Path to Prosperity

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# Exit RGGI: The Potential Economic Impact of a Maine Withdrawal from the Regional Greenhouse Gas Initiative

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## Executive Summary

The Regional Greenhouse Gas Initiative (RGGI) is a carbon dioxide cap and trade agreement between nine states in the Northeastern United States. RGGI Inc. is the entity responsible for managing the goals of the law. RGGI determines a limit on the amount of carbon dioxide ($CO_2$) emitted by all of the regulated electric power plants in the region equal to a total number of tons per year. Each state agrees to issue a fixed number of allowances corresponding to this limit, proportional to the number of power plants in the state.

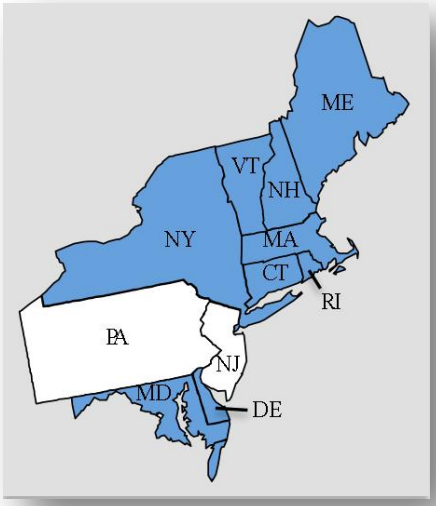
To estimate the economic effects of a hypothetical departure by Maine from the RGGI the Beacon Hill Institute applied its Maine STAMP® (State Tax Analysis Modeling Program). Since its inception in 2008, Maine's qualified electric producers have paid over $48 million dollars to purchase almost 20 million allowances for an average cost of $2.41 each. Maine Efficiency Trust is the largest beneficiary of proceeds from the auctions, which the trust uses to fund energy efficiency and renewable energy programs.

In 2013, RGGI changed its "Model Rule" to cut the number of allowances available for auction by almost half to 91 million short tons starting in 2014. As a result, allowance prices increased dramatically. RGGI's own analysis indicates that allowance prices will more than double to $6.02 per ton in 2014 and increase to $8.41 by 2020 under their baseline scenario, and skyrocket to $7.27 in 2014 and $10.15 in 2020 under a high cost scenario.

We base our estimates on the emissions cap and auction prices from RGGI's 2012 Program Review. We provide two estimates: (1) using the RGGI reference case allowances prices and (2) the prices at which cost containment provisions would be triggered. Our major findings show that Maine exiting the RGGI program will:

- save affected electricity producers and thus consumers $106 to $132 million from 2015 to 2020;
- raise employment by an expected 270 to 330 jobs over the period;
- increase real disposable income by $10 million to $11 million; and
- boost investment by $5 to $6 million.

## Introduction




The Regional Greenhouse Gas Initiative (RGGI) is a carbon dioxide cap and trade agreement between nine states in the Northeastern United States — Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island and Vermont. Its purpose is to reduce carbon dioxide emissions from electric power plants.[1]

Cap and trade programs are designed to limit pollutants generated by power plants while providing flexibility in the methods used to comply with the limits. Power plants obtain tradable permits to emit specific amounts of a regulated substance. The number of permits is limited by a regulatory agency or by direct legislation. Permits are either issued to sources at no cost or sold at auction. They are then traded among firms. The requirements to use the permits and the market for a finite number of permits together generate costs that are designed to provide an incentive for firms to reduce the amount of pollution they emit. At the same time, trading introduces flexibility, intended to encourage innovation and minimize economic disruption.

The first cap and trade program in the United States was the Acid Rain Program of the U.S. Environmental Protection Agency, which began in 1995. Power plants were given permission to emit an amount of sulfur dioxide as a percentage of output. Subsequent modifications implemented in 2000 increased the scope of the program, lowered the percentage of emissions allowed, and capped the amount of sulfur dioxide that could be generated by all of the regulated power plants combined.[2] There is strong evidence that cap and trade to curb acid rain did effectively cut down on sulfur dioxide emissions but replicating such a program for greenhouse gases could be far more challenging.[3]

## How RGGI Works

RGGI determines a limit on the amount of carbon dioxide ($CO_2$) emitted by all of the regulated electric power plants in the region to a total number of tons per year. Each state agrees to issue a fixed number of allowances corresponding to this limit, proportional to the number of power plants in the state. The majority of these permits are sold at auctions managed by RGGI that are held four times a year.

RGGI, Inc. is a non-profit corporation with no regulatory authority. Instead, it drafts a comprehensive regulatory program called the Model Rule, which must be adopted by the legislature in each participating state.[4] RGGI, Inc. provides services through subcontractors to implement the regulations including monitoring emissions, compliance and managing the auction process. Its operations are funded by the states that contract with RGGI to administer

the program. The RGGI, Inc. Board of Directors consists of two representatives from each state who are heads of the member states' environmental regulatory agencies.[5]

Each state enacts its own regulations based on the Model Rule, with some variation allowed outside of the core program.[6] RGGI, Inc. grants each state a number of allowances that are sold at quarterly auctions. One allowance permits a power company to emit one short ton, or 2000 pounds, of $CO_2$. For the first three years of the program, the total number of allowances was fixed at 188 million short tons.[7] These allowances can be traded on a secondary market, and regulated power plants can use $CO_2$ allowances issued by any participating state. In addition to these allowances, the first Model Rule provided for allowances based on certifiable reductions in $CO_2$ emissions during the three years prior to the implementation of the program.[8] There are also provisions for allowances to be issued for voluntary renewable energy programs and optional limited industrial exemptions.[9]

The Model Rule defines a control period of three years. The first control period included the calendar years from 2009 to 2011. By March 2012, each power plant was required to submit a number of allowances equal to the tons of $CO_2$ emitted during the control period, or be subject to penalties determined by the state regulatory agencies. A provision to extend the control period by one year in case the price of an allowance reached a particular value was adopted. This ceiling was never reached, and the second control period began on January 2012.

The Model Rule —and consequently the regulations imposed by the member states— apply to any fossil-fuel generator with a nameplate capacity equal to or greater than 25 megawatts of electricity.[10] Nameplate capacity is defined as the maximum sustained electricity output that a power plant can generate during operation unrestricted by external factors such as fuel supply or seasonal restrictions.[11] Such a generator is called a unit, and a source is a company that owns one or more units. $CO_2$ output and allowances pertain to sources. Currently, RGGI applies to 167 power plants.[12] States have the option to grant exemptions to power plants under certain conditions.

Auctions for allowances are managed by RGGI, Inc. and are held quarterly. Each state has the option to offer allowances for sale, and in general, all states offer most of the allowances that they have to sell.[13] From the first auctions in September and December 2008, prior to the beginning of the first control period, to mid-2010, all available allowances were purchased. During this period, the clearing price fell from an initial price of around $3.00 to less than $2.00. Subsequently, until the end of 2012, some percentage of allowances were unsold at each auction, and the price of an allowance remained under $2.00 as it became clear that $CO_2$ emissions for the control period would fall below the regional cap. Most of the unsold allowances were retired; that is, they were not allocated or reserved for

future allocation by the states, but were removed from circulation. Throughout 2013, in anticipation of the stricter regulations that came into effect at the start of 2014, all permits have been sold at each auction, and the price has fluctuated around $3.00.

Initially, the goal of RGGI was to stabilize $CO_2$ emissions generated by regional power plants at current levels and then reduce them gradually by ten percent by the year 2016. The initial cap was 188 million short tons, which was reduced to 165 million short tons after the withdrawal of New Jersey at the end of 2012. At the time the program was implemented, $CO_2$ emission levels had already fallen substantially, and continue to fall. This was due to the economic downturn that began in 2008 and to an increase in the use of natural gas, which emits less $CO_2$ than coal, the main source of power replaced by natural gas. As a result, total auction proceeds for 2010, 2011 and 2012 were $283 million, $175 million, and $168 million, respectfully.[14]

State payments to RGGI, Inc. for program administration amounted to just under $2 million per year between 2010 and 2012.[15] . Due to the decline in auction proceeds, the percentage of auction proceeds used to fund RGGI, Inc. operations rose from 0.70 percent to 1.13 percent. For 2014, state payment obligations were budgeted at $1.7 million or 3.60 percent of the total state payments.

According to the U.S. Energy Information Agency (EIA), the use of coal declined from 23 percent of the RGGI state's power resource used in 2005 to 9 percent in 2012, while the use of natural gas increased from 25 percent to 44 percent over the same period.[16] Factors that have been attributed to RGGI itself include conservation efforts implemented by the states that were funded by the proceeds of the allowance auctions.

This disparity was reflected in the quarterly auctions for allowances. After an initial period, the demand for allowances fell during the first compliance period, resulting in a drop in price and a situation in which the total number of allowances for which bids were submitted was less than the amount offered during some of the auctions.

## 2012 Model Rule Change

A program review by RGGI, Inc. in 2012 recommended, among other things, that the cap on $CO_2$ emissions be lowered by 45 percent, to 91 million short tons. This recommendation was incorporated into a revised Model Rule in December 2012 and will take effect starting with the first auction on March 5, 2014. [17]


The most significant change to the Model Rule is the new cap. During 2013, in anticipation of the change, auctions resulted in sales of all allowances offered, with bids double the available allowances. In addition to lowering the cap,

the number of allowances offered is reduced by a percentage of the amount of banked allowances that are held by regulated entities at the end of the first control period. Banked allowances are allowances bought in prior years, but not yet retired. This adjustment will be made over the 7-year period from 2014 to 2020. A second adjustment will be made for 2012 and 2013 allowances that exceed the total quantity of 2012 and 2013 emissions. This amount will be subtracted from the total cap over the six-year period from 2015 to 2020 after the actual size of the excess is determined.[18]

Other changes include the definition of an interim control period consisting of the first two years of the three-year control period. At the end of this period, sources are required to hold 50 percent of the allowances that they will need to have at the end of the control period. The new rules also eliminate the extension of the control period by one year in case the price allowances exceed a maximum level. Instead, a cost containment reserve of additional allowances will be created, to be released immediately in any auction in which the demand for allowances at prices above a certain cap exceeded the supply of allowances offered for sale in that auction. This cap starts at $4 in 2014 and increases by $2 for the next three years, increasing 2.5 percent thereafter.[19]

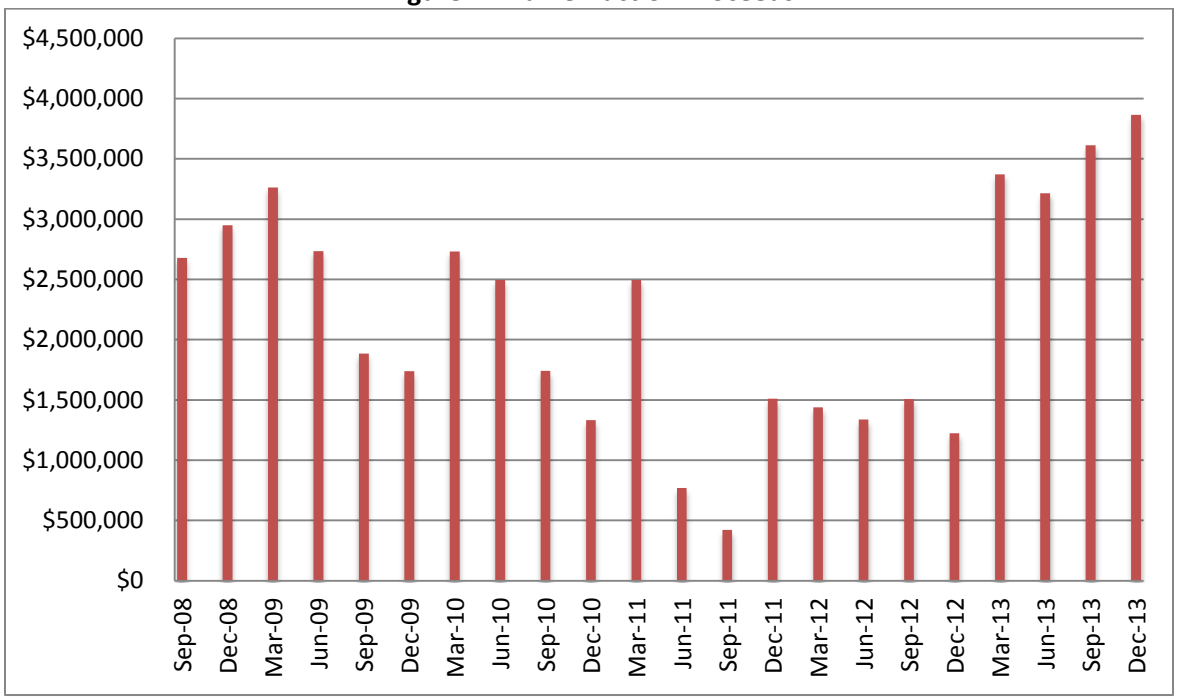
## Maine and RGGI

The State of Maine provides a portion of RGGI's operating expenses commensurate with its share of regulated sources. For 2014, state payment obligations were budgeted at $1,651,460, of which Maine's share is $70,770, or 3.60 percent of the total state payments.[20]

The state of Maine exempts units that supply 10 percent or less of their annual gross generations to the electric grid, and those, which generate more than 50 percent of combustion using fuels other than fossil fuels.[21] Furthermore, offset allowances can be granted for a number of conservation projects, including landfill methane capture and destruction, reduction in emissions of sulfur hexafluoride ($SF_6$), sequestration of carbon due to reforestation, improved forest management or avoided conversion, reduction or avoidance of $CO_2$ emissions from natural gas, oil, or propane end-use combustion due to end-use energy efficiency; and avoided methane emissions from agricultural manure management operations.[22]

According to the U.S. Energy Information Administration, nearly half of the electricity in Maine is provided by renewable sources such as hydroelectric dams and biomass from wood products.[23] RGGI lists six facilities in Maine, which fall under its oversight: Androscoggin Energy, which is owned and operated by Verso Paper, Bucksport Clean Energy, Maine Independence Station, Rumford Power, Westbrook Energy Center and William F. Wyman.[24]

**Figure 1: Maine Auction Proceeds**




The proceeds from the auction of Maine's share of $CO_2$ allowances are distributed by the Efficiency Maine trust. Quarterly auction revenue amounts are shown in Graph 1 below.[25] The trust distributes money to various energy efficiency programs including grants for large-scale energy efficiency projects, incentives for homes and businesses to upgrade equipment and appliances with energy-efficient alternatives, and low-income weatherization programs. During the latter part of the first control period, until 2013, not all allowances were sold at the quarterly auctions, and revenue gradually declined. Throughout 2013, all allowances were sold at each auction.

In May of 2011, the Governor of New Jersey, Chris Christie, announced the state's intention to withdraw from RGGI by the end of the year. In the announcement, he claimed that because of the high cap and low cost of allowances, RGGI had had no effect on $CO_2$ emissions, and that New Jersey's $CO_2$ emissions had already fallen to less than the target quantity for the year 2020 for other reasons. Governor Christie characterized the initiative as a tax and voiced the concern that if the cap were too stringent, the increase in the cost of electricity would benefit power plants in Pennsylvania, which does not participate in RGGI, at the expense of New Jersey providers.[26]

In light of the new Model Rule, which will impose dramatically lower (and declining) level of emissions permits, the auction prices should increase significantly. As noted above, last year power producers anticipated the tighter restrictions and future cost increases by purchasing all available permits at an average price of $3 per ton, much higher than the previous average price of $2 per ton. This is likely to foreshadow much higher auction price over the next five years, which will be passed on the electricity consumers in the participating states.

## RGGI's Economic Estimates of the New Model Rule


RGGI, Inc. conducted a cost and economic impact analysis of a New Model Rule cap of 91 million tons that went into effect this year. RGGI, Inc. estimates that the auction proceeds of approximately $3.957 billion in the period from 2012 to 2020, or an additional $2.408 billion under the previous rule. RGGI, Inc.'s analysis assumes that the vast majority of the proceeds will be used to fund energy efficiency and renewable energy programs.[27]

RGGI, Inc. also reports the economic impact of energy efficiency investments from auction proceeds and electricity customer co-payments of $2.76 billion produce $15.08 billion from 2013 to 2040. RGGI, Inc. reports $5.5 dollars of savings for each dollar of investment, for an astounding return on investment of 550 percent. The numbers are clearly flawed. RGGI, Inc. reports that the 91 million ton cap will produce an increase of $8.7 billion in GDP, an increase of $7.2 billion in personal income and an increase of 131,900 job years.[28]

The results from RGGI, Inc.'s methodology do not stand up to any reasonable economic analysis. In fact, they are admittedly not based on any kind of formal study. These large positive economic impacts prompt BHI to question aspects of the analysis and the details of the inputs. However, in an email response, a RGGI representative indicated that no formal study existed.[29]

First RGGI, Inc.'s accounting calls into question the robustness of its approach. RGGI, Inc. reports the employment effects in job years instead of jobs, which inflates the employment effects to include temporary jobs. If a worker holds a job for one year, RGGI counts it as one "job year" and if that worker holds a job for the entire 28-year period, RGGI considers it 28 job years. If we divide the 131,900 job years by the 28 reporting years (2012-2040 reported by RGGI), we get 4,711 full time equivalent jobs over the entire period and the entire nine states, or, on average 523 jobs per state. Using Maine's portion of the projected emissions as a proxy for auction proceeds, we estimate that the employment effect for Maine would be 188 jobs over the entire 28-year period.

If the RGGI, Inc. economic analysis repeated the same double counting of jobs as "job years" in their reporting for increases in GDP and personal income we would find similar reductions. The $8.7 billion increase in GDP reported for the entire period becomes $311 million, or $12.4 million for Maine and $7.2 billion increase in personal income would become $257 million for the RGGI states and $10.3 million for Maine. Finally, the 550 percent investment return rate would become 19.64 percent, which is still a very optimistic rate of investment return.

Did RGGI, Inc. account for the law of diminishing marginal returns in estimating the savings from the energy efficiency investments? The first dollar invested should provide a much larger return on investment than the last dollar invested. With an average investment return of 550 percent, the first invested dollars would have an even much higher return, which seems implausible.

Did the RGGI, Inc. energy efficiency analysis account for the rebound effect or free riders? The rebound effect is a term used to describe the fact that the demand curve for energy consumption is downward sloping. Therefore, energy being a normal good, any reduction in energy prices or bills due to energy efficiency investments will be offset, at least partially, by an increase in the quantity demanded. Free riders are businesses or households that would have made the energy efficiency investment without the subsidy program, but applied for the program to gain the benefits. As Efficiency Maine explains in their Triennial Review, "The baseline is adjusted to account for the share of program participants that might have chosen the efficient measure in the absence of the program, as well as other similar effects."[30] Again, it is not clear the RGGI, Inc. analysis made such adjustments.

More problematic is that RGGI, Inc. "projected fossil fuel prices post-2020 were made using the EIA's AEO [Annual Energy Outlook] 2012 high oil price cases data."[31] According to the AEO forecast, domestic oil prices will rise to $182.10 per barrel next year from a current price of $101 today, then increase further to $193.48 in 2025 and to $200.36 in 2035, all reported in 2010 dollars. Oddly, RGGI, Inc. did not use the AEO reference case, which projects oil prices rising to $116.91 per barrel next year and $144.98 in 2035.[32] Obviously, the recent surge in domestic oil production, and surge in natural gas usage, may make the AEO reference case projections too high. Nevertheless, RGGI, Inc.'s use of the high fossil fuel prices is what drives the 550 percent return for energy efficiency investments. This clearly inflates the economic impact of these investments.

The question of net economic impact derives from the use of these funds. In its analysis, RGGI, Inc. contends that $1 added to the electricity production cost produces very little negative economic impact, presumably $1 or less. On the other hand, RGGI projects that the same $1 invested in energy efficiency and renewable energy investments produces $5.5 in net economic benefits. Again, for the reasons stated above, we find this estimate dubious.

## BHI Cost and Economic Estimates

The Beacon Hill Institute at Suffolk University (BHI) estimates the cost and benefits if Maine were to follow the New Jersey example and leave RGGI. More specifically, BHI quantifies the cost and impact on the state's economy. To that end, BHI applied its Maine STAMP® (State Tax Analysis Modeling Program) to estimate the economic effects.[33]

BHI used RGGI, Inc. projections for emissions and auction prices to estimate the auction proceeds that Maine will gain from 2015 to 2020. We include Maine's portion of the RGGI administrative fees, since these resources will be paid by Maine electricity consumers, but will not be paid to the Maine Efficiency Trust. We also use two auction prices to determine the savings to Maine's electricity consumers: the RGGI reference case and the allowance price caps under the new model rule. Table 1 displays the cost estimates and economic impact of Maine leaving the RGGI program, compared to a baseline of no policy change.

**Table 1: Auction Proceeds and Economic Estimates of Maine leaving RGGI (2014 $)**

| Costs Estimates | Reference Case | High Case |
|---|---|---|
| Total cost 2015-2020 ($ million) | 106 | 132 |
| **Economic Indicators** | | |
| Total Employment (jobs) | 270 | 330 |
| Investment ($ million) | 5 | 6 |
| Real Disposable Income ($ million) | 10 | 11 |

The state's electricity consumers would save $106 million under the baseline scenario and $132 million under the cost cap scenario. The rather modest cost numbers reflect that fact that only six power plants are affected by RGGI in Maine. Nevertheless, were Maine to leave RGGI, these funds would remain with consumers who would not be charged by power producers that must buy permits from RGGI. However, at the same time Maine would also lose the auction proceeds, which fund energy efficiency and renewable energy programs.

The STAMP model simulation indicates that Maine's exit from the RGGI program would produce very modest economic net benefits. A portion of the state's ratepayers will face slightly lower electricity prices that will reduce their cost of living, which will in turn increase household disposable income. By 2020, the Maine economy will add 270 jobs under the reference case cost scenario and 330 jobs under the high cost scenario.

The reduction in electricity price will increase real incomes as some firms and households spend less of their budget on electricity. In 2020, real disposable income would increase by $10 million to $11 million under the reference and high cost cases, respectively. Furthermore, net investment will fall by $5 million to $6 million.

If we were to apply the RGGI, Inc. analysis "job years" approach to our reference case results, the employment effects would increase to 7,560 "jobs years", real disposable income years would rise to $308 million and investment years would rise to $140 million.

These net economic benefits of Maine leaving RGGI do not affect all state households and businesses evenly: there are, as always, winners and losers. The gains flow to the owners of the electricity generation plants subject to RGGI, and the costs flow to those businesses and households that contract to provide the energy efficiency and renewable energy services. In essence, the RGGI program transfers resources from a portion of Maine's economy and to a few very narrow industries within the economy. (Thus, the gains from leaving RGGI are distributed across many and the impact on each individual is small. Whereas the losses are focused on very few, and thus the impact on each individual is large.)

## Conclusion

Since 2009, the RGGI program has redirected over $48 million from Maine's electricity consumers and producers and diverted these funds to energy efficiency renewable energy firms. The adoption of the new Model Rule will triple these funds to $146 million to $183 million over the next five years. These transfers distort the energy market in favor of more inefficient uses of the funds.

Were Maine to withdraw from the RGGI program, the market distortions would decrease and produce a small boost to economic activity. However, the gains would be spread across a great many electricity consumers, which individually would feel little change, while the costs would be felt by very small portion of firms and households.

The RGGI program has and will continue to generate economic benefits for a small group of favored industries.

## APPENDIX

## Modeling a Maine exit from RGGI using STAMP

To simulate the exit of Maine from the RGGI program, we need to calculate the amount of auction revenue that affected power plants would no longer need to buy for the period 2015-2020. We utilize the projections of emissions and auction prices data from RGGI's 2012 Program Review Final Modeling Analysis.[34] Specifically, we use the emissions and price data from the 2013 IPM Modeling results from the spreadsheets labeled "emissions" and "allowance prices" in the Excel workbook RGGI Results_91_Cap_Bank_MR.[35] We adjusted the Maine emissions budget down to reflect the initial 91 million ton cap for 2014 and the banked allowances from the first control period (296,000 tons per year) using the "2014 $CO_2$ Allowance Allocation," or 2.817 million tons.[36]

Next, we estimate the banked allowances from the second control period: 2012 and 2013. Using the 2012 and 2013 $CO_2$ Allowance Allocation to estimate that affected power plants have 2.107 million banked allowances from the second control period, which divided by 6 years (2015 – 2020) results in an additional annual budget adjustment of 351,000 tones. We subtract this amount from our estimated 2015 budget of 2.907 million to obtain our 2015 adjusted budget of 2.556 million tons. The for the $CO_2$ allocation budgets for 2016 through 2020, we simply subtracted 2.5 percent from the previous year's budget.

We calculated the Maine's auction proceeds by multiplying the $CO_2$ allocation budget for each year by the allowance prices for each year listed in the RGGI Results_91_Cap_Bank_MR. For years 2017 and 2019, we used the midpoint of the adjacent year prices; we calculated the 2017 price as the midpoint between 2016 and 2018.

We simulated these changes in the Maine STAMP model as an increase in revenue for the state sales tax on the utility sector. The funds were redirected to the utility, construction and Professional, Scientific, and Technical Services sectors. The model provides estimates of the proposals' impact on employment, wages and income. Each estimate represents the change that would take place in the indicated variable against a "baseline" assumption of the value that variable for a specified year in the absence of the policy of Maine leaving RGGI.

Because the RPS requires Maine households and firms to use more expensive "green" power than they otherwise would have under a baseline scenario, the cost of goods and services will increase under the RPS. These costs would typically manifest through higher utility bills for all sectors of the economy. For this reason, we selected the sales tax as the most fitting way to assess the impact of the RPS. Standard economic theory shows that a price increase of a good or service leads to a decrease in overall consumption, and consequently a decrease in the production of that good or service. As producer output falls, the decrease in production results in a lower demand for capital and labor.

BHI utilized its STAMP (State Tax Analysis Modeling Program) model to identify the economic effects and understand how they operate through a state's economy. STAMP is a five-year dynamic CGE (computable general equilibrium) model that has been programmed to simulate changes in taxes, costs (general and sector-specific) and other economic inputs. As such, it provides a mathematical description of the economic relationships among producers, households, governments and the rest of the world. It is general in the sense that it takes all the important markets, such as the capital and labor markets, and flows into account. It is an equilibrium model because it assumes that demand equals supply in every market (goods and services, labor and capital). This equilibrium is achieved by allowing prices to adjust within the model. It is computable because it can be used to generate numeric solutions to concrete policy and tax changes.[37]

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[34] Regional Greenhouse Gas Initiative, Inc., 2012 Program Review, (February 2013), http://www.rggi.org/design/program-review
[35] Needed
[36] Regional Greenhouse Gas Initiative, Inc., "Allowance Allocation," (January 13, 2014), http://www.rggi.org/market/tracking/allowance-allocation
[37] For a clear introduction to CGE tax models, see John B. Shoven and John Whalley, "Applied General-Equilibrium Models of Taxation and International Trade: An Introduction and Survey," *Journal of Economic Literature* 22 (September 1984): 1008. Shoven and Whalley have also written a useful book on the practice of CGE modeling entitled Applying General Equilibrium (Cambridge: Cambridge University Press, 1992).

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