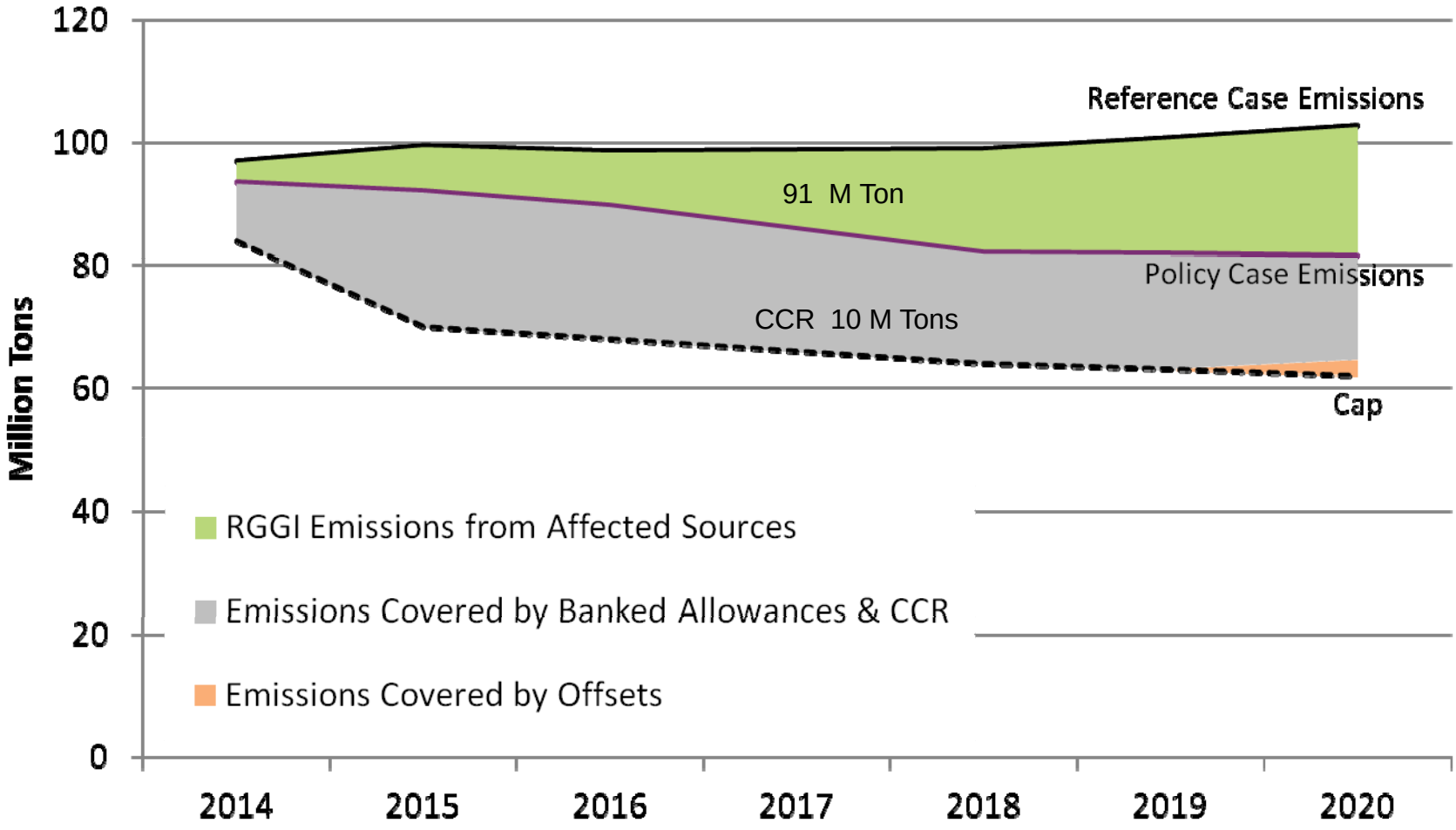
91_Cap_Bank_MR & 91_Cap_Alt Bank_MR – Results Summary

Scenario Name	Allowance Price (2010$) Projection (2014-2020)	Cumulative CCR Allowances Released	Offsets	Cumulative Emissions Reduction
91_Cap_Bank_MR	$6.00 - $8.40	17.6 M	0 M	86 M
91_Cap_AltBank_MR	$3.60 - $10.20	10 M	2.7 M	91 M

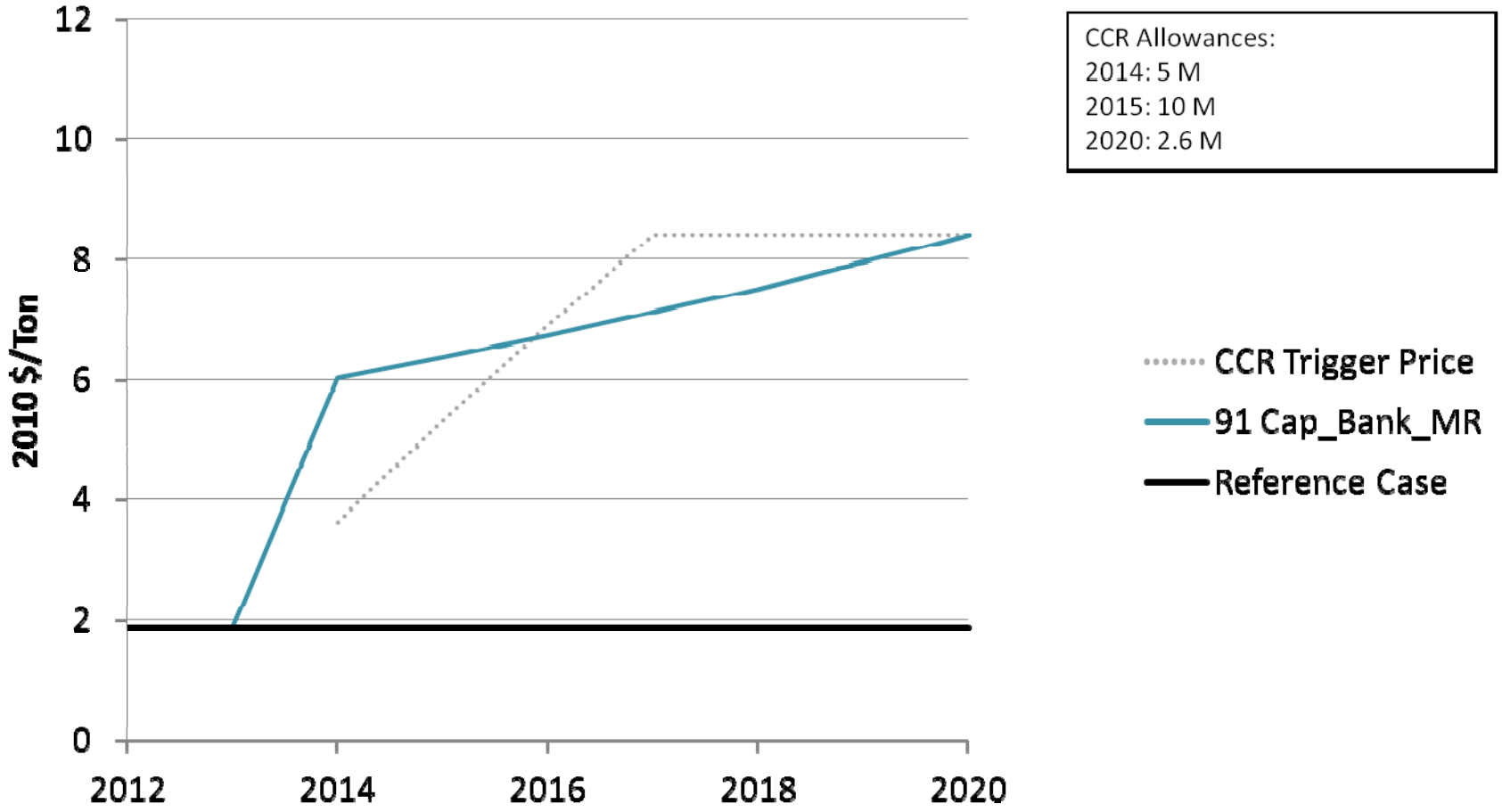
RGGI Model Rule Scenario Results
Sources of Emission Reductions 91 Cap_Bank_MR



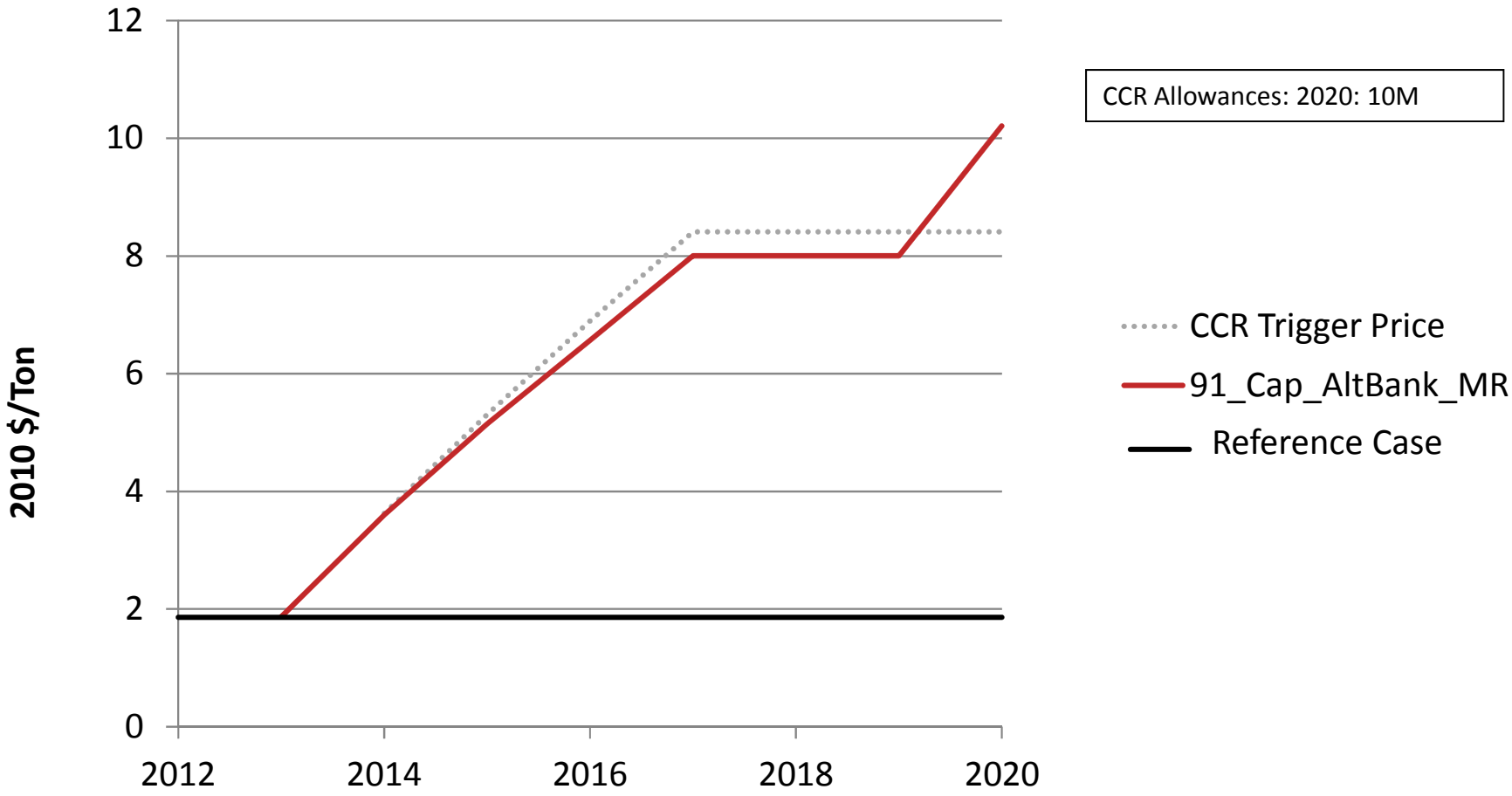
RGGI Model Rule Scenario Results
Sources of Emission Reductions 91 Cap_AltBank_MR



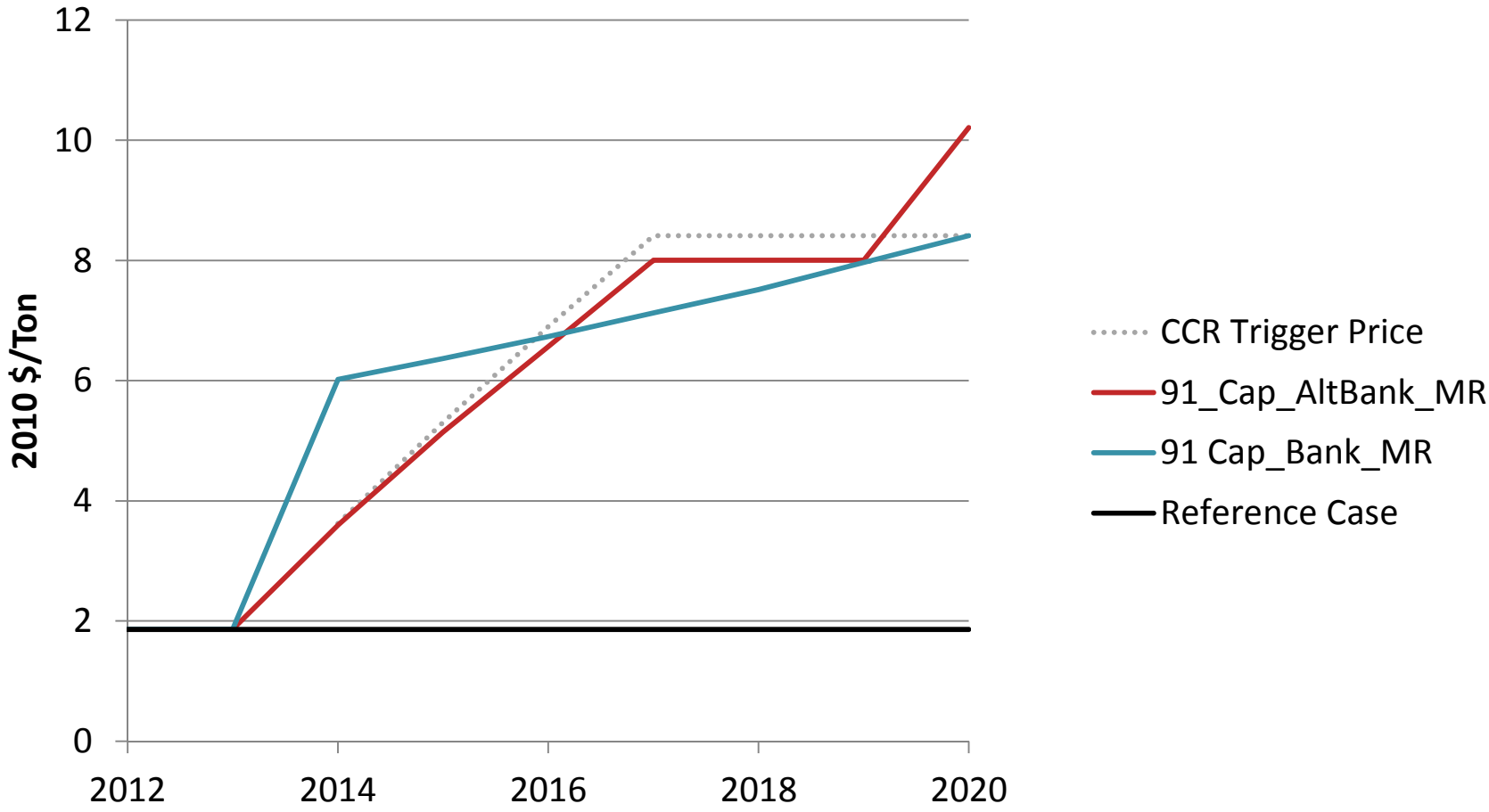
RGGI Model Rule Scenario Results
Allowance Prices 91_Cap_Bank_MR



RGGI Model Rule Scenario Results
Allowance Prices 91_Cap_MR Cases



RGGI Model Rule Scenario Results
Allowance Prices 91_Cap_MR Cases



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JULY 26, 2013

APPENDIX C: REMI MODELING

REMI Economic Impact Analysis Assumptions and Results

91 Cap Bank Model Rule Case

June 3, 2013

NESCAUM

REMI Model Overview

- The REMI (Regional Economic Models, Inc.) Policy Insight + Model:
  - NESCAUM's REMI model is a 12-state economic and demographic forecasting model
  - Uses a regional REMI Reference Case

- REMI output includes estimates of:
  - Changes in gross regional product ($);
  - Changes in employment (job-years); and
  - Changes in real personal (disposable) income ($).

RGGI Program Review REMI Analysis

- The **IPM 91 Cap Bank Model Rule and 91 Cap Alt Bank Model Rule cases** were released on February 7, 2013.
- The **IPM 91 Cap Bank Model Rule Case** incorporated the program elements included in the *Updated Model Rule* released on February 7, 2013.
- The REMI analysis has been updated to reflect the IPM modeling results for the **IPM 91 Cap Bank Model Rule Case (91 Cap Bank MR Case)**.
- This analysis projects the potential macroeconomic impacts of the incremental changes between the current RGGI program **(REMI Reference Case)** and changes to the RGGI program **(IPM 91 Cap Bank MR Case)**

RGGI Program Review REMI Analysis

- Analysis projects potential macroeconomic impacts for the 9-state RGGI region due to potential changes in the RGGI program
- Analysis does not project macroeconomic benefits due to carbon emissions reductions (e.g., value of avoided GHG emissions)
- These benefits are in addition to the macroeconomic benefits due to the current RGGI program
- This analysis does not make any projections for RGGI allowance prices or RGGI proceeds after 2020
- This analysis does not analyze the impacts of investing RGGI proceeds generated after 2020

REMI Assumptions and Inputs

REMI Assumptions

- The REMI economic analysis uses the REMI Reference Case
- Inputs to REMI are developed using two sources of data which describe economic impacts resulting from potential changes to the RGGI program:

1) **States' Investments of RGGI Allowance Proceeds**

2) **IPM Output on Electricity Market Changes**

REMI Assumptions

States' Investments of RGGI Allowance Proceeds

- States' investments generate *incremental* changes in regional economic activity (e.g., spending, prices, labor availability)

- REMI model quantifies changes in the **91 Cap Bank MR Case** including the incremental investment of additional projected proceeds from 2012-2020

- Examples of proceed investments include: energy efficiency programs, GHG abatement projects, direct bill assistance

REMI Assumptions

States' Investments of RGGI Allowance Proceeds

- For this analysis, each state provided assumptions for how projected incremental proceeds from 2012-2020 could be invested.
- The following slides describe how proceeds were projected for the Reference Case and 91 Cap Bank MR Case and how investments were modeled for this analysis.
- This analysis does not make any projections for RGGI allowance prices or RGGI proceeds after 2020.
- This analysis does not analyze the impacts of investing RGGI proceeds generated after 2020.

REMI Assumptions

States' Investments of RGGI Allowance Proceeds

- Annual proceeds were calculated by multiplying the estimated number of allowances projected to be purchased at auction by the projected CO_2 allowance price.
  - For the **IPM Reference Case**, calculation assumes that the market purchases enough allowances to meet demand based on emissions, minus the 47M banked allowances from first control period spread over the time horizon.
  - For the **91 Cap Bank MR Case**, calculation assumes in 2012 that the market purchases allowances to meet demand based on emissions. For 2013, assumes that the market is made aware of new policies in 2013 and assumes market purchases 100% of available allowances. Post 2013, assumes that the market purchases all available allowances.

REMI Assumptions

States' Investments of RGGI Allowance Proceeds

- Cumulative projected proceeds for the **IPM Reference case** are **$1,549.38 Million** (2010$).

- Cumulative projected proceeds for the **91 Cap Bank MR Case** is **$3,957.34 Million** (2010$), representing an additional **$2,407.96 Million** (2010$) in proceeds compared to the Reference Case.

REMI Assumptions

States' Investments of RGGI Allowance Proceeds

- **State Proceed Investments:** The table below provides the breakdown of how each state assumed to invest the additional proceeds in the 91 Cap Bank MR Case (through 2020) compared to the Reference Case.

State	Electric EE Investments	Fossil Fuel EE Investments	Clean & Renewable Energy Investments	Direct Bill Assistance	GHG Abatement & Climate Change Programs	Admin/ Other	Total
Connecticut	50.0%*	19.5%*	23.0%*	0.0%*	7.5%*	0.0%	**100%**
Delaware	65.0%	10.0%	0.0%	5.0%	15.0%	5.0%	**100%**
Maine	68.0%*	13.0%	0.0%	14.0%	0.0%	5.0%*	**100%**
Maryland	46.0%	0.0%	10.5%	40.0%	$1M	3.5%	**100%**
Massachusetts	94.0%	6.0%	0.0%	0.0%	0.0%	0.0%	**100%**
New Hampshire	25.3%*	25.3%*	0.0%	46.2%*	0.0%	3.2%*	**100%**
New York	16.0%	59.0%	0.0%	0.0%	10.0%	15.0%	**100%**
Rhode Island	95.0%*	0.0%	0.0%	0.0%	0.0%	5.0%*	**100%**
Vermont	0.0%	98.0%	0.0%	0.0%	0.0%	2.0%	**100%**

* Percentage invested may vary based on annual projected allowance prices.

REMI Assumptions

Timing and Duration of Investment of RGGI Proceeds

- REMI model analyzes the impacts of potential changes to RGGI program (including incremental additional proceed investments) made in 2013-2021.

- Assumes a 1-year lag time between receipt and investment of RGGI proceeds (e.g., 2014 proceeds are invested in 2015).

- REMI model includes assumptions on projected benefits of proceeds invested through 2040 to incorporate the lifetime impacts of these investments made in 2013-2021.

REMI Assumptions

Timing and Duration of Investment of RGGI Proceeds

- Energy savings benefits of states' investments in energy efficiency and similar programs are measured over their full lifetime.

- Lifetimes of benefits vary by type of program:
  - **Electric Energy Efficiency Measures:** Residential: 15 yrs; Commercial & Industrial: 15 yrs
  - **Fossil Fuel Energy Efficiency Measures:** 15 yrs
  - **Clean & Renewable Energy Measures:** 20 yrs
  - **GHG Abatement & Climate Change Programs:** 20 yrs

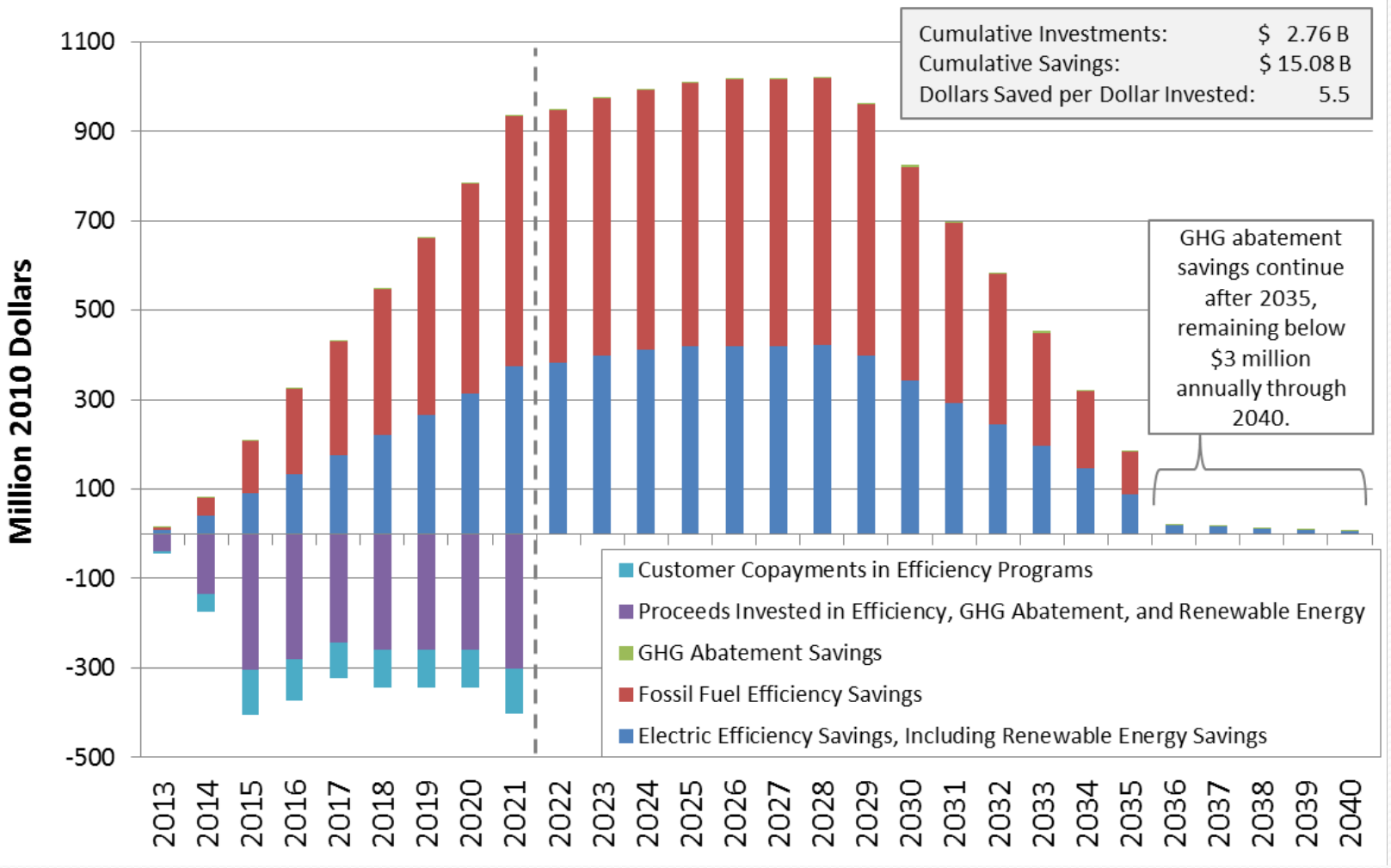
REMI Assumptions

Timing and Duration of Investment of RGGI Proceeds

- Projected fossil fuel prices post-2020 were made using the AEO 2012 high oil price cases data

- Projected electricity prices post-2020 were extrapolated from IPM by using the AEO 2012 electricity price growth rate

91 Cap Bank MR Case REMI Inputs:
Investments in Efficiency and Bill Savings (2013-2040)



REMI Assumptions

IPM Output on Electricity Market Changes

- IPM outputs reflect incremental changes in the electricity market's response to RGGI, which in turn influence regional economic activity

- IPM 91 Cap Bank MR Case models the RGGI program from 2012 to 2020

REMI Assumptions

IPM Output on Electricity Market Changes

- REMI analysis uses data from the IPM model outputs (2012-2020), including incremental changes from the reference case to potential cap scenarios in:
  - Projected energy prices
  - Projected CO_2 allowance prices
  - Generation
  - Load
  - Fuel mix
  - Imports
  - Energy Costs: Overnight capital, retrofit, new build, fixed and variable O&M, fuel

REMI Assumptions

IPM Output on Electricity Market Changes

- **Regional changes in electricity market outcomes**
  - **Impacts to Generators—net impacts equal sum of following components:**
    - Allowance purchases by generators with CO_2 emissions (-)
    - Impact of allowance price on generator revenues (+/-)
    - Impact on load due to investments in EE (-)
    - Change in generation (imports, effect of EE) (-)
  - **Impacts to Ratepayers—net impacts equal sum of following components:**
    - Influence of allowance purchases (-)
    - Impact on load due to investments in EE (+)
    - Avoided Energy and Capacity Costs from EE (+)
    - Avoided Distribution Costs from EE (+)

REMI Assumptions

IPM Output on Electricity Market Changes

- **Regional changes in electricity market outcomes (*continued*)**
  - **Impacts to Shareholders of Generation Companies:**
    - Change in marginal generator income x 14% (population of 9 RGGI states as % of US total) (-)
  - **Other Economic Impacts:**
    - Changes in new capacity builds (-)
    - Changes in retrofits to existing capacity (-)

REMI Results

Summary of Regional Economic Impacts

- **Results for the 91 Cap Bank MR Case are presented as both:**
  - **Value change** (in 2010$ or job-years) between the 91 Cap Bank Model Rule case and business-as-usual regional economy (REMI Reference Case)
  - **Percentage change** between the 91 Cap Bank Model Rule Case from the business-as-usual regional economy (REMI Reference Case)

Summary of Regional Economic Impacts *(3% Discount Rate)*

Summary of Regional Economic Impacts, 2012-2040

Scenario	91 Cap Bank MR
Cumulative Change in Gross State Product ($2010)	$8.7 Billion
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional GSP:	$48,000 Billion
Cumulative Change in Employment (Job-Years)	131,900
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional Employment:	941,000,000
Cumulative Change in Real Personal Income ($2010)	$7.2 Billion
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional Real Personal Income:	$43,000 Billion

Additional REMI Results

Summary of Regional Economic Impacts *(0% Discount Rate)*

Summary of Regional Economic Impacts, 2012-2040

Scenario	91 Cap Bank MR
Cumulative Change in Gross State Product ($2010)	$15.3 Billion
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional GSP:	$74,000 Billion
Cumulative Change in Employment (Job-Years)	131,900
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional Employment:	941,000,000
Cumulative Change in Real Personal Income ($2010)	$13.0 Billion
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional Real Personal Income:	$66,000 Billion

Summary of Regional Economic Impacts *(7% Discount Rate)*

Summary of Regional Economic Impacts, 2012-2040

Scenario	91 Cap Bank MR
Cumulative Change in Gross State Product ($2010)	$4.2 Billion
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional GSP:	$31,000 Billion
Cumulative Change in Employment (Job-Years)	131,900
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional Employment:	941,000,000
Cumulative Change in Real Personal Income ($2010)	$3.3 Billion
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional Real Personal Income:	$28,000 Billion

TECHNICAL SUPPORT DOCUMENT FOR AMENDMENTS TO COMAR 26.09 MD CO_2 Budget Trading Program

JULY 26, 2013

APPENDIX D: BILL IMPACT ANALYSIS

Customer Electricity Bill Analysis: 91 Cap Bank Model Rule Case

June 3, 2013

Agenda

- Overview of Analysis
- Analysis Group Methodology
- Assumptions Development and Sources
  - Model Assumptions
  - State Assumptions
- Results

IPM 91 Cap Bank Model Rule Case

- The **IPM 91 Cap Bank Model Rule and 91 Cap Alt Bank Model Rule cases** were released on February 7, 2013.
- The **IPM 91 Cap Bank Model Rule Case** incorporated the program elements included in the *Updated Model Rule* released on February 7, 2013.
- The customer electricity bills analysis has been updated to reflect the IPM modeling results for the **IPM 91 Cap Bank Model Rule Case**.
- This presentation provides an analysis of the potential change in the average monthly customer electricity bill based on changes from the **IPM Reference Case** to the **IPM 91 Cap Bank Model Rule Case (91 Cap Bank MR Case)**.

Methodology

- **Analysis Group Analysis:**
  - Calculates the potential change in the average monthly electricity bill on a residential, commercial, and industrial customer class average basis (change from IPM Reference Case to 91 Cap Bank MR Case).
  - Includes adjustment to customer class average consumption each year based on total energy efficiency (EE) savings in that customer class
  - Includes adjustment to the average monthly bill by customer class as a result of investments in direct bill assistance
- **Does not account for:**
  - Savings due to fossil fuel EE investments
  - Savings on customer bills post-2020 due to EE investments made during the IPM modeling period (2012-2020)

Methodology – Average Monthly Bill Impact Calculation

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$/kWh x Monthly kWh = $/Month

Energy Rate

- Reflects wholesale electricity prices – affects competitive supply offers and standard offer/default service rates
- Modeled by ICF for reference and policy scenario through 2020
- IPM model prices reflect impact of lower load (GWh) due to investments in energy efficiency
- Same for all customer classes

Delivery (T/D) Rate

- Reflects cost of delivery of electricity to end-use customer, including transmission, distribution, customer charges, etc.
- Based on 5-year averages, using public data reported by distribution companies to EIA
- Calculated for each customer class

Average Monthly Use

- Based on historical consumption, using public data reported by distribution companies to EIA
- Five-year average to smooth out annual weather-driven variations
- Includes adjustment to customer average usage (GWh) due to investments in energy efficiency
- Average calculated for each customer class

Average Monthly Bill

- Product of combined customer-class average energy and delivery rates, and average customer class monthly consumption
- Adjusted for direct bill assistance refunds for each customer class

Average Monthly Bill *Impact*

- *Difference* in average monthly bill, between Reference case and Policy Case

Does not account for :

- Savings on customer bills post 2020 due to EE investments made during the IPM modeling period (2012-2020)
- Savings due to fossil fuel EE investments

Model Assumptions – Electricity Rates & Average Monthly Usage

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- **Electricity Rate Assumptions ($/kWh)**
  - **Energy Rates:** IPM model output; prices reflect impact of lower load (GWh) due to investments in energy efficiency
  - **Delivery (T/D) Rate:** 5-year average rates from U.S. Energy Information Association (EIA)
- **Average Monthly Usage Assumptions**
  - **Historical Usage Data:** 5-year averaged data from EIA
  - Adjustment made to customer average usage (GWh) due to investments in energy efficiency

State Assumptions – Projected Proceed Investments

- Cumulative projected proceeds for the **IPM Reference case** are **$1,549.38 Million** (2010$)**.**
- Cumulative projected proceeds for the **91 Cap Bank MR Case** is **$3,957.34 Million** (2010$), representing an additional **$2,407.96 Million** (2010$) in proceeds compared to the Reference Case.
  - Annual proceeds were calculated by multiplying the estimated number of allowances projected to be purchased at auction by the projected CO_2 allowance price.
  - For the IPM reference case, calculation assumes that the market purchases enough allowances to meet demand based on emissions, minus the 47M banked allowances from first control period spread over the time horizon.
  - For the 91 Cap Bank MR Case, calculation assumes in 2012 that the market purchases allowances to meet demand based on emissions. For 2013, assumes that the market is made aware of new policies in 2013 and assumes market purchases 100% of available allowances. Post 2013, assumes that the market purchases all available allowances.

State Assumptions – Projected Proceed Investments

- **Projected Proceed Investments:** States made assumptions on how projected additional proceeds from the 91 Cap Bank MR Case may be invested in the following categories:
  - Electric EE
  - Fossil Fuel EE
  - Clean & Renewable Energy
  - GHG Abatement & Climate Change Programs
  - Direct Bill Assistance
  - Admin/Other

State Assumptions – Projected Proceed Investments

- **State Proceed Investments:** The table below provides the breakdown of how each state assumed to invest the additional proceeds in the 91 Cap Bank MR Case (through 2020) compared to the Reference Case.

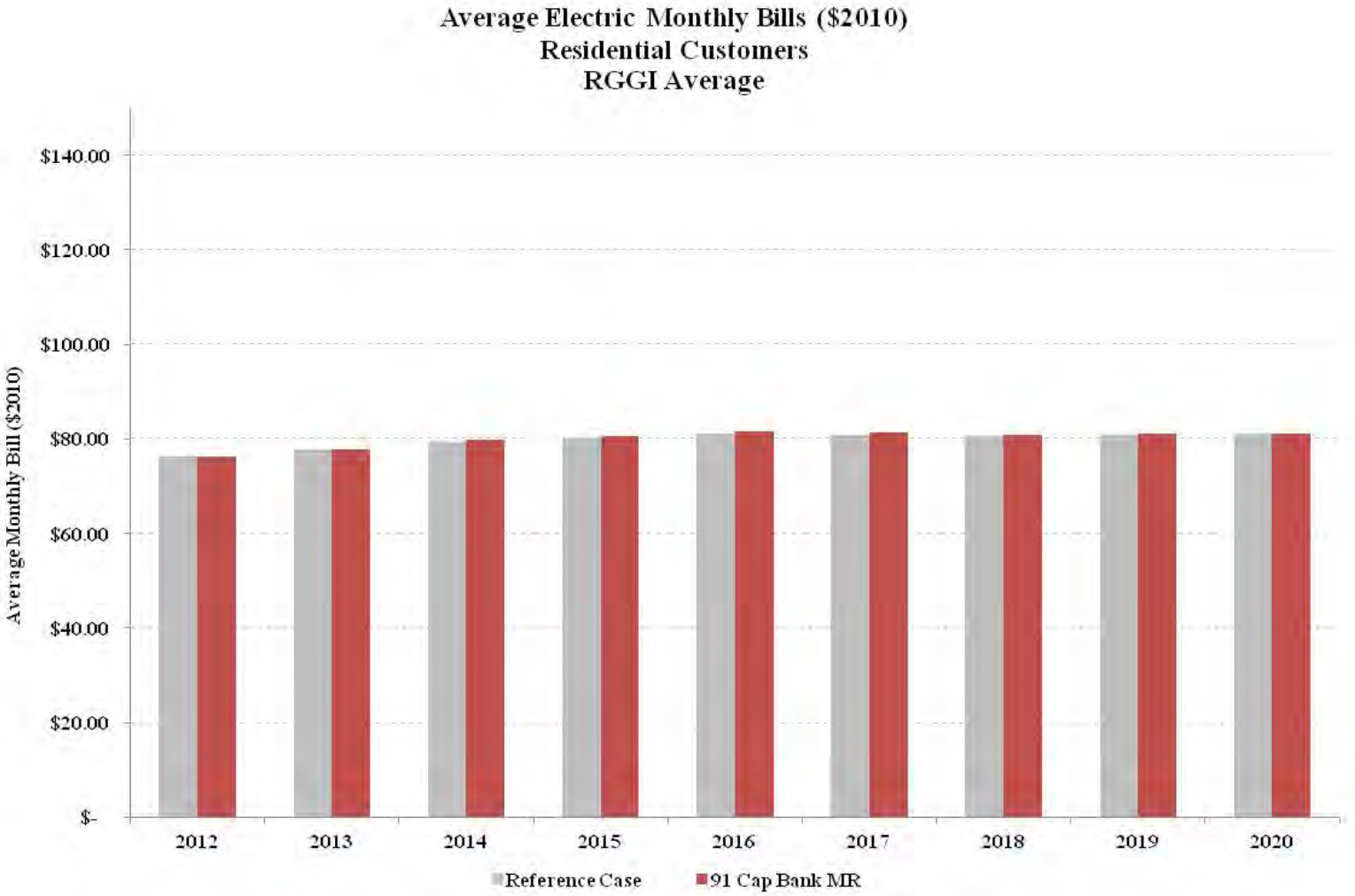
State	Electric EE Investments	Fossil Fuel EE Investments	Clean & Renewable Energy Investments	Direct Bill Assistance	GHG Abatement & Climate Change Programs	Admin/ Other	Total
Connecticut	50.0%*	19.5%*	23.0%*	0.0%*	7.5%*	0.0%	**100%**
Delaware	65.0%	10.0%	0.0%	5.0%	15.0%	5.0%	**100%**
Maine	68.0%*	13.0%	0.0%	14.0%	0.0%	5.0%*	**100%**
Maryland	46.0%	0.0%	10.5%	40.0%	$1M	3.5%	**100%**
Massachusetts	94.0%	6.0%	0.0%	0.0%	0.0%	0.0%	**100%**
New Hampshire	25.3%*	25.3%*	0.0%	46.2%*	0.0%	3.2%*	**100%**
New York	16.0%	59.0%	0.0%	0.0%	10.0%	15.0%	**100%**
Rhode Island	95.0%*	0.0%	0.0%	0.0%	0.0%	5.0%*	**100%**
Vermont	0.0%	98.0%	0.0%	0.0%	0.0%	2.0%	**100%**

* Percentage invested may vary based on annual projected allowance prices.

Results

The following slides show results for the 91 Cap Bank MR Case from 2012-2020, consistent with the IPM modeling timeline.

Residential Average Bills
91 Cap Bank MR Case & Reference Case (2012-2020)



Notes:
[1] Usage and Delivery rates based on 5-year historical averages from EIA. Energy rates and avoided load totals based on ICF modeling.

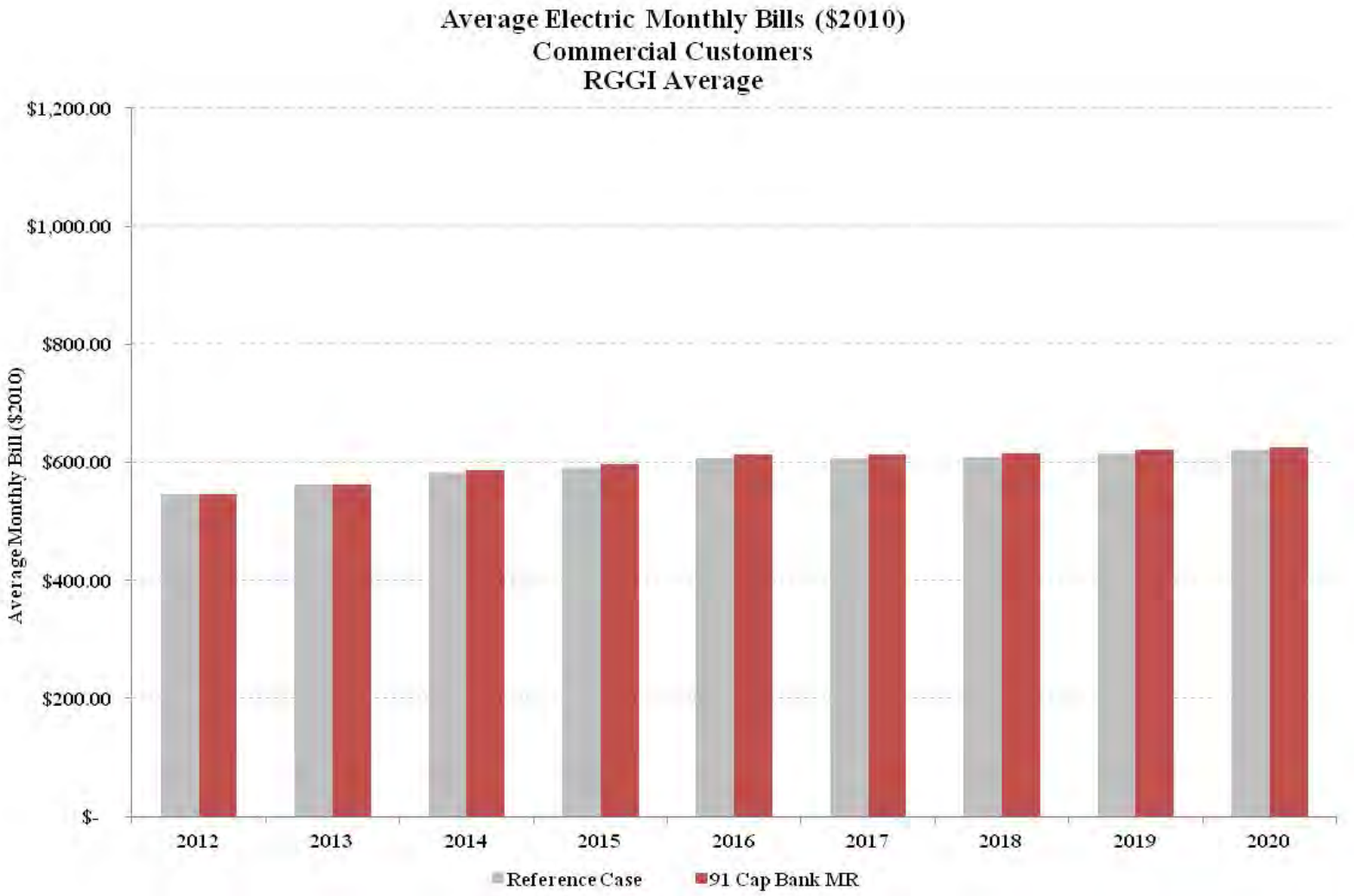
Regional Average Bill Impacts – 91 Cap Bank MR Case
Residential Results (2012-2020)

RGGI Inc.

Average Bill Impacts
RGGI Average Residential Customers

Year	Average Monthly Bill ($2010) Reference Case	Difference between Reference Case and Scenario Cases ($2010) 91 Cap Bank MR Average Monthly Difference ($2010)	Percent Difference
2012	$ 76.28	$ (0.01)	0.0%
2013	$ 77.72	$ (0.11)	-0.1%
2014	$ 79.32	$ 0.28	0.3%
2015	$ 79.91	$ 0.34	0.4%
2016	$ 81.08	$ 0.35	0.4%
2017	$ 80.77	$ 0.30	0.4%
2018	$ 80.42	$ 0.27	0.3%
2019	$ 80.74	$ 0.10	0.1%
2020	$ 81.00	$ (0.13)	-0.2%
Average	$ 79.70	$ 0.16	0.2%

Commercial Average Bills
91 Cap Bank MR Case & Reference Case (2012-2020)



Notes:
[1] Usage and Delivery rates based on 5-year historical averages from EIA. Energy rates and avoided load totals based on ICF modeling.

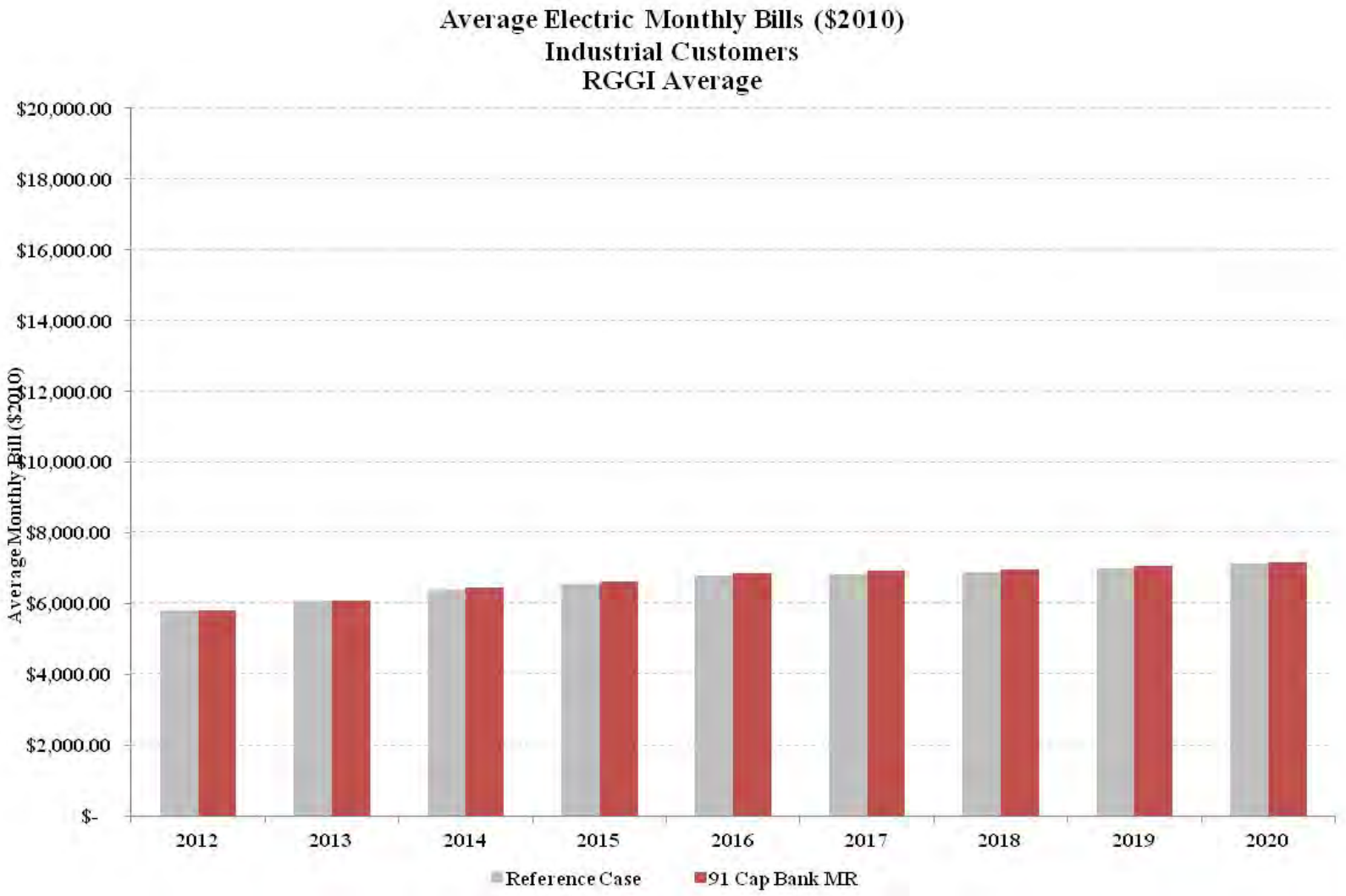
Regional Average Bill Impacts – 91 Cap Bank MR Case
Commercial Results (2012-2020)

RGGI Inc.

Average Bill Impacts
RGGI Average Commercial Customers

Year	Average Monthly Bill ($2010) Reference Case	Difference between Reference Case and Scenario Cases ($2010) 91 Cap Bank MR Average Monthly Difference ($2010)	Percent Difference
2012	$ 545.27	$ 0.00	0.0%
2013	$ 562.86	$ (0.12)	0.0%
2014	$ 581.79	$ 5.26	0.9%
2015	$ 591.41	$ 6.12	1.0%
2016	$ 606.22	$ 6.36	1.0%
2017	$ 607.45	$ 6.52	1.1%
2018	$ 608.21	$ 6.70	1.1%
2019	$ 614.85	$ 5.55	0.9%
2020	$ 621.05	$ 4.29	0.7%
Average	$ 593.23	$ 4.52	0.8%

Industrial Average Bills
91 Cap Bank MR Case & Reference Case (2012-2020)



Notes:
[1] Usage and Delivery rates based on 5-year historical averages from EIA. Energy rates and avoided load totals based on ICF modeling.

Regional Average Bill Impacts – 91 Cap Bank MR Case
Industrial Results (2012-2020)

RGGI Inc.

Average Bill Impacts
RGGI Average Industrial Customers

Year	Average Monthly Bill ($2010) Reference Case	Difference between Reference Case and Scenario Cases ($2010) 91 Cap Bank MR Average Monthly Difference ($2010)	Percent Difference
2012	$ 5,812.52	$ (0.05)	0.0%
2013	$ 6,087.00	$ (2.30)	0.0%
2014	$ 6,377.85	$ 67.75	1.1%
2015	$ 6,544.06	$ 79.36	1.2%
2016	$ 6,777.80	$ 82.51	1.2%
2017	$ 6,830.58	$ 84.77	1.2%
2018	$ 6,875.96	$ 87.29	1.3%
2019	$ 6,998.25	$ 72.19	1.0%
2020	$ 7,113.54	$ 55.23	0.8%
Average	$ 6,601.95	$ 58.53	0.9%

Regional Average Bill Impacts – 91 Cap Bank MR Case Summary Results

RGGI Inc.

RGGI Average Monthly Bill Impact for years 2012-2020

	Reference Case	91 Cap Bank MR	
Customer Class	Average Monthly Bill ($2010)	Average Monthly Difference	Percent Difference
Residential	$ 79.70	$ 0.16	0.2%
Commercial	$ 593.23	$ 4.52	0.8%
Industrial	$ 6,601.95	$ 58.53	0.9%

MD Average Bill Impacts –
IPM 91 Cap Bank Model Rule Scenario Summary Results

RGGI Inc.

MD Monthly Bill Impact for years 2012-2020

	Reference Case	91 Cap Bank MR	
Customer Class	Average Monthly Bill ($2010)	Average Monthly Difference	Percent Difference
Residential	$ 82.30	$ (1.23)	-1.5%
Commercial	$ 692.99	$ 2.29	0.3%
Industrial	$ 2,912.27	$ 12.85	0.4%

MD Average Bill Impacts –
IPM 91 Cap Bank Model Rule Scenario Residential Results (2012-2020)

Average Bill Impacts
MD Residential Customers

	Average Monthly Bill ($2010)	Difference between Reference Case and Scenario Cases ($2010)	
		91 Cap Bank MR	
Year	Reference Case	Average Monthly Difference ($2010)	Percent Difference
2012	$ 76.22	$ (0.04)	-0.1%
2013	$ 78.88	$ (0.50)	-0.6%
2014	$ 80.78	$ (1.22)	-1.5%
2015	$ 82.01	$ (1.20)	-1.5%
2016	$ 84.42	$ (1.33)	-1.6%
2017	$ 84.24	$ (1.33)	-1.6%
2018	$ 84.01	$ (1.24)	-1.5%
2019	$ 84.74	$ (1.76)	-2.1%
2020	$ 85.40	$ (2.48)	-2.9%
Average	$ 82.30	$ (1.23)	-1.5%

MD Average Bill Impacts –
IPM 91 Cap Bank Model Rule Scenario Commercial Results (2012-2020)

RGGI Inc.

Average Bill Impacts
MD Commercial Customers

Year	Average Monthly Bill ($2010) Reference Case	Difference between Reference Case and Scenario Cases ($2010) 91 Cap Bank MR Average Monthly Difference ($2010)	Percent Difference
2012	$ 612.19	$ (0.01)	0.0%
2013	$ 643.90	$ (0.16)	0.0%
2014	$ 668.02	$ 1.29	0.2%
2015	$ 685.52	$ 2.49	0.4%
2016	$ 714.39	$ 1.56	0.2%
2017	$ 717.51	$ 4.28	0.6%
2018	$ 720.02	$ 6.99	1.0%
2019	$ 731.99	$ 3.74	0.5%
2020	$ 743.40	$ 0.45	0.1%
Average	$ 692.99	$ 2.29	0.3%

MD Average Bill Impacts –
IPM 91 Cap Bank Model Rule Scenario Industrial Results (2012-2020)

Average Bill Impacts
MD Industrial Customers

Year	Average Monthly Bill ($2010) Reference Case	Difference between Reference Case and Scenario Cases ($2010) 91 Cap Bank MR Average Monthly Difference ($2010)	Percent Difference
2012	$ 2,451.95	$ (0.02)	0.0%
2013	$ 2,624.77	$ (0.58)	0.0%
2014	$ 2,759.71	$ 7.06	0.3%
2015	$ 2,861.64	$ 13.42	0.5%
2016	$ 3,019.13	$ 9.22	0.3%
2017	$ 3,049.29	$ 23.03	0.8%
2018	$ 3,076.08	$ 36.82	1.2%
2019	$ 3,149.00	$ 21.24	0.7%
2020	$ 3,218.84	$ 5.50	0.2%
Average	$ 2,912.27	$ 12.85	0.4%

Previous 91 Cap Scenarios Modeling:			
Scenario	% Change in Average Monthly Bill Compared to Reference Case, 2012-2020		
	Residential	Commercial	Industrial
91 Cap Alt Bank IPM Scenario (Released January 14, 2013):	- 1.3%	+ 0.4%	+ 0.6%
Interim 91 Cap Bank MR Scenario (Draft April 9, 2013):	- 1.5%	+ 0.3%	+ 0.4%