Refined Economic Impact Analysis for the Greenhouse Gas Emissions Reduction Act 2012 Plan

Prepared for
Maryland Department of the Environment

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Acronyms and Abbreviations

BGE	Baltimore Gas and Electric
BWI	Baltimore/Washington International Thurgood Marshall Airport
CAP	Climate Action Plan
CAFE	Corporate Average Fuel Economy
DBED	Department of Business and Economic Development
DGS	Department of General Services
DHCD	Department of Housing and Community Development
DHMH	Department of Health and Mental Hygiene
DNR	Department of Natural Resources
EPA	U.S. Environmental Protection Agency
GGRA	Greenhouse Gas Emissions Reduction Act
GHG	Greenhouse Gas
IMPLAN	Impact Analysis for Planning
MACT	Maximum Achievable Control Technology
MARC	Maryland Area Regional Commuter
MDA	Maryland Department of Agriculture
MDOT	Maryland Department of Transportation
MDP	Maryland Department of Planning
MEA	Maryland Energy Administration
MIA	Maryland Insurance Administration
MDE	Maryland Department of the Environment
NAICS	North American Industrial Classification System
PAYD	Pay-As-You-Drive®
PEPCO	Potomac Electric Power Company
RECs	Renewable Energy Credits
RESI	Regional Economic Studies Institute of Towson University
REMI	Regional Economic Models, Inc.
RGGI	Regional Greenhouse Gas Initiative
SAM	Social Accounting Matrix
SMECO	Southern Maryland Electric Cooperative

1.0 Executive Summary

1.1 Introduction

Climate change and mitigation strategies are important factors for many elements of the economy and society in general: the rising costs of energy and transportation, threats to the environment, and the health of the greater population (and, by extension, the labor pool). Energy, transportation, agriculture and forestry, recycling, buildings, land use, and many other areas are affected by climate change. As such, mitigating climate change is a vital concern.

Maryland State government agencies are doing their part to mitigate the negative effects of climate change by creating and implementing climate change mitigation strategies designed to reduce GHG emissions in The State. The GGRA strategies under various state government agencies have been organized into eight subject areas: energy, transportation, agriculture and forestry, recycling, multi-sector, buildings, land use, and innovative initiatives.

This report is a refinement of RESI's 2014 results, taking into account the short-term job creation, economic activity, and wage effects from these GGRA strategies and potential enhancements of some programs. The 2014 report was a preliminary analysis of the potential economic impacts of mitigation strategies for the 2012 GGRA report. During this refinement, RESI used a dynamic model known as the REMI model PI+ to assist in determining cumulative benefits and annual impacts to the region. This model allowed RESI to review the interactions among agencies within the region from the strategies and changes that would result from the interaction of those agencies. The results of this report are considered to be a more accurate representation of the possible outcomes from these reduction strategies and provide a potential estimation of economic activity through 2020.

This report includes refined data from agencies that outlined spending on programs, and allocation of funds to different industries. Additionally, areas such as *Transportation* were refined with agency coordination to determine the impact from these programs directly associated with greenhouse gas reduction, and the categories of spending such as architecture, planning, land acquisition, and construction. This report highlights how the GGRA will benefit Maryland in job creation across all economic groups, as well as retain Maryland's currently highly educated workforce through programs associated with the green economy.

1.2 Summary of Findings

RESI analyzed data collected in collaboration with state agencies and MDE in order to estimate the economic impacts of climate action strategies and their subprograms. Using data contained in strategy write-ups provided by MDE as well as external research from a variety of sources, including the implementing agencies, RESI estimated the impacts of each strategy and subprogram.

RESI coordinated with state agencies to develop a methodology. The agencies assisted in the development and finalization of all assumptions used in the economic modeling for RESI's

analysis. Through this coordinated effort, RESI built upon their original design in 2011 creating an investment and operation phase. A detailed explanation of the investment and operation phases and what they entail can be found in Appendix B.1 of Appendix E of the GGRA plan.

To quantify the economic and fiscal impacts of climate action strategies and their subprograms, RESI utilized the REMI PI+ input/output model. For more information regarding REMI PI+, please refer to Appendix B.2 of Appendix E, which presents *The Economic Impact Analysis Revision for the Greenhouse Gas Emissions Reduction Act 2012 Plan* hereafter referred to as the full report in this Chapter.

A summary of RESI's findings, including the total economic impacts (employment, output, and total net benefits) of all strategies within a subject area can be found in Figure 1. Figure 2 presents the total fiscal impacts (state and local tax revenues) resulting from the investment and operation phases of the strategies. The total wage impacts can be found in Figures 3 and 4. Total net benefits can be found in Figures 5 and 6.

RESI reviewed findings for both status quo program spending and enhancement spending. Although the enhancements are not guaranteed funding, the potential to reduce more greenhouse gases and increase jobs within the state was analyzed. Enhanced programs ranged from energy, transportation, land use, and innovative initiatives. The agencies provided the potential costs to achieve these new GHG targets under the enhanced scenarios of specific strategies, and RESI used this data to create a secondary analysis.

This update provides updated costs and benefits associated with GGRA policies as analyzed in the 2014 report. In addition to updated annual data, RESI received detailed data regarding funding of programs, spending, and how programs would be implemented if enhanced GGRA reductions were approved.

For more detailed impacts and further explanation, please refer to Section 3.0 and Appendix A of the full report. Information regarding the modeling assumptions and procedures used to derive impacts for each strategy within the subject areas can be found in Appendix C of the full report. Appendix D provides a discussion of the general occupations most likely to be associated with each subject area.

Figure 1: Total Annual Economic Impacts by Strategy Subject Area—Investment and Operation Phases, 2010–2020[12]

Subject Area	Jobs[3]	Output	Total Cost	Total Net Benefit
Energy				
Status Quo	12,156.0	$14,039,556,803	$14,983,805,248	-$944,248,445
Enhancement	14,058.1	$15,448,356,592	$16,729,297,904	-$1,280,941,312
Transportation				
Status Quo	3,099.7	$3,491,312,335	$2,206,654,201	$1,284,658,134
Enhancement	6,267.7	$8,383,504,300	$4,244,515,129	$4,138,989,171
Agriculture				
Status Quo	-298.2	$2,099,151,612	$632,038,070	$1,467,113,542
Enhancement	-297.7	$2,104,949,646	$760,708,403	$1,344,241,243
Recycling				
Status Quo	325.5	$303,588,867	$9,257,145	$294,331,722
Enhancement	558.0	$419,730,048	$15,869,391	$403,860,657
Buildings				
Status Quo	726.8	$357,208,252	$7,873,194	$349,335,058
Enhancement	N/A	N/A	N/A	N/A
Land Use				
Status Quo	6,748.1	$15,258,536,194	$15,564,480,642	-$305,944,448
Enhancement	8,522.9	$21,967,353,014	$23,832,525,089	-$1,865,172,075
Innovative Initiatives				
Status Quo	3,564.2	$602,800,640	$213,878,700	$388,921,940
Enhancement	3,572.4	$616,880,934	$228,332,229	$388,548,705
Outreach				
Status Quo	0.1	$152,588	$22,500	$130,088
Enhancement	N/A	N/A	N/A	N/A
Total				
Status Quo	26,322.2	$36,152,307,291	$33,618,009,700	$2,534,297,591
Enhancement	33,442.8	$49,298,135,374	$45,819,143,839	$3,478,991,535

Source: REMI PI+, RESI

[1] The *Transportation* and *Innovative Initiatives* subject areas exhibit impacts from 2020 to 2025. However, those impacts were excluded in Figure 1 and Figure 2. For the specific distribution of impacts over time, refer to Section 3.0 of the full report. In addition, summed impacts throughout the report may not add up exactly to totals due to rounding.

[2] All dollar values are reported in 2015 dollars.

[3] Jobs figures reflect net job impacts in the year 2020.

As shown in the figure above, during the investment and operation phases of these strategies, the total economic benefits would include approximately 26,322 jobs maintained in 2020 and $36.2 billion in output between 2010 and 2020 for the status quo. The total cost of all strategies in all subject areas is approximately $33.6 billion, for the status quo. The expected net benefits under the enhanced scenarios would be $3.5 billion in net benefit with 33.4 thousand jobs maintained in 2020. The net benefit includes public and private costs. It is important to note that employment impacts are not cumulative, and therefore annual impacts are jobs created above the baseline forecast. For more information on interpreting the results, please review the REMI PI+ model overview in Appendix B.2. All employment impacts in this report represent the number of jobs created or maintained in a given year as compared to the baseline.

A summary of the wage impacts is represented in Figure 2 and 3. The investment phase generates more jobs than the operation phase because the public and private sectors must hire workers to implement the strategies. However, once policies are in place, growth stabilizes, and maintenance and monitoring are the primary employment needs of a program.

Figure 2: Wage Impact by Strategy Subject Area—Investment Phase, 2010–2020[4]

Subject Area	Jobs[5]	Wages
Energy		
Status Quo	9,019.5	$4,651,750,397
Enhancement	10,041.5	$7,761,206,051
Transportation		
Status Quo	2,490.0	$1,439,102,172
Enhancement	5,018.7	$2,980,082,579
Agriculture		
Status Quo	498.4	$59,032,440
Enhancement	498.9	$61,617,397
Recycling		
Status Quo	773.1	$292,888,641
Enhancement	1,325.3	$414,719,170
Buildings		
Status Quo	18.6	$10,284,424
Enhancement	N/A	N/A
Land Use		
Status Quo	4,920.9	$4,744,735,057
Enhancement	5,652.4	$8,053,793,823
Innovative Initiatives		
Status Quo	361.1	$228,725,433
Enhancement	368.3	$236,843,110
Outreach		
Status Quo	0.0	$0
Enhancement	N/A	N/A
Total		
Status Quo	18,081.6	$11,426,518,564
Enhancement	22,923.6	$19,518,546,554

Source: REMI PI+, RESI

[4] All dollar values are reported in 2015 dollars.
[5] Job figures reflect net job impacts in the year 2020.

Figure 3: Wage Impact by Strategy Subject Area—Operation Phase, 2010–2020[6]

Subject Area	Jobs[7]	Wages
Energy		
Status Quo	3,136.4	$1,273,496,043
Enhancement	4,051.2	$1,932,556,944
Transportation		
Status Quo	609.8	$131,679,378
Enhancement	1,249.0	$247,501,555
Agriculture		
Status Quo	-796.6	$698,379,517
Enhancement	-796.6	$698,379,517
Recycling		
Status Quo	-447.6	-$169,242,859
Enhancement	-767.3	-$238,978,248
Buildings		
Status Quo	708.2	$54,687,500
Enhancement	N/A	N/A
Land Use		
Status Quo	1,827.2	$1,601,903,602
Enhancement	2,870.5	$2,488,973,900
Innovative Initiatives		
Status Quo	3,203.1	$181,956,159
Enhancement	3,204.0	$182,612,688
Outreach		
Status Quo	0.1	$61,035
Enhancement	N/A	N/A
Total		
Status Quo	8,240.7	$3,772,920,375
Enhancement	10,519.2	$5,365,794,892

Source: REMI PI+, RESI

As shown in the figures above, these strategies result in a wage impact that ranges from of $11.4 to $19.5 billion in the investment phase for status quo and enhancement, respectively. In the operation phase, wage impacts range from $3.8 to $5.4 billion for status quo and enhancements, respectively. The strategies generate approximately 18.1 to 22.9 thousand jobs in the investment phase and 8.2 to 10.5 thousand jobs in the operation phase for status quo and enhancements, respectively.

[6] All dollar values are reported in 2015 dollars.
[7] Jobs figures reflect net job impacts in the year 2020.

RESI also calculated the total net benefits from these strategies. A summary of these findings can be found in Figures 4 and 5. Although some of these policies may generate negative net impacts, the programs are still generating other benefits that are not accounted for in the market. These benefits include environmental improvements to ecosystems and improvements to human health from reduced pollution and greenhouse gases. Additionally, the program as a whole has net economic benefits.

Figure 4: Total Net Benefit by Strategy Subject Area—Investment Phase, 2010–2020[8]

Subject Area	Output	Total Cost	Total Net Benefit
Energy			
Status Quo	$11,154,722,778	$13,097,859,286	-$2,197,436,981
Enhancement	$12,316,690,319	$13,881,581,739	-$1,783,499,402
Transportation			
Status Quo	$3,270,160,599	$2,206,654,201	$1,056,522,384
Enhancement	$7,990,266,382	$4,244,515,129	$313,182,368
Agriculture			
Status Quo	$65,643,311	$214,057,002	-$148,867,164
Enhancement	$71,441,345	$222,727,335	-$151,285,990
Recycling			
Status Quo	$719,085,693	$9,257,145	$709,828,548
Enhancement	$990,256,168	$15,869,391	$974,386,777
Buildings			
Status Quo	$17,364,502	$7,688,994	$9,675,508
Enhancement	N/A	N/A	N/A
Land Use			
Status Quo	$9,780,953,979	$15,230,800,642	-$1,133,515,000
Enhancement	$15,158,674,064	$22,837,241,668	-$974,355,000
Innovative Initiatives			
Status Quo	$301,666,260	$213,878,700	$176,430,870
Enhancement	$393,191,252	$228,332,229	$175,316,299
Outreach			
Status Quo	$0	$0	$0
Enhancement	N/A	N/A	N/A
Total			
Status Quo	$25,309,597,123	$30,980,195,969	-$5,670,598,846
Enhancement	$36,937,884,032	$41,437,956,486	-$4,500,072,454

Source: REMI PI+, RESI

[8] All dollar values are reported in 2015 dollars.

Figure 5: Total Net Benefit by Strategy Subject Area—Operation Phase, 2010–2020[9]

Subject Area	Output	Total Cost	Total Net Benefit
Energy			
Status Quo	$2,884,834,025	$1,885,945,962	$963,202,841
Enhancement	$3,131,666,273	$2,847,716,165	$226,564,081
Transportation			
Status Quo	$221,151,736	$0	$106,127,930
Enhancement	$393,237,918	$0	$202,999,028
Agriculture			
Status Quo	$2,033,508,301	$417,981,068	$1,514,239,386
Enhancement	$2,033,508,301	$537,981,068	$854,071,331
Recycling			
Status Quo	-$415,496,826	$0	-$415,496,826
Enhancement	-$570,526,120	$0	-$570,526,120
Buildings			
Status Quo	$339,843,750	$184,200	$339,659,550
Enhancement	N/A	N/A	N/A
Land Use			
Status Quo	$5,477,582,215	$333,680,000	$1,165,863,599
Enhancement	$6,808,678,950	$995,283,421	$820,949,641
Innovative Initiatives			
Status Quo	$301,134,380	$0	$223,458,425
Enhancement	$223,689,682	$0	$223,277,695
Outreach			
Status Quo	$152,588	$22,500	$130,088
Enhancement	N/A	N/A	N/A
Total			
Status Quo	$10,842,710,169	$2,637,813,730	$8,204,896,439
Enhancement	$12,360,251,342	$4,381,187,354	$7,979,063,988

Source: REMI PI+, RESI

As shown in Figures 4 and 5, total net benefit during the investment phase totals a negative $5.7 billion and a positive $7.9 billion during the operation phase for the status quo. For enhancements, as shown in Figures 4 and 5 the total net benefit during the investment phase totals a negative $4.5 billion and a positive $8.0 billion during the operation phase. Total net benefit is the difference between output impact and total cost. Total net benefit is analogous to "profit" in the business sense. Positive total net benefit values recognize desirable policy

[9] All dollar values are reported in 2015 dollars.

outcomes for Marylanders. The total net benefit from both the investment and operation phases totals $2.3 billion for status quo, a desirable outcome. An additional net benefit of $3.5 billion can be claimed in enhancement programs are considered into Maryland's GGRA initiatives.

2.0 Introduction

2.1 Overview

Climate change and mitigation strategies are important factors for many elements of the economy and society in general: the rising costs of energy and transportation, threats to the environment, and the health of the greater population (and, by extension, the labor pool). Energy, transportation, agriculture and forestry, recycling, buildings, land use, and many other areas are affected by climate change. As such, mitigating climate change is a vital concern.

Maryland state government agencies are doing their part to mitigate the negative effects of climate change by creating and implementing climate change mitigation strategies designed to reduce GHG emissions in the State. The strategies under various state government agencies have been organized into seven subject areas: energy, transportation, agriculture and forestry, recycling buildings, land use, and innovative initiatives.

RESI conducted an analysis of the potential economic impacts of mitigation strategies for the 2014 GGRA report. This report estimated the job creation, economic activity, and wage effects of these strategies and their subprograms in development or already enacted. The findings within the 2014 report were a revised analysis of these strategies from the 2013 report, providing an estimate of the economic impact these strategies would have in Maryland.

This report is a refinement of RESI's 2014 results, with more complete data about historical, current, and projected budget expenditures associated with programs. Additionally, RESI created a preliminary analysis of a selection of strategies designated for potential enhancement. Enhanced programs are those currently in the GGRA, but could be expanded to further decrease GHG output within Maryland. During this refinement, RESI used a dynamic model known as the REMI model PI+ to assist in determining net benefits and annual impacts to the region. This model allowed RESI to review the interactions among agencies within the region from the strategies. The results of this report are considered to be a more accurate representation (than the 2014 RESI report) of the possible outcomes from these reduction strategies and provide a potential estimation of economic activity through 2020 for an enhanced GGRA.

2.2 Methodology

RESI analyzed data collected by state agencies and their contractors in order to quantify the economic impacts of climate action strategies and their subprograms. Each program was assessed at the status quo and enhanced levels. Under the status quo, the programs were assessed using the historical, current, and projected budgeting data provided in cooperation with the agencies. Enhanced programs were then identified, and agencies were asked to provide further data regarding the expenditures and potential changes for those programs highlighted for enhancements. RESI in some cases used external data to determine potential outcomes from status quo and enhanced programs during investment and operational phases when agency level data was not readily available.

The impacts were modeled for two phases: an investment phase and an operation phase. The investment phase refers to the entire period during which a strategy and its subprograms are being developed, invested in, and implemented. The operation phase refers to the period during which a strategy and its subprograms have already been implemented and the "end user" cost savings are being realized. A detailed explanation of the investment and operation phases and what they entail can be found in Appendix B.1.

To quantify the economic and fiscal impacts of climate action strategies under both status quo and enhanced scenarios, RESI used the REMI PI+ input/output model. This model enumerates the economic and fiscal impacts of each dollar earned and spent by the following: employees associated with the strategies, other supporting vendors (business services, retail, etc.), each dollar spent by these vendors on other firms, and each dollar spent by the households associated with the strategies' employees, other vendors' employees, and other businesses' employees. For more information regarding REMI PI+ and how to interpret the results, please refer to Appendix B.2.

The strategies have been organized into seven subject areas: energy, transportation, agriculture and forestry, recycling, buildings, land use, and innovative initiatives. RESI's report is similarly organized, with each subject area separated into a different section. The economic impacts are broken down by year from 2010 through 2020. Figure 6 outlines the strategies under each sector that were analyzed for potential enhancements.

Figure 6: Listing of Enhanced Programs for 2015 Report

Subject Area	Program Name
Energy	Regional Greenhouse Gas Initiative EmPOWER: Energy Efficiency in the Residential Sector EmPOWER: Energy Efficiency in the Commercial and Industrial Sector EmPOWER: Energy Efficiency in the Power Sector—General Maryland Renewable Energy Portfolio Standard BeSMART (Mainstreet Initiatives) Weatherization and Energy Efficiency for Low-Income Homes
Transportation	Transportation Technologies Public Transportation Initiatives Intercity Transportation Initiatives Pricing Initiatives Bike and Pedestrian Initiatives
Agriculture	Nutrient Trading for GHG Benefits
Zero Waste	Zero Waste
Land Use	Reducing Emissions through Smart Growth and Land Use/Location Efficiency (Include Land Use Planning and Growth Boundary GHG Benefits) Priority Funding Area (Growth Boundary) Related Benefits (Transportation Sector through Smart Growth)
Innovative Initiatives	Lead-by-Example: State of Maryland Initiatives and Carbon Footprint

Source: MDE, RESI

3.0 Findings

RESI's findings show that all strategies and subprograms will have net positive significant economic impact. The direct, spinoff, and average annual economic impacts (jobs, output, and wages) for each strategy and subprogram for the investment phase and the operation phase were calculated. It is important to note that job impacts associated for any subject area or strategy do not indicate cumulative job creation. The job impacts are differences based on the current baseline for Maryland based on BEA historical data. Each year reflects new jobs or job loss difference from the baseline. This applies throughout the report for jobs. In regard to wages and output, each year's results indicate the modeled difference between the relevant policy scenario and the baseline scenario for that year. For more information on how to interpret the results please review Appendix B.2.

For more detailed economic impacts of all the programs, please refer to Appendix A. Information regarding the modeling assumptions and procedures used to derive impacts for each strategy within the subject areas can be found in Appendix C. A discussion of the general occupations most likely to be associated with each subject area is in Appendix D.

3.1 Energy

3.1.1 Regional Greenhouse Gas Initiative (RGGI)

Maryland is one of nine Northeast and Mid-Atlantic States that participate in the Regional Greenhouse Gas Initiative (RGGI) – a regional market-based cap-and-trade program to reduce CO_2 emissions from fossil-fuel fired power plants in the region.[10] RGGI reduces emissions through an emissions cap applied to the nine-state geographic region. Under the initiative, the participating states issue "allowances" equal to the number of tons of CO_2 emissions allowed under the regional cap. A single allowance permits a source to emit one ton of carbon dioxide.

Investment Phase – Status Quo

The average annual economic impacts of the investment phase of the *Regional Greenhouse Gas Initiative* strategy can be found in Figure 7.

[10] Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island and Vermont currently participate in RGGI.

Figure 7: Regional Greenhouse Gas Initiative—Investment Phase[11]

Year	Jobs	Output	Wages
2010	8.0	$640,869	$320,435
2011	8.6	$671,387	$320,435
2012	8.7	$671,387	$350,952
2013	8.3	$640,869	$366,211
2014	8.4	$701,904	$366,211
2015	7.8	$610,352	$396,729
2016	7.8	$671,387	$411,987
2017	8.6	$671,387	$457,764
2018	8.9	$732,422	$503,540
2019	7.7	$732,422	$442,505
2020	8.0	$732,422	$473,022
Average	***8.3***	***$679,710***	***$400,890***

Source: REMI PI+, RESI

As shown in the figure above, during the investment phase of this strategy's implementation will maintain approximately 8 jobs by 2020, and generate $679,710 in output and $400,890 in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *State government*, primarily due to the expectation that government sources would be used to maintain records and manage the RGGI markets. This could include additional administration to manage dissemination of funds, oversight, and budgeting.

Investment Phase – Enhanced

The average annual economic impacts of the investment phase of the *Regional Greenhouse Gas Initiative* strategy can be found in Figure 8.

[11] Values are adjusted for inflation. Summed impacts throughout the report may not add up exactly to totals due to rounding.

Figure 8: Regional Greenhouse Gas Initiative—Investment Phase[12]

Year	Jobs	Output	Wages
2010	8.0	$640,869	$320,435
2011	8.6	$671,387	$320,435
2012	8.7	$671,387	$350,952
2013	8.3	$640,869	$366,211
2014	8.4	$701,904	$366,211
2015	7.8	$610,352	$396,729
2016	7.8	$671,387	$411,987
2017	8.6	$671,387	$457,764
2018	8.9	$732,422	$503,540
2019	7.7	$732,422	$442,505
2020	8.0	$732,422	$473,022
Average	***8.3***	***$679,710***	***$400,890***

Source: REMI PI+, RESI

As shown in the figure above, during the investment phase of this strategy's enhanced implementation will remain unchanged. Under the enhanced scenario for RGGI, allowance prices will increase and therefore the more impacts would be associated with the operational side of RGGI. During the enhancement phase, this strategy will maintain approximately 8 jobs by 2020, and generate $679,710 in output and $400,890 in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *State government*, primarily due to the expectation that government sources would be used to maintain records and manage the RGGI markets. This could include additional administration to manage dissemination of funds, oversight, and budgeting.

Operation Phase – Status Quo

The average annual economic impacts of the operation phase of the Regional Greenhouse Gas Initiative strategy for status quo can be found in Figure 9.

[12] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding.

Figure 9: Regional Greenhouse Gas Initiative—Operation Phase[13]

Year	Jobs	Output	Wages
2010	298.4	$20,874,023	$11,260,986
2011	266.1	$17,211,914	$11,245,728
2012	230.4	$13,671,875	$11,016,846
2013	196.7	$10,437,012	$10,604,858
2014	167.8	$7,965,088	$10,330,200
2015	143.0	$5,798,340	$10,101,318
2016	123.1	$4,150,391	$9,811,401
2017	108.3	$2,929,688	$9,719,849
2018	96.7	$1,953,125	$9,658,813
2019	90.1	$1,403,809	$9,689,331
2020	87.7	$1,098,633	$9,872,437
Average	***164.4***	***$7,953,991***	***$10,301,070***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 88 jobs by 2020, and generate $8.0 million in output and $10.3 million in wages on average each year once in operation. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Administrative and waste management services.*

Operation Phase – Enhanced

The average annual economic impacts of the operation phase of the Regional Greenhouse Gas Initiative strategy for enhanced scenario can be found in Figure 10.

[13] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding.

Figure 10: Regional Greenhouse Gas Initiative—Operation Phase[14]

Year	Jobs	Output	Wages
2010	298.4	$20,874,023	$11,260,986
2011	266.1	$17,211,914	$11,245,728
2012	230.4	$13,671,875	$11,016,846
2013	196.7	$10,437,012	$10,604,858
2014	1,583.0	$75,118,832	$97,424,232
2015	1,390.6	$56,369,964	$98,202,411
2016	1,234.0	$41,595,422	$98,330,355
2017	1,137.1	$30,745,488	$102,004,563
2018	1,044.1	$21,087,148	$104,282,539
2019	1,004.7	$15,656,495	$108,063,850
2020	1,006.8	$12,617,314	$113,380,590
Average	***853.8***	***$28,671,408***	***$69,619,723***

Source: REMI PI+, RESI

As shown in Figure 10, the strategy will maintain approximately 1,007 jobs by 2020, and generate $28.7 million in output and $69.7 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Professional, scientific, and technical services.*

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by approximately $173,947 for the investment phase and $9,185,320 for the operation phase under the status quo.

If the program were enhanced, total state and local tax revenues would increase by approximately $626,208 for the investment phase and $33,067,152 for the operation phase.

3.1.2 GHG Reductions from Imported Power

Through the 2008 Climate Action Plan, a generation performance standard was set for load-serving entities, including electricity providers. The promotion of energy and capacity from low-carbon or renewable sources through the policy aim to reduce the amount of energy imported annually, specifically for those states in which electricity generators primarily produce electricity using a higher concentration of coal in their fuel mixtures. The policy's goal is to enact a standard of no more than 1,125 pounds of GHGs per megawatt-hour by 2013.

[14] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding.

Investment Phase

The total economic impacts of the investment phase of the *GHG Reductions from Imported Power* strategy can be found in Figure 11.

Figure 11: GHG Reductions from Imported Power—Investment Phase[15]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	-$15,259
2012	0.1	$0	$0
2013	-0.5	-$30,518	$0
2014	0.1	$61,035	$15,259
2015	-0.3	$0	$15,259
2016	0.0	$0	$0
2017	0.0	$0	$30,518
2018	-0.1	-$61,035	$0
2019	-0.5	$0	$0
2020	-1.0	-$61,035	-$15,259
Average	***-0.2***	***-$8,323***	***$2,774***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will result in one forgone job by 2020, approximately $8,323 in forgone output and generate $2,774 in wages on average each year. It should be noted that the investment phase for this strategy does not have much cost associated with the policy and any loss would result in the private sector for implementation procedures. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Protective service occupations*, primarily due to the expectation that the demand for low-carbon and renewable energy technologies would increase. Therefore, companies may wish to hire additional security personnel to ensure safety during expansion periods. Companies involved in the development of such technologies are a part of this industry.

Operation Phase

The average annual economic impacts of the operation phase of the *GHG Reductions from Imported Power* strategy can be found in Figure 12.

[15] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 12: GHG Reductions from Imported Power—Operation Phase[16]

Year	Jobs	Output	Wages
2010	3.8	$457,764	$106,812
2011	6.9	$732,422	$183,105
2012	9.1	$946,045	$274,658
2013	11.3	$1,159,668	$350,952
2014	12.3	$1,373,291	$396,729
2015	12.2	$1,342,773	$427,246
2016	13.5	$1,464,844	$488,281
2017	15.0	$1,647,949	$549,316
2018	15.6	$1,647,949	$610,352
2019	15.3	$1,770,020	$625,610
2020	13.7	$1,647,949	$595,093
Average	***11.7***	***$1,290,061***	***$418,923***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 14 jobs by 2020, and generate $1.3 million in output and $0.4 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Construction, extraction occupations* primarily due to the expectation that utilities switching from fossil fuel-based imported electricity to renewable energy sources would experience a net fuel cost savings after they recoup the upfront cost of fuel switching.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by approximately $155 for the investment phase and $261,882 for the operation phase.

3.1.3 Federal New Source Performance Standard

The U.S. Environmental Protection Agency (EPA) is using the New Source Performance Standard authority under the federal Clean Air Act to promulgate new regulations to reduce GHG emissions from fossil fuel-fired power plants. The performance standards, which are expected to become final in early 2013, will apply to new electricity generating units and will be based on existing technologies. EPA is coordinating this action on GHGs with a number of other required regulatory actions for other pollutants, thereby enabling electricity generating units to develop multi-pollutant strategies to reduce pollutants in a more efficient and cost-effective way than would be possible by addressing multiple pollutants separately.

[16] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Investment Phase

The average annual economic impacts of the investment phase of the *Federal New Source Performance Standard* strategy can be found in Figure 13.

Figure 13: Federal New Source Performance Standard—Investment Phase[17]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	18.2	$1,403,809	$701,904
2014	17.9	$1,434,326	$732,422
2015	17.2	$1,403,809	$808,716
2016	16.8	$1,342,773	$854,492
2017	16.4	$1,342,773	$885,010
2018	15.9	$1,342,773	$930,786
2019	15.6	$1,342,773	$961,304
2020	14.4	$1,281,738	$900,269
Average	***12.0***	***$990,434***	***$615,900***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 14 jobs by 2020, and generate $1.0 million in output and $0.6 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Sales, office, administrative occupations*, primarily due to the expectation that sources subject to the standard will seek out cost-effective measures to reduce air pollutants. Business entities providing such services are within this industry.

Operation Phase

The average annual economic impacts of the operation phase of the *Federal New Source Performance Standard* strategy can be found in Figure 14.

[17] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 14: Federal New Source Performance Standard—Operation Phase[18]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	7.4	$823,975	$183,105
2012	11.9	$1,312,256	$350,952
2013	16.2	$1,739,502	$488,281
2014	18.8	$2,075,195	$579,834
2015	20.6	$2,258,301	$686,646
2016	23.4	$2,563,477	$793,457
2017	24.7	$2,746,582	$915,527
2018	26.3	$2,868,652	$1,007,080
2019	26.3	$2,929,688	$1,022,339
2020	25.9	$2,929,688	$1,037,598
Average	***18.3***	***$2,022,483***	***$642,256***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 26 jobs by 2020, and generate $2.0 million in output and $0.6 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Construction, extraction occupations*, primarily due to the expectation that sources subject to the standard will switch from fossil fuel use in order to reduce air pollution and will experience cost savings from cost-effective, cleaner fuels and technologies in the long run as a result.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by approximately $245,308 for the investment phase and $6,296,959 for the operation phase.

3.1.4 MACT

EPA has adopted new air emissions requirements for industrial, commercial, and institutional boilers under two separate rulemakings.[19] The first, which took effect January 31, 2013, establishes national emission standards for Hazardous Air Pollutants (HAPs) for major sources.[20]

[18] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

[19] Boilers burn fuel, including natural gas, fuel oil, coal, biomass (e.g., wood), or other gas to produce steam or hot water. The steam is used to produce electricity, drive an industrial process, or provide heat. Emissions from burning the fuel can include toxic air pollutants like mercury, lead and particle pollution.

[20] "National Emission Standards for Hazardous Air Pollutants for Major sources: Industrial, Commercial, and Institutional Boilers and Process Heaters", 78 Fed. Reg. 7138 (January 31, 2103).

The rule affects thousands of boilers and process heaters at facilities nationwide which are considered as major sources of HAPs. These facilities also emit GHGs.

The Boiler MACT rule applies to any stationary source with a boiler or group of stationary sources with boilers that emit 10 tons per year of any single HAP or 25 tons per year of any combination of HAPs. The rule requires each boiler to meet pollution emission limits on an annual and continuous basis.

EPA also issued a Boiler MACT rule for smaller "area sources", which took effect February 1, 2013.[21]

Among other things, the Boiler MACT rules require operators to conduct a boiler tune-up to improve efficiency, minimize fuel consumption and reduce emissions. EPA estimates there will be a one percent fuel savings due to the tune-ups, which equates to an equivalent one percent reduction in GHG emissions.

Investment Phase

The average annual economic impacts of the investment phase of the *MACT* strategy can be found in Figure 15.

Figure 15: MACT—Investment Phase[22]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	1.5	$33,086	$61,035
2013	1.3	$24,815	$45,776
2014	1.0	$33,086	$45,776
2015	1.0	$16,543	$45,776
2016	1.5	$33,086	$76,294
2017	1.0	$33,086	$61,035
2018	1.5	$16,543	$61,035
2019	0.6	$33,086	$61,035
2020	0.5	$16,543	$45,776
Average	***0.9***	***$80,455***	***$45,776***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately less than one job by 2020, and generate $80,455 in output and $45,776

[21] "National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, commercial, and Institutional Boilers". 78 Fed. Reg. 7488 (February 1, 2013).

[22] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Sales, office, and administrative occupations*, primarily due to the expectation that professionals such as environmental consultants in this field would be contracted to develop and implement the technologies associated with MACT.

Operation Phase

The total economic impacts of the operation phase of the *MACT* strategy can be found in Figure 16.

Figure 16: MACT—Operation Phase[23]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	256.7	$18,157,959	$10,208,130
2013	227.0	$14,801,025	$10,177,612
2014	196.7	$11,962,891	$10,040,283
2015	168.1	$9,338,379	$9,826,660
2016	143.3	$7,080,078	$9,536,743
2017	123.4	$5,432,129	$9,307,861
2018	106.3	$3,906,250	$9,094,238
2019	94.6	$2,929,688	$8,941,650
2020	88.6	$2,258,301	$8,941,650
Average	***127.7***	***$6,896,973***	***$7,824,984***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 89 jobs by 2020, and generate $6.9 million in output and $7.8 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Protective services occupation.* Utilities and energy producing entities within the industry which house boilers subject to the strategy will reduce boiler fuel consumption in order to decrease pollutants. This will result in cost savings. This cost savings could result in additional expansion or investment which may require additional security personnel during these periods.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by approximately $17,022 for the investment phase and $2,087,507 for the operation phase.

[23] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

3.1.5 Energy Efficiency in the Residential Sector

The State's residential energy efficiency initiatives are part of the EmPOWER Maryland suite of energy efficiency programs administered primarily by MEA using SEIF revenues. Together with programs implemented by the utilities, the State's programs in all sectors, including residential, commercial and industrial, are intended to achieve the EmPOWER Maryland goal of a 15 percent reduction in per capita energy use by 2015. Programs funded and administered through other State agencies, including the DHCD, contribute to the EmPOWER goal, as do federally-funded energy efficiency programs.

Investment Phase–Status Quo

The average annual economic impacts of the investment phase of the *Energy Efficiency in the Residential Sector* strategy under status quo can be found in Figure 17.

Figure 17: Energy Efficiency in the Residential Sector Status Quo—Investment Phase[24]

Year	Jobs	Output	Wages
2010	6,518.9	$419,799,805	$151,763,916
2011	3,512.2	$221,282,959	$90,087,891
2012	3,987.3	$246,856,689	$103,271,484
2013	3,641.8	$220,733,643	$98,907,471
2014	3,466.9	$207,427,979	$99,273,682
2015	3,007.0	$175,659,180	$91,278,076
2016	363.5	$4,150,391	$20,736,694
2017	60.0	-$16,052,246	$7,400,513
2018	-75.2	-$24,841,309	-$808,716
2019	-100.7	-$25,939,941	-$4,898,071
2020	-71.7	-$23,315,430	-$6,210,327
Average	***2,210.0***	***$127,796,520***	***$59,163,874***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will result in approximately 72 forgone jobs by 2020, and generate $127.8 million in output and $59.2 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Sales, office, and administrative occupations*. Newly created programs to promote energy efficiency within the residential sector include incentives for households to replace current appliances for Energy Star equivalents. These consumer purchases being offset by some of the energy efficiency programs, help to drive employment within the retail sales industry.

[24] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Investment Phase–Enhanced

The average annual economic impacts of the investment phase of the *Energy Efficiency in the Residential Sector* strategy under enhanced scenario can be found in Figure 18.

Figure 18: Energy Efficiency in the Residential Sector Enhanced—Investment Phase[25]

Year	Jobs	Output	Wages
2010	6,518.9	$419,799,805	$151,763,916
2011	3,512.2	$221,282,959	$90,087,891
2012	3,987.3	$246,856,689	$103,271,484
2013	3,641.8	$220,733,643	$98,907,471
2014	3,466.9	$207,427,979	$99,273,682
2015	3,010.6	$175,868,279	$91,386,731
2016	363.9	$4,155,331	$20,761,379
2017	60.1	-$16,071,354	$7,409,322
2018	-75.3	-$24,870,879	-$809,678
2019	-100.8	-$25,970,819	-$4,903,902
2020	-71.8	-$23,343,184	-$6,217,720
Average	***2,210.3***	***$127,806,223***	***$59,175,507***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's enhanced implementation will result in approximately 72 forgone jobs by 2020, and generate $127.8 million in output and $59.2 million in wages on average each year. Although the difference is minimal, the change would help to reduce current greenhouse gas emissions between FY 2014 and FY 2020. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Sales, office, and administrative occupations*. The program does not change the current structure but rather increase the incentives available to individuals to offset their current energy consumption within Maryland.

Operation Phase—Status Quo

The total economic impacts of the operation phase of the *Energy Efficiency in the Residential Sector* strategy under the status quo can be found in Figure 19.

[25] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 19: Energy Efficiency in the Residential Sector—Operation Phase[26]

Year	Jobs	Output	Wages
2010	134.2	-$2,471,924	$1,235,962
2011	113.7	-$3,631,592	$961,304
2012	98.9	-$4,455,566	$747,681
2013	88.1	-$5,035,400	$564,575
2014	83.1	-$5,249,023	$457,764
2015	79.8	-$5,371,094	$442,505
2016	77.5	-$5,432,129	$381,470
2017	77.2	-$5,432,129	$442,505
2018	75.7	-$5,493,164	$396,729
2019	74.1	-$5,432,129	$411,987
2020	76.6	-$5,310,059	$534,058
Average	***89.0***	***-$4,846,746***	***$597,867***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 77 jobs by 2020, approximately $4.8 million in forgone output and generate $0.6 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Sales, office, and administrative occupations*, which is driven by indirect and induced job creation in reallocation of consumer spending away from utility costs.

Operation Phase—Enhanced

The total economic impacts of the operation phase of the *Energy Efficiency in the Residential Sector* strategy under the enhanced scenario can be found in Figure 20.

[26] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 20: Energy Efficiency in the Residential Sector—Operation Phase[27]

Year	Jobs	Output	Wages
2010	134.2	-$2,471,924	$1,235,962
2011	113.7	-$3,631,592	$961,304
2012	98.9	-$4,455,566	$747,681
2013	88.1	-$5,035,400	$564,575
2014	83.1	-$5,249,023	$457,764
2015	79.8	-$5,377,487	$443,032
2016	77.6	-$5,438,595	$381,924
2017	77.2	-$5,438,595	$443,032
2018	75.8	-$5,499,703	$397,201
2019	74.2	-$5,438,595	$412,478
2020	76.7	-$5,316,380	$534,693
Average	***89.0***	***-$4,850,260***	***$598,149***

Source: REMI PI+, RESI

As shown in the Figure 20, the strategy maintain approximately 77 jobs by 2020, approximately $4.8 million in forgone output and generate $0.6 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Sales, office, and administrative occupations*, which is driven by indirect and induced job creation as a result of increased household disposable income from reduced energy costs.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by approximately $54,053,314 for the investment phase and $6,436,360 for the operation phase.

If the program were enhanced, the total state and local tax revenues would increase by approximately $54,061,382 for the investment phase and $6,437,321.

3.1.6 Energy Efficiency in the Commercial and Industrial Sectors

MEA's commercial and industrial energy efficiency programs support or compliment the EmPOWER Maryland suite of energy efficiency programs. MEA administers four programs that target energy efficiency improvements in the commercial and industrial sectors, which represent approximately 58 percent of electricity consumption in Maryland. These programs offer incentives for energy audits and funding for upgrades. The four programs are: 1) DOE Save Energy Now; 2) the Lawton Loan Program; 3) C/I Deep Retrofits; and 4) the State Agencies Loan Program.

[27] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Energy Efficiency in the Commercial and Industrial Sectors is a key program under "EmPOWER Maryland" and when enhanced in tandem with RGGI will provide additional benefits to Maryland.

Investment Phase—Status Quo

The average annual economic impacts of the investment phase of the *Energy Efficiency in the Commercial and Industrial Sectors* strategy for status quo can be found in Figure 21.

Figure 21: Energy Efficiency in the Commercial and Industrial Sectors—Investment Phase[28]

Year	Jobs	Output	Wages
2010	3,255.3	$250,244,141	$115,112,305
2011	2,318.3	$175,872,803	$86,654,663
2012	2,916.2	$221,466,064	$111,816,406
2013	2,929.6	$220,489,502	$115,234,375
2014	3,127.8	$236,877,441	$127,502,441
2015	3,173.4	$240,844,727	$133,666,992
2016	5,666.1	$442,443,848	$244,918,823
2017	5,755.8	$448,913,574	$259,140,015
2018	5,789.3	$453,735,352	$271,255,493
2019	5,788.6	$453,735,352	$278,015,137
2020	5,807.6	$455,505,371	$284,301,758
Average	***4,229.8***	***$327,284,379***	***$184,328,946***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 5,808 jobs by 2020, and generate $327.3 million in output and $184.3 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Sales, office, and administrative occupations.* Energy efficiency technologies and improvements create additional savings for the commercial industry allowing for potential expansion and investments from increased energy saving incentives.

Investment Phase—Enhancement

The average annual economic impacts of the investment phase of the *Energy Efficiency in the Commercial and Industrial Sectors* strategy for the enhanced scenario can be found in Figure 22.

[28] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 22: Energy Efficiency in the Commercial and Industrial Sectors—Investment Phase[29]

Year	Jobs	Output	Wages
2010	3,255.3	$250,244,141	$115,112,305
2011	2,318.3	$175,872,803	$86,654,663
2012	2,916.2	$221,466,064	$111,816,406
2013	2,929.6	$220,489,502	$115,234,375
2014	3,127.8	$236,877,441	$127,502,441
2015	3,210.1	$243,631,055	$135,213,383
2016	5,731.7	$447,562,472	$247,752,285
2017	5,822.4	$454,107,047	$262,138,001
2018	5,856.3	$458,984,607	$274,393,643
2019	5,855.5	$458,984,607	$281,231,489
2020	5,874.8	$460,775,104	$287,590,840
Average	***4,263.5***	***$329,908,622***	***$185,876,348***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's enhanced implementation will maintain approximately 5,875 jobs by 2020, and generate $329.9 million in output and $185.9 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Sales, office, and administrative occupations.* Energy efficiency technologies and improvements create additional savings for the commercial industry allowing for potential expansion and investments from increased energy saving incentives.

Operation Phase—Status Quo

The average annual economic impacts of the operation phase of the *Energy Efficiency in the Commercial and Industrial Sectors* strategy under status quo can be found in Figure 23.

[29] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 23: Energy Efficiency in the Commercial and Industrial Sectors—Operation Phase[30]

Year	Jobs	Output	Wages
2010	311.1	$24,017,334	$5,981,445
2011	755.8	$60,852,051	$15,258,789
2012	1,330.7	$111,175,537	$28,121,948
2013	2,043.9	$177,398,682	$44,662,476
2014	2,918.9	$264,007,568	$67,230,225
2015	3,894.8	$365,783,691	$94,390,869
2016	4,398.8	$436,523,438	$112,808,228
2017	4,730.0	$494,140,625	$127,365,112
2018	4,907.5	$542,053,223	$138,671,875
2019	4,933.5	$575,622,559	$143,676,758
2020	4,880.0	$601,684,570	$145,629,883
Average	***3,191.4***	***$332,114,480***	***$83,981,601***

Source: REMI PI+, RESI

As shown in the figure above, the strategy under status quo will maintain approximately 4,880 jobs by 2020, and generate $332.1 million in output and $84.0 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Sales, office, and administrative occupations*. It is expected that businesses in the commercial and industrial sectors will benefit from energy efficiency after implementation in the form of operation cost savings, among other benefits.

Operation Phase—Enhanced

The average annual economic impacts of the operation phase of the *Energy Efficiency in the Commercial and Industrial Sectors* strategy under enhanced scenario can be found in Figure 24.

[30] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 24: Energy Efficiency in the Commercial and Industrial Sectors—Operation Phase[31]

Year	Jobs	Output	Wages
2010	311.1	$24,017,334	$5,981,445
2011	755.8	$60,852,051	$15,258,789
2012	1,330.7	$111,175,537	$28,121,948
2013	2,043.9	$177,398,682	$44,662,476
2014	2,918.9	$264,007,568	$67,230,225
2015	3,939.9	$370,015,436	$95,482,875
2016	4,449.7	$441,573,569	$114,113,304
2017	4,784.8	$499,857,329	$128,838,597
2018	4,964.3	$548,324,226	$140,276,167
2019	4,990.6	$582,281,925	$145,338,952
2020	4,936.4	$608,645,448	$147,314,672
Average	***3,220.6***	***$335,286,282***	***$84,783,586***

Source: REMI PI+, RESI

As shown in the figure above, the strategy under the enhanced scenario will maintain approximately 4,936 jobs by 2020, and generate $335.3 million in output and $84.8 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Sales, office, and administrative occupations*. It is expected that businesses in the commercial and industrial sectors will benefit from energy efficiency after implementation in the form of operation cost savings, among other benefits.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by approximately $3,191,579,250 for the investment phase and $67,256,829 for the operation phase.

If this strategy were enhanced, the total state and local tax revenues would increase by approximately $3,217,007,455 for the investment phase and $67,792,683 for the operation phase.

3.1.7 Energy Efficiency—Appliances and Other Products

MEA administers several appliance and equipment rebate programs for homeowners. It also administers low-interest loans for residential and commercial energy efficiency improvements, which may include appliances, equipment and lighting.

[31] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Investment Phase

The average annual economic impacts of the investment phase of the *Energy Efficiency – Appliances and Other Products* strategy can be found in Figure 25.

Figure 25: Energy Efficiency – Appliances and Other Products—Investment Phase[32]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	-25.4	-$1,647,949	-$595,093
2012	-60.9	-$3,875,732	-$1,464,844
2013	-94.6	-$5,950,928	-$2,380,371
2014	-124.9	-$7,812,500	-$3,372,192
2015	-158.3	-$9,887,695	-$4,486,084
2016	-185.5	-$11,535,645	-$5,584,717
2017	-183.4	-$11,230,469	-$5,874,634
2018	-165.7	-$10,070,801	-$5,706,787
2019	-140.2	-$8,361,816	-$5,096,436
2020	-114.3	-$6,713,867	-$4,348,755
Average	***-113.9***	***-$7,007,946***	***-$3,537,265***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will result in approximately 114 forgone jobs by 2020, approximately $7.0 million in forgone output and $3.5 million in forgone wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Transportation and Warehousing*. The increased demand for appliances related to energy efficiency may increase consumable good shipments within the region. Although this is a small economic benefit, this is still a positive benefit.

Operation Phase

The average annual economic impacts of the operation phase of the *Energy Efficiency – Appliances and Other Products* strategy can be found in Figure 26.

[32] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 26: Energy Efficiency – Appliances and Other Products—Operation Phase[33]

Year	Jobs	Output	Wages
2010	52.1	-$946,045	$488,281
2011	45.0	-$1,373,291	$396,729
2012	38.7	-$1,739,502	$305,176
2013	35.0	-$1,922,607	$244,141
2014	32.1	-$2,075,195	$167,847
2015	29.8	-$2,197,266	$137,329
2016	29.7	-$2,136,230	$167,847
2017	29.5	-$2,136,230	$198,364
2018	29.3	-$2,136,230	$198,364
2019	29.5	-$2,014,160	$213,623
2020	29.4	-$2,075,195	$244,141
Average	***34.6***	***-$1,886,541***	***$251,076***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 29 jobs by 2020, approximately $1.9 million in forgone output and generate $0.3 million in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment as a result of this strategy are those (such as *Sales, office, and administrative occupations)* providing the goods and services that will be in demand as households have more disposable income from the energy savings.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would decrease by approximately $1,609,349 for the investment phase and increase by $5,810,761 for the operation phase.

3.1.8 Energy Efficiency in the Power Sector – General

EmPOWER Maryland mandated that the PSC require each utility to propose cost-effective energy efficiency, conservation, and demand response programs designed to achieve targeted per capita energy reductions of at least five percent by the end of 2011 and at least 10 percent by the end of 2015, in addition to a 15 percent per capita peak demand reduction.

The five participating utilities are Potomac Edison (formerly known as Allegheny Power); Baltimore Gas and Electric (BGE); Delmarva Power and Light; Potomac Electric Power Company (Pepco); and Southern Maryland Electric Cooperative (SMECO). These utilities are responsible for two thirds of the EmPOWER 15 percent energy consumption reduction goal and all of the

[33] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

peak demand reduction goal. Energy savings targets are spread amongst all customer classes, including low-to-moderate income customers.

Energy Efficiency in the Power Sector—General is a key program under "EmPOWER Maryland" and when enhanced in tandem with RGGI will provide additional benefits to Maryland.

Investment Phase—Status Quo

The average annual economic impacts of the investment phase of the *Energy Efficiency in the Power Sector – General* strategy under the status quo can be found in Figure 27.

Figure 27: Energy Efficiency in the Power Sector – General—Investment Phase[34]

Year	Jobs	Output	Wages
2010	-1,119.4	-$129,150,391	-$30,853,271
2011	-1,448.5	-$159,973,145	-$40,802,002
2012	-2,032.4	-$221,435,547	-$58,685,303
2013	-2,504.6	-$269,531,250	-$74,111,938
2014	-3,116.7	-$338,714,600	-$96,710,205
2015	-3,385.5	-$366,760,254	-$109,954,834
2016	-3,562.0	-$386,657,715	-$121,063,232
2017	-3,690.0	-$402,465,820	-$130,783,081
2018	-3,763.7	-$414,916,992	-$139,404,297
2019	-3,765.3	-$420,776,367	-$143,554,688
2020	-3,747.1	-$424,865,723	-$146,286,011
Average	***-2,921.4***	***-$321,386,164***	***-$99,291,715***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will result in approximately 3,747 forgone jobs by 2020, approximately $321.4 million in forgone output and $99.3 million in forgone wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Computer, math, architect, engineer occupations*, primarily due to the expectation that the power sector will contract with professional consultants to implement energy efficiency improvements.

Investment Phase—Enhancement

The average annual economic impacts of the investment phase of the *Energy Efficiency in the Power Sector – General* strategy under the enhanced scenario can be found in Figure 28.

[34] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 28: Energy Efficiency in the Power Sector – General—Investment Phase[35]

Year	Jobs	Output	Wages
2010	-1,119.4	-$129,150,391	-$30,853,271
2011	-1,448.5	-$159,973,145	-$40,802,002
2012	-2,032.4	-$221,435,547	-$58,685,303
2013	-2,504.6	-$269,531,250	-$74,111,938
2014	-3,116.7	-$338,714,600	-$96,710,205
2015	-3,394.3	-$367,710,997	-$110,239,867
2016	-3,571.2	-$387,660,037	-$121,377,061
2017	-3,699.5	-$403,509,122	-$131,122,107
2018	-3,773.5	-$415,992,571	-$139,765,671
2019	-3,775.1	-$421,867,135	-$143,926,821
2020	-3,756.8	-$425,967,091	-$146,665,224
Average	***-2,926.5***	***-$321,955,626***	***-$99,478,134***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase under the enhanced scenario of this strategy's implementation will result in approximately 3,757 forgone jobs by 2020, approximately $322.0 million in forgone output and $99.5 million in forgone wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Professional, scientific, and technical services*, primarily due to the expectation that the power sector will contract with professional consultants to implement energy efficiency improvements.

Operation Phase—Status Quo

The average annual economic impacts of the operation phase of the *Energy Efficiency in the Power Sector – General* strategy under the status quo scenario can be found in Figure 29.

[35] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 29: Energy Efficiency in the Power Sector – General—Operation Phase[36]

Year	Jobs	Output	Wages
2010	80.3	$9,246,826	$2,197,266
2011	142.3	$15,899,658	$3,967,285
2012	218.8	$23,925,781	$6,301,880
2013	340.2	$37,200,928	$10,040,283
2014	510.8	$56,365,967	$15,762,329
2015	723.2	$80,139,160	$23,376,465
2016	711.8	$77,026,367	$24,124,146
2017	723.4	$78,552,246	$25,741,577
2018	720.9	$79,223,633	$26,947,021
2019	705.7	$78,979,492	$27,221,680
2020	690.5	$78,491,211	$27,328,491
Average	***506.2***	***$55,913,752***	***$17,546,220***

Source: REMI PI+, RESI

As shown in the figure above, the strategy under the status quo will maintain approximately 691 jobs by 2020, and generate $55.9 million in output and $17.5 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Construction, extraction occupations.* Energy efficiency improvements implemented during the investment phase will result in cost savings for power generating entities within the industry, which may then expand employment or operations. Other top gaining industries reflect the increased household spending resulting from new households established due to direct and indirect job creation and wage generation in the *Construction, extraction occupations* industry.

Operation Phase—Enhancement

The average annual economic impacts of the operation phase of the *Energy Efficiency in the Power Sector – General* strategy under the enhanced scenario can be found in Figure 30.

[36] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 30: Energy Efficiency in the Power Sector – General—Operation Phase[37]

Year	Jobs	Output	Wages
2010	80.3	$9,246,826	$2,197,266
2011	142.3	$15,899,658	$3,967,285
2012	218.8	$23,925,781	$6,301,880
2013	340.2	$37,200,928	$10,040,283
2014	510.8	$56,365,967	$15,762,329
2015	725.1	$80,346,903	$23,437,063
2016	713.6	$77,226,041	$24,186,682
2017	725.2	$78,755,875	$25,808,306
2018	722.7	$79,429,002	$27,016,876
2019	707.5	$79,184,229	$27,292,246
2020	692.3	$78,694,682	$27,399,334
Average	***507.2***	***$56,025,081***	***$17,582,686***

Source: REMI PI+, RESI

As shown in the figure above, the strategy under the enhanced scenario will maintain approximately 692 jobs by 2020, and generate $56.0 million in output and $17.6 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is the *Construction* sector. Energy efficiency improvements implemented during the investment phase will result in cost savings for power generating entities within the industry, which may then expand employment or operations. Other top gaining industries reflect the increased household spending resulting from new households established due to direct and indirect job creation and wage generation in the *Construction, extraction occupations* industry.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by approximately $4,494,845 for the investment phase and $18,514,443 for the operation phase.

If the strategy was enhanced, the total state and local tax revenues would increase by approximately $4,502,692 for the investment phase and $18,546,764 for the operation phase.

3.1.9 Maryland Renewable Energy Portfolio Standard Subprogram

The RPS is implemented through the creation, sale and transfer of RECs. Each REC represents one megawatt of renewably generated electricity. Electricity suppliers are required to purchase RECs to demonstrate they have obtained specified percentages of their energy supply from renewable resources. Sources are classified as Tier 1 and Tier 2. Tier 1 sources consist of:

[37] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

solar; wind; qualifying biomass; qualifying methane; geothermal; ocean; qualifying fuel cell, qualifying hydroelectric power, poultry litter-to-energy; waste-to-energy; and refuse-derived fuel. Non-solar Tier 1 requirements gradually increase to 18 percent in 2020, and then peak in 2022 at 20 percent and are subsequently maintained at that level. Tier 1 includes a solar set-aside requirement which gradually increases until it peaks at two percent in 2020. Maryland's Tier 2 source (eligible hydroelectric power) requirement remains constant at 2.5 percent through 2018, after which it sunsets. The development of renewable energy sources is further promoted by requiring electricity suppliers to pay a financial penalty for failing to acquire sufficient RECs to satisfy the RPS. The penalty is used to support the development of new Tier 1 renewable sources in the State.

The RPS is designed to create a stable and predictable market for renewable energy and to foster additional development and growth in the renewable energy industry.

Investment Phase—Status Quo

The average annual economic impacts of the investment phase of the *Maryland Renewable Energy Portfolio Standard Subprogram* strategy for status quo can be found in Figure 31.

Figure 31: Maryland Renewable Energy Portfolio Standard Subprogram—Investment Phase[38]

Year	Jobs	Output	Wages
2010	487.1	$28,045,654	$10,894,775
2011	7,249.2	$417,968,750	$167,144,775
2012	2,698.3	$154,144,287	$73,776,245
2013	6,441.0	$365,722,656	$166,763,306
2014	3,769.0	$210,906,982	$111,907,959
2015	10,887.4	$616,149,902	$305,389,404
2016	7,282.8	$406,311,035	$229,507,446
2017	40,462.6	$2,299,865,723	$1,203,445,435
2018	39,924.7	$2,203,369,141	$1,289,352,417
2019	17,769.5	$998,352,051	$682,495,117
2020	6,427.2	$324,462,891	$315,597,534
Average	***13,036.3***	***$729,572,643***	***$414,206,765***

Source: REMI PI+, RESI

As shown in the previous figure, the investment phase of this strategy's implementation under status quo will maintain approximately 6,427 jobs by 2020, and generate $729.6 million in output and $414.2 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Professional, scientific, and technical services,* primarily due to the expectation that those

[38] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

entities implementing renewable energy would seek outside contractors and purchasers to assist in acquiring the investment materials.

Investment Phase—Enhancement

The average annual economic impacts of the investment phase of the *Maryland Renewable Energy Portfolio Standard Subprogram* strategy for status quo can be found in Figure 32.

Figure 32: Maryland Renewable Energy Portfolio Standard Subprogram—Investment Phase[39]

Year	Jobs	Output	Wages
2010	487.1	$28,045,654	$10,894,775
2011	7,249.2	$417,968,750	$167,144,775
2012	2,698.3	$154,144,287	$73,776,245
2013	6,441.0	$365,722,656	$166,763,306
2014	3,769.0	$210,906,982	$111,907,959
2015	11,197.9	$633,720,958	$314,098,347
2016	7,490.5	$417,898,010	$236,052,425
2017	41,616.5	$2,365,452,146	$1,237,764,691
2018	41,063.2	$2,266,203,722	$1,326,121,526
2019	18,276.2	$1,026,822,556	$701,958,172
2020	6,610.5	$333,715,761	$324,597,587
Average	***13,354.5***	***$747,327,408***	***$424,643,619***

Source: REMI PI+, RESI

As shown in the previous figure, the investment phase of this strategy's implementation under enhancement will maintain approximately 6,611 jobs by 2020, and generate $747.3 million in output and $424.6 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Professional, scientific, and technical services*, primarily due to the expectation that those entities implementing renewable energy would seek outside contractors and purchasers to assist in acquiring the investment materials.

Operation Phase—Status Quo

The average annual economic impacts of the operation phase of the *Maryland Renewable Energy Portfolio Standard Subprogram* strategy under status quo can be found in Figure 33.

[39] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 33: Maryland Renewable Energy Portfolio Standard Subprogram—Operation Phase[40]

Year	Jobs	Output	Wages
2010	-346.5	-$37,506,104	-$4,730,225
2011	-625.6	-$64,453,125	-$12,374,878
2012	-845.9	-$85,723,877	-$18,737,793
2013	-1,025.7	-$103,485,107	-$24,505,615
2014	-1,134.5	-$116,333,008	-$29,296,875
2015	-1,193.0	-$126,831,055	-$27,175,903
2016	-1,275.8	-$137,268,066	-$31,311,035
2017	-1,819.9	-$192,749,023	-$50,506,592
2018	-2,451.1	-$257,324,219	-$74,386,597
2019	-2,877.8	-$303,710,938	-$92,620,850
2020	-3,154.6	-$337,524,414	-$106,216,431
Average	***-1,522.8***	***-$160,264,449***	***-$42,896,618***

Source: REMI PI+, RESI

As shown in the figure above, the strategy under status quo will result in approximately 3,155 forgone jobs by 2020, approximately $160.3 million in forgone output and $42.9 million in forgone wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment as a result of this strategy are those (such as *Farm, fishing, and forestry occupations)* which provide goods and services that households demand. New households are likely to be created due to the development of a renewable energy industry in Maryland as a result of job creation and wage generation in industries—such as *Farm, fishing, and forestry occupations*—associated with RPS.

Operation Phase—Enhancement

The average annual economic impacts of the operation phase of the *Maryland Renewable Energy Portfolio Standard Subprogram* strategy under enhancements can be found in Figure 34.

[40] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 34: Maryland Renewable Energy Portfolio Standard Subprogram—Operation Phase[41]

Year	Jobs	Output	Wages
2010	-346.5	-$37,506,104	-$4,730,225
2011	-625.6	-$64,453,125	-$12,374,878
2012	-845.9	-$85,723,877	-$18,737,793
2013	-1,025.7	-$103,485,107	-$24,505,615
2014	-1,134.5	-$116,333,008	-$29,296,875
2015	-1,227.0	-$130,447,959	-$27,950,892
2016	-1,312.2	-$141,182,609	-$32,203,948
2017	-1,871.8	-$198,245,744	-$51,946,914
2018	-2,521.0	-$264,662,462	-$76,507,917
2019	-2,959.9	-$312,372,014	-$95,262,165
2020	-3,244.6	-$347,149,767	-$109,245,458
Average	***-1,555.9***	***-$163,778,343***	***-$43,887,516***

Source: REMI PI+, RESI

As shown in the figure above, the strategy under enhancement will result in approximately 3,245 forgone jobs by 2020, approximately $163.8 million in forgone output and $43.9 million in forgone wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment as a result of this strategy are those (such as *Farm, fishing, and forestry occupations)* which provide goods and services that households demand. New households are likely to be created due to the development of a renewable energy industry in Maryland as a result of job creation and wage generation in industries—such as *Farm, fishing, and forestry occupations*—associated with RPS.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by approximately $184,296,290 for the investment phase and decrease by $23,268,807 for the operation phase.

If the strategy was enhanced, the total state and local tax revenues would increase by approximately $188,794,735 in the investment phase and decrease by $23,836,770 in the operation phase.

3.1.10 Incentives and Grant Subprograms to Support Renewable Energy

MEA administers a number of incentives and grant programs to promote and accelerate the development of renewable energy production in Maryland, from utility scale facilities to on-site distributed generation.

[41] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

This is a voluntary incentive based program. Funding for the incentive and grant programs comes from the Strategic Energy Investment Fund.

Investment Phase

The average annual economic impacts of the investment phase of the *Incentives and Grant Subprograms to Support Renewable Energy* strategy can be found in Figure 35.

Figure 35: Incentives and Grant Subprograms to Support Renewable Energy—Investment Phase[42]

Year	Jobs	Output	Wages
2010	241.4	$18,615,723	$8,682,251
2011	323.8	$26,702,881	$14,129,639
2012	5.1	$4,638,672	$5,615,234
2013	-254.2	-$12,451,172	-$1,464,844
2014	-320.0	-$16,235,352	-$3,784,180
2015	-330.3	-$16,135,742	-$4,456,848
2016	-355.5	-$18,543,091	-$7,043,121
2017	-285.0	-$13,598,267	-$5,611,725
2018	-244.8	-$11,255,981	-$5,400,269
2019	-170.7	-$6,246,094	-$3,188,110
2020	-107.0	-$2,016,968	-$1,073,547
Average	***-136.1***	***-$4,229,581***	***-$326,865***

Source: REMI PI+, RESI

As shown in the previous figure, the investment phase of this strategy's implementation will result in approximately 107 forgone jobs by 2020, approximately $4.2 million in forgone output and $0.3 million in forgone wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of the government spending associated with this strategy is *Protective services* occupations, which results from the government spending associated with the grant program.

Operation Phase

The average annual economic impacts of the operation phase of the *Incentives and Grant Subprograms to Support Renewable Energy* strategy can be found in Figure 36.

[42] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 36: Incentives and Grant Subprograms to Support Renewable Energy—Operation Phase[43]

Year	Jobs	Output	Wages
2010	-23.7	-$6,317,139	-$4,211,426
2011	25.0	-$2,014,160	-$3,524,780
2012	64.0	$1,708,984	-$2,868,652
2013	93.3	$4,882,813	-$2,319,336
2014	114.8	$7,568,359	-$1,907,349
2015	119.2	$9,007,080	-$1,659,119
2016	128.3	$10,717,285	-$1,366,333
2017	133.0	$12,142,456	-$1,171,143
2018	132.0	$13,168,579	-$1,138,611
2019	125.5	$13,795,654	-$1,301,270
2020	117.6	$14,194,702	-$1,577,789
Average	***93.5***	***$7,168,601***	***-$2,095,073***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 118 jobs by 2020, generate $7.2 million in output and result in $2.1 million in forgone wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Building, grounds, personal care, and service occupations.* A wide variety of business are expected to take advantage of the commercial grants and would therefore experience cost savings as a result. These cost savings could be used for business growth. Similar effects would be experienced by residential consumers under the residential programs, and household spending on a variety of goods and sectors would increase as a result.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would decrease by $564,654 for the investment phase and increase by $6,604,798 for the operation phase.

3.1.11 Offshore Wind Initiatives to Support Renewable Energy

Maryland waters are part of the Mid-Atlantic Bight region, a coastal area spanning from North Carolina to Massachusetts with substantial wind resources located in close proximity to coastal population centers. In fact, this area has the greatest renewable energy potential relative to other U.S. offshore regions in the Gulf of Mexico, Pacific, and Alaska. Research indicates that the potential power supply available from offshore wind substantially exceeds the region's current energy use. Maryland, therefore, has the potential to access large energy resources off

[43] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

the coast that could contribute to meeting future energy demands while simultaneously displacing fossil fuel generation.

Maryland has taken a lead among Mid-Atlantic States working to harness offshore wind resources. We are moving forward expeditiously to put in place financial support, regulatory parameters, lease conditions, and data-gathering initiatives to support the deployment of a first-phase major offshore wind project in the Maryland Wind Energy Area (WEA) by 2018.

Investment Phase

The average annual economic impacts of the investment phase of the *Offshore Wind Initiatives to Support Renewable Energy* strategy can be found in Figure 37.

Figure 37: Offshore Wind Initiatives to Support Renewable Energy—Investment Phase[44]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.0	$0	$0
2014	0.0	$0	$0
2015	0.0	$0	$0
2016	0.0	$0	$0
2017	2,167.9	$88,134,766	$56,182,861
2018	25.9	$1,159,668	$3,005,981
2019	-7.7	-$1,037,598	$1,098,633
2020	-25.1	-$2,258,301	-$137,329
Average	***540.2***	***$21,499,634***	***$15,037,537***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will result in approximately 25 forgone jobs by 2020, and generate $21.5 million in output and $15.0 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Sales, office, and administrative occupations*, primarily due to the expectation that the expertise of environmental consultants and engineers would be in demand as offshore wind is established and in need of proper development and management.

Operation Phase

The average annual economic impacts of the operation phase of the *Offshore Wind Initiatives to Support Renewable Energy* strategy can be found in Figure 38.

[44] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 38: Offshore Wind Initiatives to Support Renewable Energy—Operation Phase[45]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.0	$0	$0
2014	0.0	$0	$0
2015	0.0	$0	$0
2016	0.0	$0	$0
2017	0.0	$0	$0
2018	281.8	$16,662,598	$37,902,832
2019	291.2	$17,333,984	$39,627,075
2020	290.2	$17,333,984	$40,908,813
Average	***287.7***	***$17,110,189***	***$39,479,574***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 290 jobs by 2020, and generate $17.1 million in output and $39.5 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Sales, office, and administrative occupations.* A wide variety of businesses will benefit positively from the need for management and maintenance of offshore wind once implemented, and may hire additional employees.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by $2,388,305 for the investment phase and $10,175,236 for the operation phase.

3.1.12 Title V Permits for GHG Sources

The Title V operating permits program was established through the Clean Air Act amendments of 1990. Before 1990, states were required to issue air pollution permits to businesses which created new pollution sources or modified existing pollution sources. Title V of the amendments required all states to develop and implement permit programs for sources already in operation. The program is achieving enhanced compliance with industrial and commercial air pollution requirements. The Title V Program does not establish any new emissions limitations, standards, or work practices on an affected facility. However, there may be additional recordkeeping, monitoring, or reporting requirements. EPA granted Maryland final full approval for its Title V permit program in February 2003.

[45] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Investment Phase

The average annual economic impacts of the investment phase of the *Title V Permits for GHG Sources* strategy can be found in Figure 39.

Figure 39: Title V Permits for GHG Sources—Investment Phase[46]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	1.5	$122,070	$61,035
2013	1.3	$91,553	$45,776
2014	1.0	$122,070	$45,776
2015	1.0	$61,035	$45,776
2016	1.5	$122,070	$76,294
2017	1.0	$122,070	$61,035
2018	1.5	$61,035	$61,035
2019	0.6	$122,070	$61,035
2020	0.5	$61,035	$45,776
Average	***0.9***	***$80,455***	***$45,776***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately one job by 2020, and generate $80,455 in output and $45,776 in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Sales, office, and administrative occupations.* The companies and enterprises required to purchase Title V permits are likely to demand services in this industry relating to energy efficiency and emissions reductions to lower the amount of permits they need to purchase through auctions. This industry will also benefit from auction proceeds being invested into various energy efficiency programs relating to the services provided within this industry.

Operation Phase

The average annual economic impacts of the operation phase of the *Title V Permits for GHG Sources* strategy can be found in Figure 40.

[46] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 40: Title V Permits for GHG Sources—Operation Phase[47]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	8.2	$549,316	$289,917
2012	7.1	$457,764	$305,176
2013	6.2	$335,693	$305,176
2014	5.4	$335,693	$289,917
2015	3.4	$122,070	$259,399
2016	3.2	$122,070	$244,141
2017	3.0	$122,070	$274,658
2018	2.9	$122,070	$274,658
2019	2.1	$122,070	$228,882
2020	2.0	$61,035	$259,399
Average	***4.0***	***$213,623***	***$248,302***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 2 jobs by 2020, and generate $0.2 million in output and $0.2 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment from this phase of the strategy is *Protective service occupations* and *Sales, office, and administrative occupations*, primarily due to the expectation that the ongoing permit auctions and the resulting proceeds will need to be administered and monitored by individuals employed by the state government.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $17,022 for the investment phase and $6,597,563 for the operation phase.

3.1.13 BeSMART

The Department of Housing and Community Development (DHCD) has pursued new opportunities to help people and communities through energy efficiency retrofits for homes and small businesses. With a "Main Street" approach, DHCD competed for and won an award of $20 million from the U.S. Department of Energy's (DOE) Better Buildings/EECBG program. This Recovery Act-funded award was a three-year commitment that funded energy efficiency retrofits through a new DHCD program called BeSMART. The BeSMART investments and initiatives subsequently provided the foundation for DHCD's newly created Housing and Building Energy unit, which was launched in 2012.

[47] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

BeSMART has been identified as a program that could increase GHG benefits to Maryland if enhanced.

Investment Phase—Status Quo

The average annual economic impacts of the investment phase of the *BeSMART* strategy can be found in Figure 41.

Figure 41: BeSMART—Investment Phase[48]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	966.9	$49,652,100	$20,587,921
2012	2,515.1	$130,035,400	$56,217,194
2013	2,288.5	$120,269,775	$55,957,794
2014	2,750.0	$145,202,637	$70,240,021
2015	7,222.5	$380,615,234	$182,254,791
2016	3,306.3	$178,222,656	$99,102,020
2017	3,202.0	$171,569,824	$98,339,081
2018	902.5	$47,119,141	$38,482,666
2019	-291.4	-$20,141,602	$1,190,186
2020	689.0	$31,433,105	$23,464,203
Average	***2,141.0***	***$112,179,843***	***$58,712,352***

Source: REMI PI+, RESI

As shown in the figure above, investment phase of this strategy's implementation will maintain approximately 689 jobs by 2020, and generate $112.2 million in output and $58.7 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Construction.* This industry would be in higher demand to equip and accommodate energy reduction measures in households and businesses.

Investment Phase—Enhancement

The average annual economic impacts of the investment phase of the *BeSMART* strategy can be found in Figure 42.

[48] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 42: BeSMART—Investment Phase[49]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	966.9	$49,652,100	$20,587,921
2012	2,515.1	$130,035,400	$56,217,194
2013	2,288.5	$120,269,775	$55,957,794
2014	4,914.2	$257,751,465	$120,670,319
2015	13,037.6	$686,706,543	$325,931,549
2016	6,032.0	$325,500,488	$178,768,158
2017	5,859.6	$314,941,406	$178,955,078
2018	1,723.1	$91,125,488	$72,177,887
2019	-435.8	-$30,395,508	$5,409,241
2020	1,320.4	$61,950,684	$45,745,850
Average	***3,474.7***	***$182,503,440***	***$96,401,908***

Source: REMI PI+, RESI

As shown in the figure above, investment phase of this strategy's implementation will maintain approximately 1,320 jobs by 2020, and generate $182.5 million in output and $96.4 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Construction.* This industry would be in higher demand to equip and accommodate energy reduction measures in households and businesses.

Operation Phase—Status Quo

The average annual economic impacts of the operation phase of the *BeSMART* strategy can be found in Figure 43.

[49] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 43: BeSMART—Operation Phase[50]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.1	$0	-$3,815
2012	-0.1	$0	$0
2013	0.5	$30,518	$7,629
2014	0.5	$61,035	$0
2015	0.5	$0	$19,073
2016	0.6	$0	$19,073
2017	0.5	$0	$15,259
2018	1.3	$122,070	$34,332
2019	1.8	$61,035	$49,591
2020	1.2	$61,035	$26,703
Average	***0.6***	***$30,518***	***$15,259***

Source: REMI PI+, RESI

As shown in Figure 43, the strategy will maintain approximately one job by 2020, and generate $30,518 in output and $15,259 in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Management of companies and enterprises*, primarily due to the expectation that operation of this strategy will likely require management of funds distributed through the Energy Efficiency and Conservation Block Program. Another top-gaining industry is *Health care and social assistance*, which is driven by indirect and induced job creation in healthcare associated with the relatively high job creation from *Management of companies and enterprises* and other industries. The new employees and households directly associated with this policy as well as the indirect beneficiaries of the grant program will increase demand for healthcare.

Operation Phase—Enhancement

The average annual economic impacts of the operation phase of the *BeSMART* strategy can be found in Figure 44.

[50] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 44: BeSMART—Operation Phase[51]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.1	$0	-$3,815
2012	0.0	$0	$0
2013	0.9	$30,518	$15,259
2014	1.0	$61,035	$15,259
2015	0.7	$0	$19,073
2016	1.2	$61,035	$30,518
2017	1.0	$61,035	$30,518
2018	2.1	$183,105	$53,406
2019	2.4	$122,070	$68,665
2020	2.1	$122,070	$57,220
Average	***1.0***	***$58,261***	***$26,009***

Source: REMI PI+, RESI

As shown in Figure 44, the strategy will maintain approximately 2 jobs by 2020, and generate $58,261 in output and $26,009 in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Management of companies and enterprises*, primarily due to the expectation that operation of this strategy will likely require management of funds distributed through the Energy Efficiency and Conservation Block Program. Another top-gaining industry is *Health care and social assistance*, which is driven by indirect and induced job creation in healthcare associated with the relatively high job creation from *Management of companies and enterprises* and other industries. The new employees and households directly associated with this policy as well as the indirect beneficiaries of the grant program will increase demand for healthcare.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $1,688,278,413 for the investment phase, and $2,142 for the operation phase.

If this strategy was enhanced, the total state and local tax revenues would increase by approximately $2,739,963,103 for the investment phase and $3,571 for the operation phase.

3.1.14 Weatherization and Energy Efficiency for Low-Income Houses

Since inception of the federally-funded Weatherization Assistance Program (WAP) in the seventies, more than seven million homes have been weatherized across the nation. Scientific Studies and the energy industry recognize that energy efficiency is among the most viable

[51] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

options for decreasing fossil fuel consumption and consequently reducing GHG emissions. Energy-efficiency is cost-effective and can be implemented quickly. A weatherized household can realize up to $400 in first-year energy savings and an annual CO2 reduction of 2.65 metric tons on average.[52] WAP is designed to help eligible low income households with the installation of energy conservation materials to reduce the consumption of energy and the cost of maintenance. The U.S. Department of Energy (DOE) has funded WAP since 1976, with major funding increases to the program under the American Recovery and Reinvestment Act of 2009.

Weatherization and Energy Efficiency for Low-Income Houses is a strategy that has been identified as providing greater GHG benefits for Maryland if enhanced.

Investment Phase—Status Quo

The average annual economic impacts of the investment phase of the *Weatherization and Energy Efficiency for Low-Income Houses* strategy can be found in Figure 45.

Figure 45: Weatherization and Energy Efficiency for Low-Income Houses—Investment Phase[53]

Year	Jobs	Output	Wages
2010	685.4	$15,014,648	$7,980,347
2011	1,602.1	$36,254,883	$19,676,208
2012	1,790.5	$42,388,916	$24,169,922
2013	837.2	$21,575,928	$14,179,230
2014	1,479.3	$35,644,531	$21,942,139
2015	1,789.6	$43,395,996	$27,004,242
2016	1,796.6	$44,311,523	$28,453,827
2017	1,242.1	$30,883,789	$21,354,675
2018	208.6	$3,906,250	$5,245,209
2019	157.1	$183,105	$1,724,243
2020	137.6	-$1,281,738	-$362,396
Average	***1,066.0***	***$24,752,530***	***$15,578,877***

Source: REMI PI+, RESI

As shown in Figure 45, the investment phase of this strategy's implementation will maintain approximately 138 jobs by 2020, and generate $24.8 million in output and $15.6 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Other services except Public Administration*, primarily due to the expectation that the policy will drive increased demand for energy auditing services, which are contained within this industry. Another top-gaining industry is *Construction*, which includes repair and maintenance associated with weatherization.

[52] U.S. Department of Energy, Oak Ridge National Laboratory, "Weatherization Assistance Program Technical Memorandum Background Data and Statistics," http://energy.gov, March 2010

[53] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Investment Phase—Enhancement

The average annual economic impacts of the investment phase of the *Weatherization and Energy Efficiency for Low-Income Houses* strategy can be found in Figure 46.

Figure 46: Weatherization and Energy Efficiency for Low-Income Houses—Investment Phase[54]

Year	Jobs	Output	Wages
2010	685.4	$15,014,648	$7,980,347
2011	1,602.1	$36,254,883	$19,676,208
2012	1,790.5	$42,388,916	$24,169,922
2013	837.2	$21,575,928	$14,179,230
2014	2,915.2	$69,458,008	$40,481,567
2015	3,578.4	$88,012,695	$53,150,177
2016	3,607.3	$91,064,453	$57,529,449
2017	2,498.8	$64,392,090	$44,193,268
2018	422.2	$9,887,695	$12,279,510
2019	310.9	$2,014,160	$5,302,429
2020	261.9	-$1,586,914	$1,052,856
Average	***1,682.7***	***$39,861,506***	***$25,454,088***

Source: REMI PI+, RESI

As shown in Figure 46, the investment phase of this strategy's implementation will maintain approximately 262 jobs by 2020, and generate $39.9 million in output and $25.5 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Other services except Public Administration*, primarily due to the expectation that the policy will drive increased demand for energy auditing services, which are contained within this industry. Another top-gaining industry is *Construction*, which includes repair and maintenance associated with weatherization.

Operation Phase—Status Quo

The average annual economic impacts of the operation phase of the *Weatherization and Energy Efficiency for Low-Income Houses* strategy can be found in Figure 47.

[54] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 47: Weatherization and Energy Efficiency for Low-Income Houses—Operation Phase[55]

Year	Jobs	Output	Wages
2010	3.6	$30,518	$49,591
2011	3.9	$30,518	$53,406
2012	2.8	-$30,518	$38,147
2013	4.2	$30,518	$61,035
2014	3.3	$0	$49,591
2015	3.0	-$61,035	$49,591
2016	2.3	-$61,035	$57,220
2017	2.9	-$61,035	$49,591
2018	3.6	$61,035	$72,479
2019	4.8	$0	$95,367
2020	3.7	$0	$72,479
Average	***3.5***	***-$5,549***	***$58,954***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 4 jobs by 2020, result in approximately $5,549 in forgone output and generate $58,954 in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment as a result of this strategy are *Health Care and Social Assistance*. It is expected that households receiving weatherization services as a result of this policy will save on energy costs and experience an increase in disposable income, which will be spent on a wide variety of goods and services in such industries.

Operation Phase—Enhancement

The average annual economic impacts of the operation phase of the *Weatherization and Energy Efficiency for Low-Income Houses* strategy can be found in Figure 48.

[55] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 48: Weatherization and Energy Efficiency for Low-Income Houses—Operation Phase[56]

Year	Jobs	Output	Wages
2010	3.6	$30,518	$49,591
2011	3.9	$30,518	$53,406
2012	2.8	-$30,518	$38,147
2013	4.2	$30,518	$61,035
2014	7.1	$0	$118,256
2015	6.2	-$61,035	$99,182
2016	5.1	-$122,070	$83,923
2017	5.6	-$122,070	$91,553
2018	5.7	-$61,035	$99,182
2019	6.2	-$122,070	$110,626
2020	5.9	-$122,070	$106,812
Average	***5.1***	***-$49,938***	***$82,883***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 6 jobs by 2020, result in approximately $49,938 in forgone output and generate $82,883 in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment as a result of this strategy are *Health Care and Social Assistance*. It is expected that households receiving weatherization services as a result of this policy will save on energy costs and experience an increase in disposable income, which will be spent on a wide variety of goods and services in such industries.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $748,166,237 during the investment phase and $1,657 during the operation phase.

If the strategy is enhanced, the total state and local tax revenues would accumulate to approximately $1,180,993,740 for the investment phase and $2,414 during the operation phase.

3.1.15 GHG Prevention of Significant Deterioration Permitting Program

The Prevention of Significant Deterioration (PSD) program is a federal preconstruction review and permitting program applicable to new major stationary sources and major modifications at existing major stationary sources. It requires the application of Best Available Control Technology (BACT) to control emissions of certain pollutants, which now include GHGs. A BACT determination is based on consideration of a number of factors, including the cost-

[56] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

effectiveness of the controls and the energy and environmental impacts. The BACT requirements apply to all new major sources of GHG emissions and major modifications at GHG emitting facilities. This means that GHG sources subject to the requirements must evaluate and apply currently available measures (and later technology as it develops) to reduce GHG emissions.

Investment Phase

The average annual economic impacts of the investment phase of the *Prevention of Significant Deterioration* strategy can be found in Figure 49.

Figure 49: Prevention of Significant Deterioration—Investment Phase[57]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	1.5	$122,070	$61,035
2013	1.3	$91,553	$45,776
2014	1.0	$122,070	$45,776
2015	1.0	$61,035	$45,776
2016	1.5	$122,070	$76,294
2017	1.0	$122,070	$61,035
2018	1.5	$61,035	$61,035
2019	0.6	$122,070	$61,035
2020	0.5	$61,035	$45,776
Average	***0.9***	***$80,455***	***$45,776***

Source: REMI PI+, RESI

As shown in the previous figure, the investment phase of this strategy's implementation will maintain approximately one job by 2020, and generate $80,455 in output and $45,776 in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Sales, office, and administrative occupations*, primarily due to the expectation that processing and management will be required for tracking stationary sources subject to preconstruction reviews.

Operation Phase

The total economic impacts of the operation phase of the *Prevention of Significant Deterioration* strategy can be found in Figure 50.

[57] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 50: Prevention of Significant Deterioration—Operation Phase[58]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	2.7	$183,105	$106,812
2013	2.4	$152,588	$106,812
2014	2.1	$152,588	$76,294
2015	0.6	$0	$76,294
2016	0.5	$0	$76,294
2017	0.4	$0	$61,035
2018	0.5	$0	$76,294
2019	0.0	$61,035	$76,294
2020	-0.1	$0	$61,035
Average	***0.8***	***$49,938***	***$65,197***

Source: REMI PI+, RESI

As shown in Figure 50, the strategy will result in less than one forgone job by 2020, and generate $49,938 in output and $65,197 in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Sales, office, and administrative occupations,* primarily due to the expectation that public administration will conduct the preconstruction reviews during operation of the strategy.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $17,022 for the investment phase and $6,545,005 for the operation phase.

3.2 Transportation

3.2.1 Transportation Technology Initiatives

This suite of programs reduces GHG emissions in several ways. "Upstream" fuel standards, such as the federal Renewable Fuels Standard, require transportation fuel producers to blend renewable fuels into their petroleum products. Depending on manufacturers' choices of renewable fuels, this program has the potential to reduce the per unit carbon intensity of their product inventory over time. The Maryland Clean Cars Program requires car manufacturers to meet a fleet-wide average GHG emissions standard for vehicles sold in the State. The national CAFE standards for light-duty vehicles and medium and heavy-duty vehicle standards require car and truck manufacturers to both reduce GHG emissions and increase the fuel efficiency (i.e., more miles per gallon) of their vehicle fleets over time. Maryland, California and other leadership states have played a key role in advancing more stringent national standards. In

[58] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

addition to achieving significant GHG reductions over time, these programs will produce public health, air quality, water quality and economic benefits for Marylanders.

Transportation technologies include both a current status quo scenario and an enhanced scenario.

Investment Phase—Status Quo

The average annual economic impacts of the investment phase of the *Transportation Technology Initiatives* strategy during status quo can be found in Figure 51.

Figure 51: Transportation Technology Initiatives—Investment Phase[59]

Year	Jobs	Output	Wages
2010	517.6	$65,845,850	$25,296,600
2011	548.0	$70,135,500	$28,805,575
2012	555.4	$72,308,700	$31,217,325
2013	547.7	$72,487,750	$32,634,925
2014	532.7	$71,648,375	$33,352,875
2015	737.6	$97,142,425	$44,357,650
2016	727.3	$97,170,075	$46,059,275
2017	711.7	$96,306,975	$47,099,150
2018	692.5	$94,797,500	$47,631,675
2019	673.8	$93,433,625	$48,019,325
2020	655.2	$92,129,300	$48,255,650
Average	***627.2***	***$83,946,007***	***$39,339,093***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 655 jobs by 2020, and generate $83.9 million in output and $39.3 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Construction,* due to the needed labor to complete transportation roadway programs through 2020. Other sectors include *Professional, scientific, and technical services,* as the program would require land planning and architecture expertise to complete.

Investment Phase—Enhancement

The average annual economic impacts of the investment phase of the *Transportation Technology Initiatives* strategy during enhancement can be found in Figure 52.

[59] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 52: Transportation Technology Initiatives—Investment Phase[60]

Year	Jobs	Output	Wages
2010	569.4	$72,430,435	$27,826,260
2011	602.8	$77,149,050	$31,686,133
2012	610.9	$79,539,570	$34,339,058
2013	602.5	$79,736,525	$35,898,418
2014	586.0	$78,813,213	$36,688,163
2015	811.3	$106,856,668	$48,793,415
2016	800.0	$106,887,083	$50,665,203
2017	782.8	$105,937,673	$51,809,065
2018	761.7	$104,277,250	$52,394,843
2019	741.1	$102,776,988	$52,821,258
2020	720.7	$101,342,230	$53,081,215
Average	***689.9***	***$92,340,608***	***$43,273,003***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 721 jobs by 2020, and generate $92.3 million in output and $42.3 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Construction,* due to the needed labor to complete transportation roadway programs through 2020. Other sectors include *Professional, scientific, and technical services,* as the program would require land planning and architecture expertise to complete.

Operation Phase—Status Quo

The average annual economic impacts of the operation phase of the *Transportation Technology Initiatives* strategy during the status quo can be found in Figure 53.

[60] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 53: Transportation Technology Initiatives—Operation Phase[61]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	457.2	$24,060,060	$10,354,615
2013	470.9	$24,609,377	$11,549,376
2014	458.3	$23,730,469	$12,098,693
2015	434.9	$22,192,384	$12,222,292
2016	413.6	$20,654,298	$12,222,292
2017	394.6	$19,335,938	$12,181,090
2018	390.2	$19,116,212	$12,387,085
2019	384.8	$18,237,305	$12,593,077
2020	375.8	$17,358,397	$12,716,676
Average	***343.7***	***$17,208,585***	***$9,847,745***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 376 jobs by 2020, and generate $17.2 million in output and $9.8 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Health Care and Social Assistance.* The increase in this sector may be reflective of the newly employed transit workers, and an increase in potential population needs through 2020.

Operation Phase—Enhancement

The average annual economic impacts of the operation phase of the *Transportation Technology Initiatives* strategy during the enhancement can be found in Figure 54.

[61] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 54: Transportation Technology Initiatives—Operation Phase[62]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	502.9	$26,466,066	$11,390,077
2013	518.0	$27,070,314	$12,704,314
2014	504.1	$26,103,516	$13,308,562
2015	478.4	$24,411,622	$13,444,521
2016	455.0	$22,719,728	$13,444,521
2017	434.0	$21,269,532	$13,399,199
2018	429.3	$21,027,834	$13,625,794
2019	423.3	$20,061,035	$13,852,385
2020	413.4	$19,094,237	$13,988,344
Average	***462.0***	***$23,135,987***	***$13,239,746***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 413 jobs by 2020, and generate $23.1 million in output and $13.2 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Health Care and Social Assistance.* The increase in this sector may be reflective of the newly employed transit workers, and an increase in potential population needs through 2020.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by approximately $8,849,380 for the investment phase and $5,299,912 for the operation phase.

If this strategy was enhanced, the total state and local tax revenues would increase by approximately $11,504,194 in the investment phase and $7,600,903 during the operation phase.

3.2.2 Public Transportation Initiatives

For several decades, vehicle miles traveled (VMT) has risen faster than the increase in population, in Maryland and nationwide. Land use development over the past 40 to 50 years has put more people living beyond the reach of easy access to transit facilities, increasing automobile driving and tailpipe emissions of GHGs and other air pollutants. This program is designed to advance the effort to meet a goal set by the O'Malley-Brown Administration of doubling transit ridership by 2020 and the continuation of that same growth rate beyond 2020. In order to achieve this growth, actions are needed to increase the availability, attractiveness

[62] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

and convenience of public transportation, improve the operational efficiency of the system, and increase system capacity. Actions related to land use planning, pricing disincentives for driving cars, and bike and pedestrian access improvements, addressed in other sections of this Chapter, are also necessary to achieve the ridership goal.

Public Transportation Initiatives is another program that has great potential to increase GHG reduction benefits if an enhanced scenario is pursued.

Investment Phase—Status Quo

The average annual economic impacts of the investment phase of the *Public Transportation Initiatives* strategy during status quo can be found in Figure 55.

Figure 55: Public Transportation Initiatives—Investment Phase[63]

Year	Jobs	Output	Wages
2010	868.7	$105,544,450	$39,934,150
2011	903.6	$110,690,500	$45,252,650
2012	905.5	$113,008,900	$49,022,400
2013	887.6	$112,705,950	$51,384,225
2014	861.0	$111,164,125	$52,747,475
2015	816.6	$106,163,400	$51,892,325
2016	789.8	$104,092,125	$52,167,975
2017	764.6	$102,040,450	$52,273,250
2018	741.1	$100,045,075	$52,276,000
2019	720.8	$98,620,850	$52,436,250
2020	702.2	$97,478,350	$52,642,600
Average	***814.7***	***$105,595,834***	***$50,184,482***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 702 jobs by 2020, and generate $105.6 million in output and $50.2 million in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Construction,* as the additional labor in this industry will be needed to complete projects associated with this strategy.

Investment Phase—Enhancement

The average annual economic impacts of the investment phase of the *Public Transportation Initiatives* strategy during enhancement can be found in Figure 56.

[63] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 56: Public Transportation Initiatives—Investment Phase[64]

Year	Jobs	Output	Wages
2010	1,737.5	$211,088,900	$79,868,300
2011	1,807.2	$221,381,000	$90,505,300
2012	1,811.0	$226,017,800	$98,044,800
2013	1,775.3	$225,411,900	$102,768,450
2014	1,722.0	$222,328,250	$105,494,950
2015	1,633.2	$212,326,800	$103,784,650
2016	1,579.6	$208,184,250	$104,335,950
2017	1,529.2	$204,080,900	$104,546,500
2018	1,482.1	$200,090,150	$104,552,000
2019	1,441.7	$197,241,700	$104,872,500
2020	1,404.5	$194,956,700	$105,285,200
Average	***1,629.4***	***$211,191,668***	***$100,368,964***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 1,405 jobs by 2020, and generate $211.2 million in output and $100.4 million in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Construction,* as the additional labor in this industry will be needed to complete additional projects associated with this strategy.

Operation Phase—Status Quo

The average annual economic impacts of the operation phase of the *Public Transportation Initiatives* strategy during status quo can be found in Figure 57.

[64] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 57: Public Transportation Initiatives—Operation Phase[65]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.0	$0	$0
2014	0.0	$0	$0
2015	0.0	$0	$0
2016	0.0	$0	$0
2017	52.9	$966,796	$611,800
2018	112.3	$2,175,293	$1,450,196
2019	168.5	$3,383,788	$2,364,120
2020	224.7	$4,350,587	$3,368,683
Average	***139.6***	***$2,719,116***	***$1,948,700***

Source: REMI PI+, RESI

As shown in Figure 57, the strategy will maintain approximately 225 jobs by 2020, and generate $2.7 million in output and $1.9 million in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment as a result of this strategy are *Transportation and Warehousing,* as new occupations will arise from more public transit offerings.

Operation Phase—Enhancement

The average annual economic impacts of the operation phase of the *Public Transportation Initiatives* strategy during enhancement can be found in Figure 58.

[65] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 58: Public Transportation Initiatives—Operation Phase[66]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.0	$0	$0
2014	0.0	$0	$0
2015	0.0	$0	$0
2016	0.0	$0	$0
2017	105.7	$1,933,593	$1,223,600
2018	224.5	$4,350,587	$2,900,391
2019	337.0	$6,767,577	$4,728,240
2020	449.5	$8,701,173	$6,737,366
Average	***279.2***	***$5,438,232***	***$3,897,399***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 450 jobs by 2020, and generate $5.4 million in output and $3.9 million in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment as a result of this strategy are *Transportation and Warehousing,* as new occupations will arise from more public transit offerings.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by $40,562,409 for the investment phase and decrease by $287,587 for the operation phase.

If the strategy was enhanced, the total state and local tax revenues would increase by $52,895,164 during the investment phase and decrease by $779,438 for the operation phase.

3.2.3 Intercity Transportation Initiatives

Traffic congestion along the I-95 corridor between the Wilmington region, Baltimore and Washington, D.C. has been steadily increasing over the past few decades. The State is implementing strategies to reduce congestion and mobile emissions, including GHGs, by providing alternatives to single occupant vehicle use as well as improvements to Maryland's transportation systems. These strategies enhance connectivity and reliability of non-automobile intercity passenger options through infrastructure and technology investments. This includes expansion of intercity passenger rail and bus services as well as improved connections between air, rail, intercity bus, and regional or local transit systems.

[66] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Intercity Transportation Initiatives is a strategy that has been identified as providing more GHG benefits if enhanced.

Investment Phase—Status Quo

The average annual economic impacts of the investment phase of the *Intercity Transportation Initiatives* strategy during the status quo can be found in Figure 59.

Figure 59: Intercity Transportation Initiatives—Investment Phase[67]

Year	Jobs	Output	Wages
2010	125.2	$15,191,250	$5,744,500
2011	130.2	$15,933,000	$6,510,250
2012	130.5	$16,267,750	$7,053,250
2013	127.9	$16,224,000	$7,393,250
2014	124.1	$16,001,250	$7,589,250
2015	126.2	$16,885,250	$8,278,000
2016	122.3	$16,609,750	$8,395,000
2017	118.6	$16,317,000	$8,472,000
2018	115.0	$16,023,250	$8,523,500
2019	111.9	$15,805,750	$8,589,250
2020	91.4	$12,596,250	$7,080,750
Average	***120.3***	***$15,804,955***	***$7,602,636***

Source: REMI PI+, RESI

As shown in the previous figure, the investment phase of this strategy's implementation will maintain approximately 91 jobs by 2020, and generate $15.8 million in output and $7.6 million in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Construction,* as a result of the Department of Transportation's goal to complete intercity projects associated with increasing public transportation.

Investment Phase—Enhancement

The average annual economic impacts of the investment phase of the *Intercity Transportation Initiatives* strategy during the enhancement can be found in Figure 60.

[67] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 60: Intercity Transportation Initiatives—Investment Phase[68]

Year	Jobs	Output	Wages
2010	156.5	$18,989,063	$7,180,625
2011	162.8	$19,916,250	$8,137,813
2012	163.1	$20,334,688	$8,816,563
2013	159.9	$20,280,000	$9,241,563
2014	155.1	$20,001,563	$9,486,563
2015	157.7	$21,106,563	$10,347,500
2016	152.9	$20,762,188	$10,493,750
2017	148.2	$20,396,250	$10,590,000
2018	143.8	$20,029,063	$10,654,375
2019	139.8	$19,757,188	$10,736,563
2020	114.2	$15,745,313	$8,850,938
Average	***150.4***	***$19,756,193***	***$9,503,295***

Source: REMI PI+, RESI

As shown in the previous figure, the investment phase of this strategy's implementation will maintain approximately 114 jobs by 2020, and generate $19.8 million in output and $9.5 million in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Construction,* as a result of increased transportation construction projects in the region.

Operation Phase—Status Quo

The average annual economic impacts of the operation phase of the *Intercity Transportation Initiatives* strategy during the status quo can be found in Figure 61.

[68] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 61: Intercity Transportation Initiatives—Operation Phase[69]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	7.9	$109,863	$96,131
2013	9.4	$164,795	$130,462
2014	8.1	$109,863	$130,462
2015	8.8	$109,863	$157,928
2016	8.3	$109,863	$164,795
2017	9.7	$219,726	$185,395
2018	10.1	$329,589	$226,593
2019	10.6	$219,726	$247,192
2020	10.1	$219,726	$205,994
Average	***9.2***	***$177,002***	***$171,661***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 10 jobs by 2020, and generate $0.2 million in output and $0.2 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Transportation and Warehousing*, primarily due to the expectation that this strategy will encourage increased ridership. Publicly managed transportation providers such as MARC will likely require increased staff to manage increased demand for these transit systems.

Operation Phase—Enhancement

The average annual economic impacts of the operation phase of the *Intercity Transportation Initiatives* strategy during the enhancement can be found in Figure 62.

[69] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 62: Intercity Transportation Initiatives—Operation Phase[70]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	9.9	$137,329	$120,164
2013	11.7	$205,994	$163,078
2014	10.1	$137,329	$163,078
2015	11.0	$137,329	$197,411
2016	10.4	$137,329	$205,994
2017	12.2	$274,658	$231,743
2018	12.6	$411,986	$283,241
2019	13.3	$274,658	$308,990
2020	12.6	$274,658	$257,492
Average	***11.5***	***$221,252***	***$214,577***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 13 jobs by 2020, and generate $0.2 million in output and $0.2 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Transportation and Warehousing*, primarily due to the expectation that this strategy will encourage increased ridership. Publicly managed transportation providers such as MARC will likely require increased staff to manage increased demand for these transit systems.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by approximately $13,666,556 for the investment phase and $13,583 for the operation phase.

If the strategy is enhanced, the total state and local tax revenues would increase by approximately $14,417,582 during the investment phase and $16,087 for the operation phase.

3.2.4 Pricing Initiatives

This program includes transportation pricing disincentives and travel demand management incentive programs. Projects are tied to commute alternatives and programs including ride sharing (Commuter Connections), guaranteed ride home, transportation demand program management and marketing, outreach and education programs (Clean Air Partners), parking cash-out subsidies, transportation information kiosks, local car sharing programs, telework partnerships, parking fees, and vanpool programs.

[70] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Pricing Initiatives is a strategy that has been identified as providing a greater GHG benefit if enhancement was pursued.

Investment Phase—Status Quo

The average annual economic impacts of the investment phase of the *Pricing Initiatives* strategy during status quo can be found in Figure 63.

Figure 63: Pricing Initiatives—Investment Phase[71]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.0	$0	$0
2014	0.0	$0	$0
2015	0.0	$0	$0
2016	0.0	$0	$0
2017	0.0	$0	$0
2018	0.0	$0	$0
2019	0.0	$0	$0
2020	0.0	$0	$0
Average	***0.0***	***$0***	***$0***

Source: REMI PI+, RESI

As shown in the figure above, the investment of strategy implementation will have no discernable economic impact under status quo. At the current time, this program does not have any funds associated with GHG reduction.

Investment Phase—Enhancement

The average annual economic impacts of the investment phase of the *Pricing Initiatives* strategy during enhancement can be found in Figure 64.

[71] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 64: Pricing Initiatives—Investment Phase[72]

Year	Jobs	Output	Wages
2010	1,874.6	$226,861,000	$85,268,250
2011	1,959.6	$239,203,500	$96,962,750
2012	1,969.9	$244,996,750	$105,147,750
2013	1,934.3	$244,679,500	$110,123,250
2014	1,877.5	$241,410,750	$112,843,000
2015	251.4	$30,442,000	$26,925,250
2016	129.5	$13,628,500	$14,974,750
2017	60.4	$3,866,250	$6,806,000
2018	32.2	-$259,500	$1,861,500
2019	25.3	-$1,270,250	-$924,500
2020	31.5	-$301,000	-$2,063,000
Average	***922.4***	***$113,023,409***	***$50,720,455***

Source: REMI PI+, RESI

As shown in the figure above, the investment of strategy implementation will maintain approximately 32 jobs by 2020, and generate $113.0 million in output and $50.7 million in wages on average each year. The sector experiencing the most significant gains for this strategy is *Construction.* A vital sector in completing programs to would increase public transportation and reduce congestion along Maryland roadways.

Operation Phase—Status Quo

The average annual economic impacts of the operation phase of the *Pricing Initiatives* strategy can be found in Figure 65.

[72] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 65: Pricing Initiatives—Operation Phase[73]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.0	$0	$0
2014	0.0	$0	$0
2015	0.0	$0	$0
2016	0.0	$0	$0
2017	0.0	$0	$0
2018	0.0	$0	$0
2019	0.0	$0	$0
2020	0.0	$0	$0
Average	***0.0***	***$0***	***$0***

Source: REMI PI+, RESI

As shown in the figure above, the investment of strategy implementation will have no discernable impact on the economy under status quo. At the current time, this program does not have any funds associated with GHG reduction.

Operation Phase—Enhancement

The average annual economic impacts of the operation phase of the *Pricing Initiatives* strategy can be found in Figure 66.

[73] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 66: Pricing Initiatives—Operation Phase[74]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	375.6	$7,250,977	$4,446,030
2013	382.7	$7,594,299	$5,278,587
2014	385.4	$7,662,964	$5,893,135
2015	384.4	$7,443,237	$6,305,122
2016	381.1	$7,086,182	$6,574,631
2017	379.4	$6,811,524	$6,801,224
2018	377.7	$6,564,331	$6,967,735
2019	375.3	$6,207,275	$7,105,064
2020	373.5	$5,960,083	$7,245,827
Average	***379.4***	***$6,953,430***	***$6,290,817***

Source: REMI PI+, RESI

As shown in Figure 66, the investment of strategy implementation will maintain approximately 374 jobs by 2020, and generate $7.0 million in output and $6.3 million in wages on average each year. The sector with the most significant job growth for this strategy is *Transportation and Warehousing.* As increased mobility within the region becomes easier, industries that rely on fast and safe roadways with minimal congestion can flourish.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by approximately $0 for the investment phase and $0 for the operation phase.

If the strategy is enhanced, the total state and local tax revenues would increase by approximately $22,080,096 during the investment phase and decrease by $2,490,073 during the operation phase.

3.2.5 Bike and Pedestrian Initiatives

This program is part of the State's effort to reduce GHG and other motor vehicle emissions from cars by providing alternatives to single occupant vehicle use. Building appropriate infrastructure for additional bicycle and pedestrian travel in urban areas increases access to and use of public transit and supports the State’s 2020 transit ridership goal.

Bike and Pedestrian Initiatives is a strategy that has been identified as providing greater GHG benefits to Maryland if enhanced.

[74] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Investment Phase—Status Quo

The average annual economic impacts of the investment phase of the *Bike and Pedestrian Initiatives* strategy can be found in Figure 67.

Figure 67: Bike and Pedestrian Initiatives—Investment Phase[75]

Year	Jobs	Output	Wages
2010	347.4	$60,563,443	$10,017,395
2011	568.9	$91,360,906	$14,820,645
2012	1,870.4	$284,397,672	$46,240,126
2013	1,317.2	$193,626,186	$34,671,237
2014	1,229.2	$68,994,140	$34,078,217
2015	1,181.2	$65,588,378	$34,263,610
2016	1,133.8	$62,402,344	$34,263,610
2017	1,103.2	$60,095,214	$34,442,138
2018	1,079.8	$58,337,402	$34,641,266
2019	1,056.6	$56,579,589	$34,881,592
2020	1,041.1	$55,480,957	$35,327,911
Average	***1,084.4***	***$96,129,658***	***$31,604,341***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 1,041 jobs by 2020, and generate $96.1 million in output and $31.6 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Construction*. The development and creation of bike and pedestrian paths will likely require engineers, planners, and construction workers within this industry.

Investment Phase—Enhancement

The average annual economic impacts of the investment phase of the *Bike and Pedestrian Initiatives* strategy can be found in Figure 68.

[75] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 68: Bike and Pedestrian Initiatives—Investment Phase[76]

Year	Jobs	Output	Wages
2010	347.4	$60,563,443	$10,017,395
2011	568.9	$91,360,906	$14,820,645
2012	1,870.4	$284,397,672	$46,240,126
2013	1,317.2	$193,626,186	$34,671,237
2014	1,268.3	$185,079,518	$35,160,065
2015	3,135.0	$452,746,585	$90,969,087
2016	3,017.4	$431,323,246	$91,129,302
2017	2,930.1	$414,184,571	$91,312,407
2018	2,859.3	$400,854,496	$91,701,507
2019	2,793.6	$388,476,566	$92,182,158
2020	2,747.7	$380,383,302	$93,223,572
Average	***2,077.8***	***$298,454,226***	***$62,857,046***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 2,748 jobs by 2020, and generate $298.5 million in output and $62.9 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Construction*. The development and creation of bike and pedestrian paths will likely require engineers, planners, and construction workers within this industry.

Operation Phase—Status Quo

The average annual economic impacts of the operation phase of the *Bike and Pedestrian Initiatives* strategy can be found in Figure 69.

[76] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 69: Bike and Pedestrian Initiatives—Operation Phase[77]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.9	$0	$0
2014	0.2	$0	$0
2015	0.0	$0	$0
2016	-0.5	$0	-$6,867
2017	0.5	$0	$27,466
2018	0.0	$0	-$6,867
2019	0.7	$0	$27,466
2020	-0.9	$0	-$27,466
Average	***0.0***	***$0***	***$2,746***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will result in less than one forgone job by 2020, and generate $0 in output and $2,746 in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Accommodation and Food Services*; primarily due to the expectation that one of the reasons households will increase use of bike and pedestrian paths is transportation cost savings. The increase in disposable income may result in households eating out more, or taking increased family trips.

Operation Phase—Enhancement

The average annual economic impacts of the operation phase of the *Bike and Pedestrian Initiatives* strategy can be found in Figure 70.

[77] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 70: Bike and Pedestrian Initiatives—Operation Phase[78]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.9	$0	$0
2014	0.3	$0	$0
2015	1.6	$0	$15,260
2016	-1.2	$0	-$15,260
2017	0.0	$0	$0
2018	0.0	$0	-$15,260
2019	1.2	$0	$30,516
2020	0.0	$0	$0
Average	***0.3***	***$0***	***$1,387***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will result in no additional jobs by 2020, and generate $0 in output and $1,387 in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Accommodation and Food Services*; primarily due to the expectation that one of the reasons households will increase use of bike and pedestrian paths is transportation cost savings. The increase in disposable income may result in households eating out more, or taking increased family trips.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by approximately $19,085,227 for the investment phase and $5,769 for the operation phase.

If the strategy was enhanced, the total state and local tax revenues would increase by approximately $30,365,541 during the investment phase and $5,362 during the operation phase.

3.3 Agriculture and Forestry

3.3.1 Creating Ecosystem Markets to Encourage GHG Emissions Reductions

Increased attention to the benefits and cost efficiencies that ecosystem markets could provide has spurred evaluation of the potential its programs and policies may have for fostering carbon market development. Maryland's Forest Conservation Act and Critical Area Act require

[78] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

mitigation for natural resource impacts generated through land development, and mitigation banking is an option to address these mitigation requirements

The goal of this program is the establishment of ecosystem markets, creation of a tracking mechanism and the development of protocols to assess/quantify GHG benefits of individual markets. However, no quantification target has been assigned.

Investment Phase

The average annual economic impacts of the investment phase of the *Creating Ecosystem Markets to Encourage GHG Emissions Reductions* strategy can be found in Figure 71.

Figure 71: Creating Ecosystem Markets to Encourage GHG Emissions Reductions—Investment Phase[79]

Year	Jobs	Output	Wages
2010	1.6	$122,070	$61,035
2011	2.1	$122,070	$45,776
2012	1.7	$122,070	$76,294
2013	1.8	$122,070	$91,553
2014	1.6	$183,105	$76,294
2015	1.6	$122,070	$76,294
2016	1.6	$122,070	$76,294
2017	1.5	$122,070	$122,070
2018	1.6	$122,070	$91,553
2019	1.3	$122,070	$76,294
2020	0.6	$61,035	$76,294
Average	***1.5***	***$122,070***	***$79,068***

Source: REMI PI+, RESI

As shown in the previous figure, the investment phase of this strategy's implementation will maintain approximately one job by 2020, and generate $0.1 million in output and $79,068 in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment resulting from this phase of the strategy is *Sales, office, and administrative occupations*, primarily due to the expectation that trained experts in the financial services industry will implement and manage the various ecosystem markets.

Operation Phase

The average annual economic impacts of the operation phase of the *Creating Ecosystem Markets to Encourage GHG Emissions Reductions* strategy can be found in Figure 72.

[79] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 72: Creating Ecosystem Markets to Encourage GHG Emissions Reductions—Operation Phase[80]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	420.6	$85,632,324	$49,926,758
2014	-284.6	$68,695,068	$49,041,748
2015	-822.1	$55,847,168	$47,042,847
2016	-1,237.8	$46,325,684	$44,494,629
2017	-1,489.9	$41,748,047	$42,602,539
2018	-1,581.2	$42,114,258	$42,053,223
2019	-1,691.6	$40,893,555	$41,198,730
2020	-1,758.1	$40,832,520	$40,939,331
Average	***-1,055.6***	***$52,761,078***	***$44,662,476***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will result in 1,758 forgone jobs by 2020, and generate $52.8 million in output and $44.7 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Protective service occupations*. A wide variety of business types will be motivated by market compliance to engage in best practices which benefit both the environment and their bottom line. As companies seek enter the market or expand, an increase in protective workforce may be necessary to ensure employee safety during expansionary periods.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $28,821 for the investment phase, and $10,557,326 for the operation phase.

3.3.2 Nutrient Trading for GHG Benefits

Since many of the agronomic, land use, and structural practices promoted by the Maryland Nutrient Trading Program administered by MDA also store carbon and lower other GHG emissions, the existing nutrient marketplace could provide a platform for the addition of a voluntary carbon component. Just like the nutrient and sediment markets, carbon trading offers entities under regulatory requirements a potentially more cost-effective means to meet their obligations while giving farmers and landowners the opportunity to receive compensation for implementing and maintaining conservation practices. MDA will add carbon credits and

[80] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

enhanced nutrient credits to the Maryland Nutrient Trading Program. Carbon and enhanced nutrient credits would be "stacked" onto existing nutrient and sediment credits as tradable commodities, thereby increasing the potential value of the total credit package and taking another incremental step toward building a comprehensive environmental marketplace. Encouraging trades between nonpoint sources, such as agricultural operations, and point sources, such as wastewater treatment plants, and industrial facilities, or other nonpoint sources, such as highway contract and development projects, would not only create new possibilities for GHG reductions, but also improve water quality, reduce fertilizer use and soil erosion, restore wetlands and wildlife habitat, provide supplemental income for farmers and foresters, and promote Smart Growth goals by preserving agricultural and forested lands.

Nutrient Trading for GHG Benefits is a strategy that has been identified to provide greater GHG benefit under an enhanced scenario.

Investment Phase—Status Quo

The average annual economic impacts of the investment phase of the *Nutrient Trading for GHG Benefits* strategy can be found in Figure 73.

Figure 73: Nutrient Trading for GHG Benefits—Investment Phase[81]

Year	Jobs	Output	Wages
2010	2.5	$183,105	$80,109
2011	2.9	$213,623	$95,367
2012	3.1	$213,623	$91,553
2013	5.1	$305,176	$156,403
2014	0.1	$0	$3,815
2015	-0.2	$0	$0
2016	-0.2	$0	$0
2017	-0.4	-$61,035	-$22,888
2018	0.4	$61,035	$0
2019	0.2	$0	$0
2020	0.1	$0	$3,815
Average	***1.2***	***$83,230***	***$37,107***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately less than one job by 2020, and generate $83,230 in output and $37,107 in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this strategy is *Agriculture, forestry, fishing, and hunting*. Nutrient trading program will provide incremental revenues to farmers and

[81] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

landowners allowing them to expand their business. The strategy will also generate employment opportunities in industries facilitating the credit-trading market, such as in *Management, business, and financial occupations* and *Professional, scientific, and technical services*.

Investment Phase—Enhancement

The average annual economic impacts of the investment phase of the *Nutrient Trading for GHG Benefits* strategy can be found in Figure 75.

Figure 74: Nutrient Trading for GHG Benefits—Investment Phase[82]

Year	Jobs	Output	Wages
2010	15.6	$1,159,607	$507,328
2011	18.3	$1,352,875	$603,962
2012	19.9	$1,352,875	$579,803
2013	32.5	$1,932,678	$990,498
2014	0.9	$0	$24,158
2015	-1.0	$0	$0
2016	-1.5	$0	$0
2017	-2.6	-$386,536	-$144,951
2018	2.5	$386,536	$0
2019	1.4	$0	$0
2020	0.5	$0	$24,158
Average	***7.9***	***$527,094***	***$234,996***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately one job by 2020, and generate $0.5 million in output and $0.2 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this strategy is *Professional, Scientific, and Technical Services.* As the program begins to take shape, increased need for technical assistance to create the exchange will be needed.

Operation Phase—Status Quo

The average annual economic impacts of the operation phase of the *Nutrient Trading for GHG Benefits* strategy can be found in Figure 76**.**

[82] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 75: Nutrient Trading for GHG Benefits—Operation Phase[83]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.0	$0	$0
2014	0.0	$0	$0
2015	0.0	$0	$0
2016	0.0	$0	$0
2017	0.0	$0	$0
2018	0.0	$0	$0
2019	0.0	$0	$0
2020	0.0	$0	$0
Average	***0.0***	***$0***	***$0***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will have no discernable impact on the economy during the operation phase.

Operation Phase—Enhancement

The average annual economic impacts of the operation phase of the *Nutrient Trading for GHG Benefits* strategy can be found in Figure 77**.**

[83] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 76: Nutrient Trading for GHG Benefits—Operation Phase[84]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.0	$0	$0
2014	0.0	$0	$0
2015	0.0	$0	$0
2016	0.0	$0	$0
2017	0.0	$0	$0
2018	0.0	$0	$0
2019	0.0	$0	$0
2020	0.0	$0	$0
Average	***0.0***	***$0***	***$0***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will have no discernable impact during the operation phase.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $22,127 for the investment phase and experience no change for the operation phase.

If the strategy is enhanced, the total state and local tax revenues would accumulate to approximately $145,669 during the investment phase and experience no change during the operation phase.

3.3.3 Managing Forests to Capture Carbon

Managing forests to capture carbon will promote sustainable forestry management practices in existing Maryland forests on both public and private lands. The enhanced productivity resulting from enrolling unmanaged forests into management regimes will increase rates of carbon dioxide sequestration in forest biomass, increase amounts of carbon stored in harvested, durable wood products which will result in economic benefits, and increased availability of renewable biomass for energy production.

The goals of this program are to improve sustainable forest management on 30,000 acres of private land annually and on 100 percent of State-owned resource lands, and ensure 50 percent of State-owned forest lands will be third-party certified as sustainably managed.

[84] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Investment Phase

From 2010 to 2020 a total of $37.7 million was allocated to the *Managing Forests to Capture Carbon* strategy. The average annual economic impacts of the investment phase of the strategy can be found in Figure 78.

Figure 77: Managing Forests to Capture Carbon—Investment Phase[85]

Year	Jobs	Output	Wages
2010	387.8	$2,227,783	$1,617,432
2011	383.4	$2,258,301	$1,892,090
2012	377.5	$2,136,230	$2,059,937
2013	371.4	$1,953,125	$2,182,007
2014	362.7	$1,739,502	$2,227,783
2015	353.4	$1,464,844	$2,258,301
2016	346.3	$1,220,703	$2,304,077
2017	339.5	$1,098,633	$2,273,560
2018	331.9	$976,563	$2,319,336
2019	328.1	$915,527	$2,258,301
2020	324.3	$732,422	$2,212,524
Average	***355.1***	***$1,520,330***	***$2,145,941***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 324 jobs by 2020, and generate $1.5 million in output and $2.1 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Sales, office, and administrative occupations*. Sustainable forest management will be carried out by professionals in this industry. To a lesser extent, environmental consultants or management firms within the industry will likely be needed to determine and advise on best practices in sustainable forest management.

Operation Phase

The average annual economic impacts of the operation phase of the *Managing Forests to Capture Carbon* strategy can be found in Figure 79.

[85] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 78: Managing Forests to Capture Carbon—Operation Phase[86]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	47.8	$1,403,809	$350,952
2013	48.7	$1,403,809	$427,246
2014	48.5	$1,464,844	$457,764
2015	47.6	$1,342,773	$518,799
2016	47.0	$1,281,738	$534,058
2017	46.9	$1,281,738	$564,575
2018	46.1	$1,220,703	$564,575
2019	45.0	$1,281,738	$579,834
2020	43.9	$1,159,668	$534,058
Average	***46.8***	***$1,315,647***	***$503,540***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 44 jobs by 2020, and generate $1.3 million in output and $0.5 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Farming, fishing, and forestry.* It is expected that the implementation of sustainable forest management is likely to have ripple effects for a wide variety of businesses which may be contracted to facilitate management.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $1,005,298 for the investment phase and $208,681 for the operation phase.

3.3.4 Increasing Urban Trees to Capture Carbon

Trees in urban areas directly impact Maryland's carbon budget by absorbing GHG emissions from power production and vehicles, reducing heating and cooling costs and energy demand by moderating temperatures around buildings, and slowing the formation of ground level ozone as well as the evaporation of fuel from motor vehicles. Implementation of this program is supported by several other Maryland laws and programs that include outreach and technical assistance for municipalities to assess and evaluate their urban tree canopy goals, and plant trees to meet those goals.

[86] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

The goals of this program are to plant 12.5 million trees in urban areas through the Forest Conservation Act, Marylanders Plant Trees, Tree-Mendous Maryland, and 5-103 State Highway Reforestation Act planting programs.

Investment Phase

The average annual economic impacts of the investment phase of the *Increasing Urban Trees to Capture Carbon* strategy can be found in Figure 80.

Figure 79: Increasing Urban Trees to Capture Carbon—Investment Phase[87]

Year	Jobs	Output	Wages
2010	5.5	$91,553	$61,035
2011	5.6	$91,553	$45,776
2012	5.3	$91,553	$45,776
2013	5.7	$122,070	$76,294
2014	5.4	$152,588	$76,294
2015	4.7	$61,035	$45,776
2016	4.9	$122,070	$45,776
2017	4.4	$61,035	$61,035
2018	5.1	$61,035	$61,035
2019	4.8	$122,070	$61,035
2020	3.8	$61,035	$61,035
Average	***5.0***	***$94,327***	***$58,261***

Source: REMI PI+, RESI

As shown in the previous figure, the investment phase of this strategy's implementation will maintain approximately 4 jobs by 2020, and generate $94,327 in output and $58,261 in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Sales, office, and administrative occupations*. This strategy will require cooperation between local community organizers and governments in planning and implementation, and funds will be passed through to this industry for administration purposes.

Operation Phase

The average annual economic impacts of the operation phase of the *Increasing Urban Trees to Capture Carbon* strategy can be found in Figure 81.

[87] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 80: Increasing Urban Trees to Capture Carbon—Operation Phase[88]

Year	Jobs	Output	Wages
2010	234.2	$10,406,494	$3,814,697
2011	292.2	$15,594,482	$5,294,800
2012	336.0	$19,866,943	$6,561,279
2013	363.7	$23,132,324	$7,476,807
2014	381.2	$26,031,494	$8,346,558
2015	390.5	$28,259,277	$9,124,756
2016	396.9	$30,273,438	$9,704,590
2017	396.9	$31,799,316	$10,208,130
2018	394.1	$33,203,125	$10,620,117
2019	383.2	$33,996,582	$10,635,376
2020	371.5	$34,545,898	$10,589,600
Average	***358.2***	***$26,100,852***	***$8,397,883***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 372 jobs by 2020, and generate $26.1 million in output and $8.4 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Sales, office, and administrative occupations*, primarily due to the expectation that a wide variety of businesses in the urban areas where trees are being planted will experience benefits in terms of building operation costs as carbon capture lowers ambient temperature.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $33,062 for the investment phase, and $5,328,250 for the operation phase.

3.3.5 Creating and Protecting Wetlands and Waterway Borders to Capture Carbon

In addition to forests, wetlands and marshlands are known to be very efficient at sequestering carbon. Therefore, DNR is planting forested stream buffers and pursuing the creation, protection and restoration of wetlands to promote carbon sequestration through several means, including undertaking on-the-ground wetland restoration projects through its Coastal Wetlands Initiative, the development of a terrestrial carbon sequestration protocol; a DNR Power Plant Research Project wetland study in Dorchester County, and the Sea Level Affecting Marshes Model.

[88] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

The goals of this program are the restoration of 1,142 acres of wetlands on state and public land and planting 645 acres of streamside forest buffers on state and public lands.

Investment Phase

The average annual economic impacts of the investment phase of the *Creating and Protecting Wetlands and Waterway Borders to Capture Carbon* strategy can be found in Figure 82.

Figure 81: Creating and Protecting Wetlands and Waterway Borders to Capture Carbon—Investment Phase[89]

Year	Jobs	Output	Wages
2010	2.1	$61,035	$15,259
2011	2.1	$61,035	$15,259
2012	2.2	$30,518	$15,259
2013	18.2	$396,729	$183,105
2014	18.3	$457,764	$183,105
2015	18.1	$366,211	$213,623
2016	18.7	$366,211	$213,623
2017	18.9	$427,246	$259,399
2018	18.9	$366,211	$244,141
2019	18.9	$427,246	$259,399
2020	17.7	$366,211	$228,882
Average	***14.0***	***$302,401***	***$166,460***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 18 jobs by 2020, and generate $0.3 million in output and $0.2 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this strategy is *Sales, office, and administrative occupations.* It is expected that creating and protecting wetland and waterway borders will require planning and supervision from experts knowledgeable in land management.

Operation Phase

The average annual economic impacts of the operation phase of the *Creating and Protecting Wetlands and Waterway Borders to Capture Carbon* strategy can be found in Figure 83.

[89] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 82: Creating and Protecting Wetlands and Waterway Borders to Capture Carbon—Operation Phase[90]

Year	Jobs	Output	Wages
2010	152.9	$4,119,873	$1,632,690
2011	151.8	$4,150,391	$1,770,020
2012	149.8	$4,119,873	$1,922,607
2013	200.9	$5,462,646	$2,593,994
2014	52.2	$1,373,291	$976,563
2015	47.6	$1,098,633	$823,975
2016	45.1	$915,527	$701,904
2017	44.9	$976,563	$717,163
2018	44.3	$976,563	$686,646
2019	44.7	$1,098,633	$701,904
2020	44.4	$1,098,633	$686,646
Average	***89.0***	***$2,308,239***	***$1,201,283***

Source: REMI PI+, RESI

As shown in the previous figure, the strategy will maintain approximately 44 jobs by 2020, and generate $2.3 million in output and $1.2 million in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment due to this strategy are mostly service-based sectors such as *Food preparation, serving related occupations* and *Sales, office, and administrative occupations*, primarily due to the expectation that the expanded wetlands resulting from implementation of this strategy will create tourism opportunities and increase overall household spending on a variety of both necessary and desired services (healthcare, retail, food, etc.) as a result.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $75,431 for the investment phase, and $556,621 for the operation phase.

3.3.6 Geological Opportunities to Store Carbon

Geological carbon sequestration differs from other discussed sequestration methods as it captures carbon at the source, transports it to the sequestration site, and then sequesters it. Maryland is one of eight partner states in the Midwest Region Carbon Sequestration Partnership whose role is to identify, locate, and characterize potential geologic storage levels. More than 10 gigatonnes of storage capacity has been identified to be available within Maryland (103 years of storage capacity at current CO_2 estimated production rate of 97 million metric tons per year).

[90] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

The goal of this program is to identify and assess geologic storage opportunities. However, no quantification target has been assigned.

Investment Phase

From 2010 to 2020 a total of four state employees were allocated to the *Geological Opportunities to Store Carbon* strategy. The average annual economic impacts of the investment phase of the strategy can be found in Figure 84.

Figure 83: Geological Opportunities to Store Carbon—Investment Phase[91]

Year	Jobs	Output	Wages
2010	0.4	$30,518	$0
2011	0.4	$0	-$15,259
2012	0.0	$0	$0
2013	0.1	$0	$15,259
2014	0.4	$61,035	$0
2015	0.0	$0	$0
2016	0.5	$0	$15,259
2017	0.0	$61,035	$15,259
2018	0.5	$0	$0
2019	0.5	$61,035	$30,518
2020	0.5	$61,035	$15,259
Average	***0.3***	***$24,969***	***$6,936***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately one job by 2020, and generate $24,969 in output and $6,936 in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this strategy is *Sales, office, and administrative occupations*, mainly from the expectation that environmental and geological consultants within this industry will be needed to help with development, planning, and implementation of carbon sequestration associated with this strategy.

Operation Phase

The average annual economic impacts of the operation phase of the *Geological Opportunities to Store Carbon* strategy can be found in Figure 85.

[91] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 84: Geological Opportunities to Store Carbon—Operation Phase[92]

Year	Jobs	Output	Wages
2010	138.6	$12,237,549	$2,761,841
2011	193.4	$18,524,170	$4,089,355
2012	226.6	$23,132,324	$5,081,177
2013	243.0	$26,397,705	$5,661,011
2014	250.4	$28,930,664	$6,072,998
2015	251.0	$30,822,754	$6,378,174
2016	248.2	$32,287,598	$6,484,985
2017	244.6	$33,630,371	$6,607,056
2018	236.0	$34,606,934	$6,546,021
2019	225.7	$35,278,320	$6,347,656
2020	217.2	$35,888,672	$6,088,257
Average	***225.0***	***$28,339,733***	***$5,647,139***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 217 jobs by 2020, and generate $28.3 million in output and $5.6 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Sales, office, and administrative occupations*. Companies will attempt to harness carbon sequestration associated with natural geologic reservoirs because carbon dioxide injections into these reservoirs and the resulting creation, extraction, and consumption of shale and natural gas could potentially offset higher costs associated with energy generation. Savings resulting from decreased energy costs should be passed on to consumers, who will then have more disposable income to spend on a variety of goods and services in many other industries.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $9,101 for the investment phase and $4,576,841 for the operation phase.

3.3.7 Planting Forests in Maryland

Planting trees expands forest cover and associated carbon stocks by regenerating or establishing healthy, functional forests through practices such as soil preparation, erosion control, and supplemental planting, to ensure optimum conditions to support forest growth. By 2020, the implementation goal of this program is to achieve the afforestation and/or reforestation of 43,030 acres in Maryland.

[92] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Investment Phase

From 2010 to 2020 a total of $7.7 million was allocated to the *Planting Forests in Maryland* strategy. The average annual economic impacts of the investment phase of the strategy can be found in Figure 86.

Figure 85: Planting Forests in Maryland—Investment Phase[93]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	190.3	$2,258,301	$1,632,690
2012	190.3	$2,380,371	$1,983,643
2013	99.8	$1,190,186	$1,373,291
2014	107.8	$1,190,186	$1,419,067
2015	103.4	$915,527	$1,419,067
2016	100.7	$793,457	$1,419,067
2017	97.2	$671,387	$1,388,550
2018	95.4	$610,352	$1,419,067
2019	93.7	$610,352	$1,373,291
2020	91.9	$488,281	$1,358,032
Average	***106.4***	***$1,009,854***	***$1,344,161***

Source: REMI PI+, RESI

As shown in the previous figure, the investment phase of this strategy's implementation will maintain approximately 92 jobs by 2020, and generate $1.0 million in output and $1.3 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this strategy is *Farming, fishing, and forestry occupations*, primarily due to the expectation that the implementation of this strategy will require planning from experts in forestry-related areas such as soil preparation, erosion control, and supplemental planting.

Operation Phase

The average annual economic impacts of the operation phase of the *Planting Forests in Maryland* strategy can be found in Figure 87.

[93] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 86: Planting Forests in Maryland—Operation Phase[94]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.8	$0	$0
2012	0.9	$0	$15,259
2013	0.3	-$30,518	$0
2014	0.3	$0	$0
2015	0.0	$0	$0
2016	0.7	$0	$15,259
2017	0.5	$0	$30,518
2018	0.4	$0	$0
2019	0.0	$0	$15,259
2020	0.0	$0	$0
Average	***0.4***	***-$2,774***	***$6,936***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will result in no additional jobs by 2020, approximately $2,774 in forgone output and generate $6,936 in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment due to this strategy are those (such as *Sales, office, and administrative occupations* and *Healthcare occupations)* providing goods and services in demand by households. It is likely that private landowners will experience economic benefits from effective management and operation of this strategy, which will encourage increased household spending as a result.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $673,447 for the investment phase and $2,689 for the operation phase.

3.3.8 Biomass for Energy Production

Maryland is working to promote the use of locally produced woody biomass for generation of thermal energy and electricity. Energy from forest by-products can be used to offset fossil fuel-based energy production and associated GHG emissions. There are many end users that could potentially benefit from such a program, including Maryland's public schools which could enjoy wood heating and cooling; hospitals which could utilize wood as primary heating/cooling source; municipalities which could utilize local fuel markets as key component of their urban tree management programs; and all rural landowners which would have access to a wood fuel market.

[94] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

The goal of this program is to develop policies that recognize wood as a preferred renewable energy source, recognize wood as the largest source of energy consumption in Maryland, and offer incentives to utilize locally produced wood to meet thermal energy needs.

Investment Phase

From 2010 to 2020 a total of $100.0 million was allocated to the *Biomass for Energy Production* strategy. The average annual economic impacts of the investment phase of the strategy can be found in Figure 88.

Figure 87: Biomass for Energy Production—Investment Phase[95]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	38.1	$1,708,984	$869,751
2014	57.0	$2,502,441	$1,358,032
2015	56.3	$2,380,371	$1,449,585
2016	37.1	$1,464,844	$1,022,339
2017	36.1	$1,403,809	$1,037,598
2018	36.0	$1,342,773	$1,052,856
2019	36.2	$1,403,809	$1,098,633
2020	35.8	$1,342,773	$1,098,633
Average	***30.3***	***$1,231,800***	***$817,039***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 36 jobs by 2020, and generate $1.2 million in output and $0.8 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment resulting from this strategy is *Sales, office, and administrative occupations*, primarily due to the expectation that the creation of woody biomass will be carried out by professionals in this industry. Environmental consultants and experts within the industry will also likely be contracted to provide guidance in the implementation and organization of sustainable woody biomass production.

Operation Phase

The average annual economic impacts of the operation phase of the *Biomass for Energy Production* strategy can be found in Figure 89.

[95] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 88: Biomass for Energy Production—Operation Phase[96]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	5.3	$579,834	$152,588
2014	8.9	$976,563	$259,399
2015	11.1	$1,159,668	$381,470
2016	13.0	$1,403,809	$473,022
2017	15.2	$1,647,949	$564,575
2018	16.2	$1,770,020	$610,352
2019	16.3	$1,892,090	$671,387
2020	15.6	$1,892,090	$656,128
Average	***9.2***	***$1,029,275***	***$342,629***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 16 jobs by 2020, and generate $1.0 million in output and $0.3 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this strategy is *Construction,* primarily from the expectation that the use of woody biomass which was produced during implementation of this strategy will benefit energy-producing entities which switch to this type of fuel as it is more energy efficient. Other industries will experience slight gains from the energy cost savings passed on by utilities, and residential consumers also experiencing these energy cost savings will spend more on other goods and services.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $368,176 for the investment phase, and $210,694 for the operation phase.

3.3.9 Conservation of Agricultural Land for GHG Benefits

MDA is working to safeguard Maryland's network of natural areas, agricultural lands, and coastal lands through its established conservation programs and practices. MDA will decrease the conversion and development of agricultural lands through the protection of productive farmland and will continue to pursue policies and programs that complement those of DNR and MDP by preserving or promoting forested, grassed, and wetland areas on agricultural land.

The Maryland Agricultural Land Preservation Foundation (MALPF), which was established in 1977, is one of the first and most successful programs of its kind in the country. Besides

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maintaining prime farmland and woodland as a viable local base of food and fiber production in the state, the preservation of agricultural land curbs the expansion of random urban development, safeguards wildlife habitat, and enhances the ecology of the Chesapeake Bay and its tributaries. The state's forward reaching goal is to protect 962,000 acres from commercial, residential, or industrial development by 2020.

Since 1997, Maryland has partnered with the USDA in the Conservation Reserve Enhancement Program (CREP) to offer rental payments for leased easements along with other incentives to encourage agricultural producers to protect environmentally sensitive lands, improve wildlife habitat, and reduce sediment and nutrient loss. If fully implemented at its authorized 100,000 acres, CREP has the potential to plant up to 16,000 acres of marginal land into grass, shrubs, and trees, establish 77,000 acres of grassland and forest buffers and 5,000 acres of water and wetland habitat, and restore 2,000 acres of habitat for declining, threatened, or endangered species.

Investment Phase

The average annual economic impacts of the investment phase of the *Conservation of Agricultural Land for GHG Benefits* strategy can be found in Figure 90.

Figure 89: Conservation of Agricultural Land for GHG Benefits—Investment Phase[97]

Year	Jobs	Output	Wages
2010	44.5	$2,349,854	$850,677
2011	45.5	$2,410,889	$911,713
2012	42.8	$2,288,818	$911,713
2013	32.7	$1,708,984	$747,681
2014	31.4	$1,647,949	$751,495
2015	29.5	$1,525,879	$724,792
2016	27.4	$1,403,809	$698,090
2017	25.6	$1,281,738	$667,572
2018	25.7	$1,342,773	$671,387
2019	24.1	$1,159,668	$644,684
2020	23.7	$1,159,668	$656,128
Average	***32.1***	***$1,661,821***	***$748,721***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 24 jobs by 2020, and generate $1.7 million in output and $0.7 million in wages on average each year. The industry experiencing the greatest positive economic impacts

[97] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

in terms of employment due to this strategy is *Construction.* It is expected that new employees will be hired to manage and track the conservation and development of agricultural lands.

Operation Phase

The total economic impacts of the operation phase of the *Conservation of Agricultural Land for GHG Benefits* strategy can be found in Figure 91.

Figure 90: Conservation of Agricultural Land for GHG Benefits—Operation Phase[98]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	600.3	$122,802,734	$15,861,511
2012	609.2	$123,626,709	$19,195,557
2013	597.1	$122,833,252	$21,171,570
2014	434.8	$91,918,945	$18,211,365
2015	387.9	$88,745,117	$17,253,876
2016	348.3	$85,998,535	$16,269,684
2017	320.4	$84,045,410	$15,361,786
2018	298.6	$82,519,531	$14,526,367
2019	281.9	$81,237,793	$13,854,980
2020	269.0	$80,322,266	$13,286,591
Average	***377.0***	***$87,640,936***	***$14,999,390***

Source: REMI PI+, RESI

As shown in Figure 91, the strategy will maintain approximately 269 jobs by 2020, and generate $87.6 million in output and $15.0 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment resulting from this strategy is *Farm, fishing, and forestry occupations*, primarily due to the increased demand for individuals familiar with agricultural land and productive uses.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $204,733 for the investment phase and $14,106,601 for the operation phase.

3.4 Zero Waste

3.4.1 Zero Waste

In Maryland, waste diversion is defined as the volume of waste that is diverted from entering the waste stream through recycling or source reduction activities. Source reduction activities are those that reduce or prevent the creation of waste. Maryland estimates the source

[98] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

reduction rate using a checklist for counties to document their source reduction activities, including backyard composting, reuse programs, and technical assistance. The counties' responses are tallied and correspond with a source reduction credit, up to a maximum of 5%, which is added to the recycling rate to produce the waste diversion rate.

Reducing the generation and disposal of waste has many benefits. It saves energy and natural resources, preserves the capacity of existing solid waste disposal facilities and reduces greenhouse gases and other pollutants generated by landfills and manufacturing processes.

Zero Waste is a strategy that has been identified as providing greater GHG benefits if enhanced.

Investment Phase—Status Quo

The average annual economic impacts of the investment phase of the *Recycling and Source Reduction* strategy can be found in Figure 92.

Figure 91: Recycling and Source Reduction—Investment Phase[99]

Year	Jobs	Output	Wages
2010	873.3	$67,474,365	$21,640,778
2011	891.6	$68,328,857	$23,357,391
2012	891.6	$68,481,445	$24,765,015
2013	882.6	$68,023,682	$25,863,647
2014	867.6	$67,138,672	$26,699,066
2015	847.6	$65,856,934	$27,278,900
2016	826.9	$64,636,230	$27,748,108
2017	810.3	$63,537,598	$28,175,354
2018	795.6	$62,622,070	$28,598,785
2019	782.8	$61,767,578	$29,094,696
2020	773.1	$61,218,262	$29,666,901
Average	***840.3***	***$65,371,427***	***$26,626,240***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 773 jobs by 2020, and generate $65.4 million in output and $26.6 million in wages on average each year. The industry with the most significant employment gains during this time period is *Administrative and Waste Management Services.* This industry may see growth over the time period associated with new recycling facilities and collection routes being added to meet the *Zero Waste* requirements.

[99] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Investment Phase—Enhancement

The average annual economic impacts of the investment phase of the *Recycling and Source Reduction* strategy can be found in Figure 93.

Figure 92: Recycling and Source Reduction—Investment Phase[100]

Year	Jobs	Output	Wages
2010	873.3	$67,474,365	$21,640,778
2011	891.6	$68,328,857	$23,357,391
2012	891.6	$68,481,445	$24,765,015
2013	882.6	$68,023,682	$25,863,647
2014	867.6	$67,138,672	$26,699,066
2015	1,452.9	$112,897,600	$46,763,828
2016	1,417.5	$110,804,966	$47,568,185
2017	1,389.1	$108,921,595	$48,300,606
2018	1,364.0	$107,352,120	$49,026,489
2019	1,341.9	$105,887,276	$49,876,621
2020	1,325.3	$104,945,591	$50,857,544
Average	***1,154.3***	***$90,023,288***	***$37,701,743***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 1,325 jobs by 2020, and generate $90.0 million in output and $37.7 million in wages on average each year. The industry with the most significant employment gains during this time period is *Administrative and Waste Management Services.* This industry may see growth over the time period associated with new recycling facilities and collection routes being added to meet the *Zero Waste* requirements.

Operation Phase—Status Quo

The average annual economic impacts of the operation phase of the *Recycling and Source Reduction* strategy can be found in Figure 94.

[100] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 93: Recycling and Source Reduction—Operation Phase[101]

Year	Jobs	Output	Wages
2010	-515.8	-$39,764,404	-$12,779,236
2011	-527.0	-$40,344,238	-$13,813,019
2012	-525.6	-$40,252,686	-$14,583,588
2013	-512.6	-$39,520,264	-$15,064,240
2014	-497.7	-$38,574,219	-$15,373,230
2015	-485.1	-$37,719,727	-$15,632,629
2016	-474.8	-$36,987,305	-$15,922,546
2017	-462.7	-$36,193,848	-$16,078,949
2018	-453.7	-$35,522,461	-$16,296,387
2019	-449.0	-$35,339,355	-$16,624,451
2020	-447.6	-$35,278,320	-$17,074,585
Average	***-486.5***	***-$37,772,439***	***-$15,385,714***

Source: REMI PI+, RESI

As shown Figure 94, the strategy will result in approximately 448 forgone jobs by 2020, approximately $37.8 million in forgone output and $15.4 million in forgone wages on average each year. The industry experiencing the greatest decline is *Administrative and Waste Management Services*. This would likely occur with the reduction from current waste management practices and purchases of landfill space within the state. The result may see a shift of these employees to recycling facilities and land acquisition to expand current recycling operations within the State.

Operation Phase—Enhancement

The average annual economic impacts of the operation phase of the *Recycling and Source Reduction* strategy can be found in Figure 95.

[101] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 94: Recycling and Source Reduction—Operation Phase[102]

Year	Jobs	Output	Wages
2010	-515.8	-$39,764,404	-$12,779,236
2011	-527.0	-$40,344,238	-$13,813,019
2012	-525.6	-$40,252,686	-$14,583,588
2013	-512.6	-$39,520,264	-$15,064,240
2014	-497.7	-$38,574,219	-$15,373,230
2015	-831.5	-$64,662,388	-$26,798,793
2016	-813.9	-$63,406,808	-$27,295,794
2017	-793.2	-$62,046,595	-$27,563,912
2018	-777.8	-$60,895,647	-$27,936,663
2019	-769.7	-$60,581,752	-$28,499,058
2020	-767.3	-$60,477,120	-$29,270,717
Average	***-666.6***	***-$51,866,011***	***-$21,725,295***

Source: REMI PI+, RESI

As shown Figure 95, the strategy will result in approximately 767 forgone jobs by 2020, approximately $51.9 million in forgone output and $21.7 million in forgone wages on average each year. The industry experiencing the greatest decline is *Administrative and Waste Management Services*. This would likely occur with the reduction from current waste management practices and purchases of landfill space within the state. The result may see a shift of these employees to recycling facilities and land acquisition to expand current recycling operations within the State.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues will increase by approximate $12,713,231 for the investment phase, and will decrease by $7,415,429 for the operation phase.

If the strategy is enhanced, the total state and local tax revenues will increase by approximately $21,793,894 during the investment phase and decrease by $12,712,164 during the operation phase.

3.5 Buildings

3.5.1 Building Codes

Given the long lifetime of buildings, updating state and local building codes on a periodic basis will provide long-term greenhouse gas emissions reductions. The statewide building code in Maryland is adopted by the Maryland Codes Administration, which is within the Department of Housing and Community Development (DHCD). The statewide building code is called the

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Maryland Building Performance Standards (MBPS) and is updated every three years following the International Codes Council (ICC) cycle.

The MBPS is based primarily on the international codes books (I-Codes) published by the ICC; the core code books adopted by Maryland are the International Building Code (IBC), the International Residential Code (IRC), and the International Energy Conservation Code (IECC). In January of each third year, the Maryland Codes Administration adopts the latest codes into the MBPS, as required by law; subsequently, the local building code authorities must adopt and implement the MBPS by July of that same year. Local code authorities may amend the MBPS to meet the specific conditions and needs of their jurisdiction – with a few exceptions. For example, the energy code (IECC) and the accessibility code (Maryland Accessibility Code or MAC) cannot be weakened. Other codes, such as the recently authorized International Green Construction Code (IgCC), are a voluntary option for local jurisdictions.

Investment Phase

The average annual economic impacts of the investment phase of the *Building Codes* strategy can be found in Figure 96.

Figure 95: Building Codes—Investment Phase[103]

Year	Jobs	Output	Wages
2010	19.5	$1,495,361	$671,387
2011	23.1	$1,739,502	$839,233
2012	21.7	$1,647,949	$869,751
2013	21.4	$1,617,432	$915,527
2014	20.5	$1,647,949	$915,527
2015	18.9	$1,525,879	$930,786
2016	19.3	$1,525,879	$976,563
2017	18.8	$1,525,879	$976,563
2018	19.2	$1,525,879	$1,052,856
2019	18.3	$1,586,914	$1,068,115
2020	18.6	$1,525,879	$1,068,115
Average	***19.9***	***$1,578,591***	***$934,948***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 19 jobs by 2020, and generate $1.6 million in output and $0.9 million in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment due to this strategy are *Sales, office, and administrative occupations*, primarily due to the expectation that implementation of new building codes will

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result in the need for new training associated with repair and maintenance and new construction projects which will require building code inspectors, construction workers, site managers, architects, engineers, and other building professionals in these two industries.

Operation Phase

The average annual economic impacts of the operation phase of the *Building Codes* strategy can be found in Figure 96.

Figure 96: Building Codes—Operation Phase[104]

Year	Jobs	Output	Wages
2010	30.8	$2,441,406	-$1,861,572
2011	91.3	$6,896,973	-$2,506,256
2012	167.7	$12,542,725	-$2,109,528
2013	265.0	$19,744,873	-$1,098,633
2014	359.1	$26,733,398	$1,091,003
2015	446.4	$33,386,230	$3,620,148
2016	525.6	$39,489,746	$6,374,359
2017	587.3	$44,311,523	$9,071,350
2018	638.6	$48,461,914	$11,680,603
2019	677.7	$51,635,742	$14,091,492
2020	708.2	$54,199,219	$16,334,534
Average	***408.9***	***$30,894,886***	***$4,971,591***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 708 jobs by 2020, and generate $30.9 million in output and $5.0 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this strategy is *Professional, Scientific, and Technical Services.* The increased level of skilled individuals in energy efficiency code knowledge, may help to foster competition within the region and support a growing green industry.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $398,903 for the investment phase and $4,189,647 for the operation phase.

[104] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

3.6 Land Use

3.6.1 Reducing Emissions through Smart Growth and Land Use/Location Efficiency (Include Land Use Planning and Growth Boundary GHG Benefits)

This program reduces Marylanders' dependence on motor vehicle travel, especially single occupant vehicles, by developing incentives and requirements for development projects and regional land use patterns that achieve land use/location efficiency with regard to transportation. The purpose is to reduce VMT and the combustion of fossil fuels. Land use/location efficiency means that residences, jobs, shopping, schools, and recreational opportunities are in close proximity to each other and that alternative transportation modes (walking, biking and mass transit) are convenient and easily accessed. The Smart Growth development pattern, together with land use/location efficiency, results in shorter trip lengths, less need for automobile and truck travel, and greater use of alternative transportation modes.

Existing state laws and initiatives that support the P.1 strategy include the Maryland Sustainable Growth Commission, Smart Growth Subcabinet, Sustainable Communities Act of 2010, 2009 planning legislation, MDP data analysis and forecasting, and MDP indicator development.

This strategy has been identified as one that can provide greater GHG benefits if enhanced.

Investment Phase—Status Quo

The average annual economic impacts of the investment phase of the *Reducing Transportation Issues through Smart Growth* strategy can be found in Figure 97.

Figure 97: Reducing Emissions through Smart Growth and Land Use/Location Efficiency (Include Land Use Planning and Growth Boundary GHG Benefits)—Investment Phase[105]

Year	Jobs	Output	Wages
2010	1,783.2	$379,758,400	$40,000,000
2011	4,443.2	$439,290,496	$101,600,000
2012	2,836.0	$469,038,548	$72,000,000
2013	2,592.8	$478,150,758	$70,400,000
2014	2,016.0	$476,456,226	$56,960,000
2015	1,588.5	$468,789,351	$46,784,000
2016	1,471.0	$459,195,129	$45,152,000
2017	1,369.3	$449,400,783	$43,520,000
2018	1,284.4	$440,178,997	$41,888,000
2019	1,208.8	$433,341,910	$40,800,000
2020	1,144.6	$414,922,431	$39,168,000
Average	***2,586.7***	***$446,229,366***	***$54,388,364***

Source: REMI PI+, RESI

As shown in the figure above, under the investment phase this strategy will maintain approximately 2,587 jobs by 2020, and generate $446.2 million in output and $54.4 million in wages on average each year. The industry that gained the most from this strategy was *Construction.* This program seeks to enable individuals within the state to pursue energy efficiency through a tax credit incentive. The current tax credit does have a sunset year, and if not expand may disinterest individuals from continuing to invest in energy efficient measures for their home or business.

Investment Phase—Enhancement

The average annual economic impacts of the investment phase under the enhanced scenario of the *Reducing Transportation Issues through Smart Growth* strategy can be found in Figure 98.

[105] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 98: Reducing Emissions through Smart Growth and Land Use/Location Efficiency (Include Land Use Planning and Growth Boundary GHG Benefits)—Investment Phase[106]

Year	Jobs	Output	Wages
2010	2,828.1	$446,774,588	$174,015,076
2011	3,217.6	$516,812,348	$213,975,528
2012	3,357.7	$551,810,056	$240,745,148
2013	3,355.1	$562,530,304	$257,496,068
2014	3,280.2	$560,536,736	$267,339,804
2015	3,172.1	$551,516,884	$272,467,868
2016	3,057.6	$540,229,564	$275,314,124
2017	2,947.3	$528,706,804	$276,989,524
2018	2,844.9	$517,857,644	$278,132,008
2019	2,755.0	$509,814,012	$279,818,128
2020	2,659.9	$488,144,037	$265,026,315
Average	***3,043.2***	***$524,975,725***	***$254,665,417***

Source: REMI PI+, RESI

As shown in the figure above, under the investment phase this strategy will maintain approximately 2,660 jobs by 2020, and generate $525.0 million in output and $254.7 million in wages on average each year. The industry that gained the most from this strategy was *Construction.* This program seeks to enable individuals within the state to pursue energy efficiency through a tax credit incentive. Under this scenario, RESI assumes that the tax credit is extended through 2020 to help offset costs associated with the smart growth initiatives. The continued tax credit past the sunset year does assist in smart growth initiatives, however, the tax credit does indicate that there could be a potential decline in some areas of employment specifically government and private consumption may decline of households.

Operation Phase—Status Quo

The average annual economic impacts of the operation phase of the *Reducing Transportation Issues through Smart Growth* strategy can be found in Figure 99.

[106] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 99: Reducing Transportation Issues through Smart Growth—Operation Phase[107]

Year	Jobs	Output	Wages
2010	733.1	$139,545,931	$42,727,625
2011	824.8	$160,052,214	$49,769,910
2012	867.0	$171,800,520	$53,594,770
2013	870.3	$174,957,962	$54,288,564
2014	852.6	$173,351,448	$53,037,899
2015	825.7	$169,266,828	$50,646,357
2016	798.3	$164,610,222	$47,898,859
2017	772.3	$159,923,499	$45,087,497
2018	747.8	$155,360,603	$42,370,042
2019	727.3	$151,908,068	$40,056,723
2020	710.8	$149,479,231	$38,228,325
Average	***793.6***	***$160,932,412***	***$47,064,234***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 711 jobs by 2020, and generate $160.9 million in output and $47.1 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment from this strategy is *Retail Trade.* Increased savings in energy may allow smaller businesses within the region to expand operations or offer better deals to customers thus increasing their level of employment through 2020.

Operation Phase—Enhancement

The average annual economic impacts of the operation phase under the enhanced scenario of the *Reducing Transportation Issues through Smart Growth* strategy can be found in Figure 100.

[107] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 100: Reducing Transportation Issues through Smart Growth—Operation Phase[108]

Year	Jobs	Output	Wages
2010	1,127.8	$187,850,292	$82,168,510
2011	1,268.9	$215,454,904	$95,711,365
2012	1,333.8	$231,269,931	$103,066,865
2013	1,338.9	$235,520,334	$104,401,085
2014	1,311.6	$233,357,719	$101,995,960
2015	1,270.4	$227,859,191	$97,396,840
2016	1,228.2	$221,590,684	$92,113,190
2017	1,188.1	$215,281,633	$86,706,725
2018	1,150.4	$209,139,273	$81,480,850
2019	1,118.9	$204,491,630	$77,032,160
2020	1,093.5	$201,222,042	$73,516,010
Average	***1,221.0***	***$216,639,785***	***$90,508,142***

Source: REMI PI+, RESI

As shown in the Figure 100, the strategy will maintain approximately 1,094 jobs by 2020, and generate $216.6 million in output and $90.5 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment from this strategy is *Retail Trade.* Increased savings in energy may allow smaller businesses within the region to expand operations or offer better deals to customers thus increasing their level of employment through 2020.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $123,807,254 during the investment phase and $41,269,085 during the operation phase.

If this strategy is enhanced, additional tax revenues would accumulate to approximately $160,949,430 during the investment phase and $41,433,728 during the operation phase.

3.6.2 Priority Funding Area (Growth Boundary) Related Benefits (Transportation Sector through Smart Growth)

Maryland has established Priority Funding Areas to preserve existing communities, to target State resources to build on past investments, and to reduce development pressure on critical farmland and natural resource areas. By encouraging projects in already developed areas, PFAs reduce the GHG emissions associated with sprawl. Priority Funding Areas are geographic growth areas defined under Maryland law and designated by local jurisdictions to provide a map for targeting State investment in infrastructure. Maryland law directs the use of State

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funding for roads, water and sewer plants, economic development and other growth-related needs toward Priority Funding Areas, recognizing that these investments are the most important tool the State has to influence smarter, more sustainable growth and development. This strategy has been identified as one that can provide greater GHG benefits if enhanced.

Investment Phase—Status Quo

The average annual economic impacts of the investment phase of the *Priority Funding Area (Growth Boundary) Related Benefits (Transportation Sector through Smart Growth)* strategy can be found in Figure 101.

Figure 101: Priority Funding Area (Growth Boundary) Related Benefits (Transportation Sector through Smart Growth)—Investment Phase[109]

Year	Jobs	Output	Wages
2010	2,828.1	$376,966,059	$146,825,220
2011	3,217.6	$436,060,419	$180,541,852
2012	3,357.7	$465,589,735	$203,128,719
2013	3,355.1	$474,634,944	$217,262,307
2014	3,280.2	$472,952,871	$225,567,960
2015	3,172.1	$465,342,371	$229,894,764
2016	3,057.6	$455,818,695	$232,296,292
2017	2,947.3	$446,096,366	$233,709,911
2018	2,844.9	$436,942,387	$234,673,882
2019	2,755.0	$430,155,573	$236,096,546
2020	2,659.9	$411,871,531	$223,615,953
Average	***3,043.2***	***$442,948,268***	***$214,873,946***

Source: REMI PI+, RESI

As shown in the figure above, under the investment phase this strategy will maintain approximately 2,660 jobs by 2020, and generate $442.9 million in output and $214.9 million in wages on average each year. The industry that gained the most from this strategy was *Construction.* This program seeks to decrease the issue of rural sprawl from residential construction. The increasing construction activity in areas that happen to be more urbanized have a two-fold effect. The first effect is increased employment to residential/mixed-use developments. A secondary construction impact can be attributed to the increase for transportation and regional amenities such as expanding or retrofitted septic systems.

[109] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Investment Phase—Enhancement

The average annual economic impacts of the investment phase under the enhanced scenario of the *Priority Funding Area (Growth Boundary) Related Benefits (Transportation Sector through Smart Growth)* strategy can be found in Figure 102.

Figure 102: Priority Funding Area (Growth Boundary) Related Benefits (Transportation Sector through Smart Growth)—Investment Phase[110]

Year	Jobs	Output	Wages
2010	3,181.6	$726,008,706	$326,278,268
2011	3,619.8	$839,820,066	$401,204,115
2012	3,777.4	$896,691,341	$451,397,153
2013	3,774.5	$914,111,744	$482,805,128
2014	3,690.3	$910,872,196	$501,262,133
2015	3,568.6	$896,214,937	$510,877,253
2016	3,439.8	$877,873,042	$516,213,983
2017	3,315.7	$859,148,557	$519,355,358
2018	3,200.5	$841,518,672	$521,497,515
2019	3,099.4	$828,447,770	$524,658,990
2020	2,992.4	$793,234,059	$496,924,340
Average	***3,423.6***	***$853,085,553***	***$477,497,657***

Source: REMI PI+, RESI

As shown in the figure above, under the investment phase this strategy will maintain approximately 2,992 jobs by 2020, and generate $853.1 million in output and $447.5 million in wages on average each year. The industry that gained the most from this strategy was *Construction.* This program seeks to decrease the issue of rural sprawl by incentivizing residential construction in urbanized regions. However, during the enhancement investment phase of this program, RESI saw some declines due to supply constraints. *Construction* remained the top gaining sector for this strategy.

Operation Phase—Status Quo

The average annual economic impacts of the operation phase of the *Priority Funding Area (Growth Boundary) Related Benefits (Transportation Sector through Smart Growth)* strategy can be found in Figure 103.

[110] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 103: Priority Funding Area (Growth Boundary) Related Benefits (Transportation Sector through Smart Growth)—Operation Phase[111]

Year	Jobs	Output	Wages
2010	1,151.4	$292,241,383	$89,481,507
2011	1,295.5	$335,186,272	$104,229,676
2012	1,361.8	$359,789,935	$112,239,816
2013	1,367.0	$366,402,348	$113,692,782
2014	1,339.1	$363,037,937	$111,073,600
2015	1,297.0	$354,483,799	$106,065,159
2016	1,253.9	$344,731,793	$100,311,264
2017	1,213.0	$334,916,712	$94,423,624
2018	1,174.5	$325,360,955	$88,732,646
2019	1,142.4	$318,130,550	$83,888,022
2020	1,116.4	$313,044,005	$80,058,935
Average	***1,246.5***	***$337,029,608***	***$98,563,366***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 1,116 jobs by 2020, and generate $337.0 million in output and $98.6 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment from this strategy is *Construction.* Increased urbanized populations continue to require more amenities such as transportation and sewage/waste collection services. To accommodate some of these services, RESI expects that state government may make strategic investments to meet the growing population needs.

Operation Phase—Enhancement

The average annual economic impacts of the operation phase under the enhanced scenario of the *Priority Funding Area (Growth Boundary) Related Benefits (Transportation Sector through Smart Growth)* strategy can be found in Figure 104.

[111] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 104: Priority Funding Area (Growth Boundary) Related Benefits (Transportation Sector through Smart Growth)—Operation Phase[112]

Year	Jobs	Output	Wages
2010	1,832.7	$348,864,828	$123,252,765
2011	2,062.0	$400,130,536	$143,567,048
2012	2,167.5	$429,501,300	$154,600,298
2013	2,175.8	$437,394,906	$156,601,628
2014	2,131.4	$433,378,621	$152,993,940
2015	2,064.3	$423,167,069	$146,095,260
2016	1,995.8	$411,525,556	$138,169,785
2017	1,930.7	$399,808,747	$130,060,088
2018	1,869.5	$388,401,507	$122,221,275
2019	1,818.3	$379,770,170	$115,548,240
2020	1,777.0	$373,698,078	$110,274,015
Average	***1,984.1***	***$402,331,029***	***$135,762,213***

Source: REMI PI+, RESI

As shown in the Figure 104, the strategy will maintain approximately 1,777 jobs by 2020, and generate $402.3 million in output and $135.8 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment from this strategy is *Construction.* As the increased urban population begins to grow, RESI expects the state will invest more into amenities such as water, public transportation, and sewage/trash collection.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $96,183,876 during the investment phase and $68,925,313 during the operation phase.

If this strategy is enhanced, additional tax revenues would accumulate to approximately $125,039,038 during the investment phase and $89,602,906 during the operation phase.

3.7 Innovative Initiatives

3.7.1 Buy Local for GHG Benefits

Although farm stands and farmers markets are not new, the phenomenal surge in the locally grown movement has been fueled by not only by an increased awareness of the benefits of fresh, healthful foods, but also the fears raised by well publicized episodes of product contamination and foodborne illness. MDA's "Buy Local" campaign continues to be highly successful in promoting local farms as preferred sources of food for Marylanders by helping

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agricultural producers market their products directly to supermarket, food service, institutional, and other wholesale buyers, as well as consumers.

MDA will promote the sustainable production and consumption of local agricultural goods and thereby help to displace the production and consumption of products transported from other states and countries. In addition to the energy savings and GHG reductions resulting from decreased transportation emissions, greater demand for local products preserves the agricultural landscape, supports agro-biodiversity, and encourages beneficial environmental practices. MDA will work with farmers, local governments, restaurants, food distributors and retailers, value-added producers, public and private institutions, and trade associations to maintain and expand its popular "Buy Local" program. By 2020, MDA aims to raise the number of farmers markets by 20 percent, establish a state farmers market association, and increase direct sales (buyer/grower) by 20 percent.

Investment Phase

The total economic impacts of the investment phase of the *Buy Local for GHG Benefits* strategy can be found in Figure 105.

Figure 105: Buy Local for GHG Benefits—Investment Phase[113]

Year	Jobs	Output	Wages
2010	83.9	$1,068,115	$823,975
2011	83.8	$1,098,633	$953,674
2012	80.3	$1,037,598	$1,007,080
2013	29.7	$396,729	$541,687
2014	27.0	$244,141	$457,764
2015	26.1	$244,141	$434,875
2016	24.8	$183,105	$385,284
2017	24.0	$122,070	$350,952
2018	24.8	$305,176	$358,582
2019	23.6	$122,070	$339,508
2020	22.8	$122,070	$312,805
Average	***41.0***	***$449,441***	***$542,381***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 23 jobs by 2020, and generate $0.4 million in output and $0.5 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment as a result of this strategy is *Forestry, fishing, and related activities*,

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primarily due to the expectation that as popularity for buying local continues, Maryland may need to increase assistance to farmers in expanding their local farms to accommodate demand.

Operation Phase

The average annual economic impacts of the operation phase of the *Buy Local for GHG Benefits* strategy can be found in Figure 106.

Figure 106: Buy Local for GHG Benefits—Operation Phase[114]

Year	Jobs	Output	Wages
2010	6.0	$1,190,186	$152,588
2011	7.5	$1,281,738	$209,808
2012	6.0	$1,220,703	$198,364
2013	6.4	$1,190,186	$225,067
2014	6.4	$1,159,668	$240,326
2015	5.7	$1,098,633	$221,252
2016	4.2	$1,037,598	$205,994
2017	4.4	$1,037,598	$202,179
2018	5.9	$1,159,668	$240,326
2019	5.2	$1,037,598	$205,994
2020	4.6	$1,037,598	$198,364
Average	***5.7***	***$1,131,925***	***$209,115***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 5 jobs by 2020, and generate $1.1 million in output and $0.2 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Farming, fishing, and forestry occupations*. As buying locally continues to be encouraged, more retailers will begin to purchase Maryland-sourced goods to meet increased demand.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate approximately $412,148 for the investment phase and $269,554 for the operation phase.

3.7.2 Voluntary Stationary Source Reductions

GGRA provides two paths for sources in the State's manufacturing sector to follow to potentially get credit for any voluntary programs that they are implementing. Either companies may simply take totally voluntary action and provide a good faith estimate of potential

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reductions, which if appropriate, included in the plan as a reduction, or a company can implement an early voluntary GHG emissions reduction plan, which must be approved by MDE before January 1, 2012 and secure a formal "credit."

Investment Phase

The average annual economic impacts of the investment phase of the *Voluntary Stationary Source Reductions* strategy can be found in Figure 107.

Figure 107: Voluntary Stationary Source Reductions—Investment Phase[115]

Year	Jobs	Output	Wages
2010	0.8	$61,035	$15,259
2011	0.7	$30,518	$15,259
2012	0.4	$30,518	$0
2013	0.3	$30,518	$15,259
2014	0.6	$61,035	$15,259
2015	0.3	$0	$15,259
2016	1.0	$61,035	$30,518
2017	0.4	$0	$30,518
2018	0.0	$0	$15,259
2019	0.7	$61,035	$30,518
2020	-0.3	$0	$30,518
Average	***0.4***	***$30,518***	***$19,420***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will result in less than one forgone job by 2020, and generate $30,518 in output and $19,420 in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy are *Sales, office, and administrative occupations*. Some sources are likely to take advantage of voluntary early reductions and develop plans to retrofit or construct new, energy-efficient facilities. These actions will require engineers, planners, and construction workers within these two industries.

Operation Phase

The average annual economic impacts of the operation phase of the *Voluntary Stationary Source Reductions* strategy can be found in Figure 108.

[115] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 108: Voluntary Stationary Source Reductions—Operation Phase[116]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	2.0	$183,105	$45,776
2012	2.7	$305,176	$76,294
2013	3.4	$366,211	$122,070
2014	4.9	$518,799	$137,329
2015	4.2	$488,281	$152,588
2016	5.4	$549,316	$183,105
2017	5.2	$549,316	$213,623
2018	5.3	$610,352	$183,105
2019	5.4	$671,387	$228,882
2020	4.3	$549,316	$228,882
Average	***3.9***	***$435,569***	***$142,878***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 4 jobs by 2020, and generate $0.4 million in output and $0.1 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment from this phase of the strategy is *Construction and extraction occupations*, primarily due to the expectation that sources which pursue voluntary early reductions have successfully implemented retrofitting or construct new, energy-efficient facilities. These facilities generate operating cost savings which are passed on to a wide variety of companies and enterprises. Positive impacts occur in other industries as these cost savings allow companies and enterprises to hire additional workers (who then spend in the economy) or increase spending with other vendors.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $5,776 during the investment phase, and $6,622,774 during the operation phase.

3.7.3 PAYD Insurance in Maryland

Pay-As-You-Drive® automobile insurance is also known as use-based insurance. Generally, use-based insurance plans are designed to align the amount of premium paid with actual vehicle usage. The distance an automobile is driven, the speed at which it is driven, and the time of day it is driven all are factors that can be used to determine premiums under a use-based plan.

[116] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Investment Phase

The average annual economic impacts of the investment phase of the *PAYD Insurance in Maryland* strategy can be found in Figure 109.

Figure 109: PAYD Insurance in Maryland—Investment Phase[117]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.0	$0	$0
2014	0.0	$0	$0
2015	0.0	$0	$0
2016	0.0	$0	$0
2017	0.0	$0	$0
2018	0.0	$0	$0
2019	0.0	$0	$0
2020	0.0	$0	$0
Average	***0.0***	***$0***	***$0***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will have discernable impact on the economy.

Operation Phase

The average annual economic impacts of the operation phase of the *PAYD* strategy can be found in Figure 110.

[117] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 110: PAYD Insurance in Maryland—Operation Phase[118]

Year	Jobs	Output	Wages
2010	-0.5	-$30,518	-$15,259
2011	-0.1	-$30,518	-$15,259
2012	-0.5	-$61,035	-$15,259
2013	-0.7	-$61,035	$0
2014	0.3	$0	$15,259
2015	-0.1	-$61,035	$0
2016	0.6	$0	$15,259
2017	-0.2	$0	$15,259
2018	0.0	$0	$0
2019	0.1	$61,035	$15,259
2020	0.6	$61,035	$15,259
Average	***0.0***	***-$11,444***	***$11,444***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately one job by 2020, result in approximately $11,444 in forgone output and generate $11,444 in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy are those (such as *Management, business, and financial occupations)* associated with the spending patterns of households experiencing increased income. This is due to those households taking advantage of PAYD as the policyholders tend to drive less than the average Maryland resident.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would not be impacted during the investment phase, and would decrease by $19,002 for the operation phase.

3.7.4 Leadership-by-Example – Local Government

Maryland county and municipal governments, together with State agencies, are adopting policies and practices to obtain high performance and energy-efficient buildings, facilities and vehicle fleets, and reduce the carbon footprint in purchasing, procurement and other government operations. Some jurisdictions have conducted GHG inventories, adopted climate action plans and targets, and implemented tracking protocol, such as those provided by the International Council for Local Environmental Initiatives.

[118] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Investment Phase

The average annual economic impacts of the investment phase of the *Leadership-by-Example – Local Government* strategy can be found in Figure 111.

Figure 111: Leadership-by-Example – Local Government—Investment Phase[119]

Year	Jobs	Output	Wages
2010	168.6	$13,031,006	$6,072,998
2011	172.5	$13,244,629	$6,637,573
2012	170.4	$13,153,076	$6,988,525
2013	167.2	$12,908,936	$7,217,407
2014	162.4	$12,725,830	$7,492,065
2015	157.2	$12,512,207	$7,720,947
2016	153.6	$12,329,102	$7,934,570
2017	151.0	$12,268,066	$8,148,193
2018	148.4	$12,207,031	$8,377,075
2019	145.7	$12,207,031	$8,544,922
2020	144.5	$12,207,031	$8,682,251
Average	***158.3***	***$12,617,631***	***$7,619,684***

Source: REMI PI+, RESI

As shown in the previous figure, the investment phase of this strategy's implementation will maintain approximately 145 jobs by 2020, and generate $12.6 million in output and $7.6 million in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment due to this strategy are *Sales, office, and administrative occupations*, primarily due to the expectation that state government must lead by example by obtaining high performance and energy-efficient buildings, among other measures. Environmental consultants will also likely be contracted to assist in the creation of GHG inventories, climate action plans and targets, and inventory and emissions tracking protocols.

Operation Phase

The average annual economic impacts of the operation phase of the *Leadership-by-example – Local Government* strategy can be found in Figure 112.

[119] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 112: Leadership-by-Example – Local Government—Operation Phase[120]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.0	$0	$0
2014	0.0	$0	$0
2015	0.0	$0	$0
2016	0.0	$0	$0
2017	0.0	$0	$0
2018	0.0	$0	$0
2019	0.0	$0	$0
2020	1,837.4	$109,313,965	$103,195,190
Average	***1,837.4***	***$109,313,965***	***$103,195,190***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 1,837 jobs by 2020, and generate $109.3 million in output and $103.2 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this strategy is *Sales, office, and administrative occupations*. Leading by example will result in higher efficiency and subsequent cost savings for local governments, which will in turn be able to support additional employment. Other industry sectors will benefit from the ongoing sustainable procurement activities of local governments.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by approximately $3,140,436 during the investment phase, and $20,478,272 for the operation phase.

3.7.5 Leadership-by-Example – Federal Government

Federal agencies with facilities located in Maryland are implementing suites of lead-by-example programs to improve efficiency, reduce waste, and integrate renewable energy and sustainable practices into their operations, facilities and fleets. These programs include tools to benchmark and track energy use and GHG emissions in order to report progress. Examples of programs include energy reduction in public buildings, facilities and lands, improved efficiencies in fleet vehicles and fuels, water conservation, waste reduction and recycling, purchasing of products and services with lower life-cycle impacts, and greater use of renewable energy.

[120] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Investment Phase

The average annual economic impacts of the investment phase of the *Leadership-by-Example – Federal Government* strategy can be found in Figure 113.

Figure 113: Leadership-by-Example – Federal Government—Investment Phase[121]

Year	Jobs	Output	Wages
2010	105.9	$8,178,711	$3,814,697
2011	108.0	$8,300,781	$4,135,132
2012	106.8	$8,239,746	$4,394,531
2013	105.2	$8,117,676	$4,547,119
2014	102.5	$8,056,641	$4,745,483
2015	98.2	$7,812,500	$4,837,036
2016	96.6	$7,751,465	$4,989,624
2017	94.1	$7,690,430	$5,142,212
2018	91.9	$7,629,395	$5,279,541
2019	90.3	$7,629,395	$5,355,835
2020	88.5	$7,507,324	$5,416,870
Average	***98.9***	***$7,901,278***	***$4,787,098***

Source: REMI PI+, RESI

As shown in the previous figure, the investment phase of this strategy's implementation will maintain approximately 87 jobs by 2020, and generate $7.9 million in output and $4.8 million in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment from to this strategy are *Sale, office, and administrative occupations*, primarily due to the expectation that federal government must lead by example by obtaining high performance and energy-efficient buildings, among other measures. Environmental consultants will also likely be contracted to assist and advise in the planning and implementation of efficiency improvements, waste reduction, water conservation, renewable energy use, and other measures.

Operation Phase

The average annual economic impacts of the operation phase of the *Leadership-by-Example – Federal Government* strategy can be found in Figure 114.

[121] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 114: Leadership-by-Example – Federal Government—Operation Phase[122]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.0	$0	$0
2014	0.0	$0	$0
2015	0.0	$0	$0
2016	0.0	$0	$0
2017	0.0	$0	$0
2018	0.0	$0	$0
2019	0.0	$0	$0
2020	1,258.4	$92,102,051	$68,771,362
Average	***1,258.4***	***$92,102,051***	***$68,771,362***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 1,258 jobs by 2020, and generate $92.1 million in output and $68.8 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this strategy is *Sales, office, and administrative occupations*, primarily due to the expectation that leading by example will result in higher efficiency and subsequent cost savings for federal governments, which will in turn be able to hire additional employees. Other industry sectors will benefit from the ongoing sustainable procurement activities of federal governments which are continuing implementation and operation of this strategy.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $1,957,467 for the investment phase and $14,969,077 for the operation phase.

3.7.6 Lead-by-Example: State of Maryland Initiatives and Carbon Footprint

Through lead-by-example programs, state government in Maryland aims to improve energy efficiency, reduce waste, and integrate renewable energy practices in all of its agencies' operations and facilities, as well as their purchasing practices. DGS currently manages the following lead-by-example programs:

- Maryland Green Building Council,
- Maryland Green Purchasing Committee,
- State Energy Database, and,
- Renewable Energy Portfolio.

[122] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

This strategy is one that has been identified as providing greater GHG reductions if enhanced.

Investment Phase—Status Quo

The average annual economic impacts of the investment phase of the *State of Maryland Initiatives to Lead by Example* strategy can be found in Figure 115.

Figure 115: State of Maryland Initiatives to Lead by Example—Investment Phase[123]

Year	Jobs	Output	Wages
2010	87.1	$4,913,330	$2,006,531
2011	30.3	$1,678,467	$804,901
2012	47.8	$2,655,029	$1,239,777
2013	172.5	$9,735,107	$4,325,867
2014	171.1	$9,399,414	$4,604,340
2015	167.5	$9,277,344	$4,817,963
2016	163.2	$9,033,203	$4,951,477
2017	158.9	$8,666,992	$5,001,068
2018	166.9	$9,155,273	$5,390,167
2019	24.3	$427,246	$1,266,479
2020	19.9	$122,070	$896,454
Average	***110.0***	***$5,914,862***	***$3,209,548***

Source: REMI PI+, RESI

As in Figure 115, the investment phase of this strategy's implementation will maintain approximately 20 jobs by 2020, and generate $5.9 million in output and $3.2 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Construction.* Part of this strategy's implementation is to increase state building's energy efficiency. This sector may see an increase in demand to meet these specialized retrofits and assessments.

Investment Phase—Enhancement

The average annual economic impacts of the investment phase of the *State of Maryland Initiatives to Lead by Example* strategy can be found in Figure 116.

[123] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 116: State of Maryland Initiatives to Lead by Example—Investment Phase[124]

Year	Jobs	Output	Wages
2010	87.1	$4,913,330	$2,006,531
2011	30.3	$1,678,467	$804,901
2012	47.8	$2,655,029	$1,239,777
2013	172.5	$9,735,107	$4,325,867
2014	171.1	$9,399,414	$4,604,340
2015	228.4	$12,650,924	$6,569,949
2016	222.6	$12,318,005	$6,752,014
2017	216.7	$11,818,626	$6,819,639
2018	227.6	$12,484,464	$7,350,228
2019	33.1	$582,608	$1,727,018
2020	27.1	$166,460	$1,222,437
Average	***133.1***	***$7,127,494***	***$3,947,518***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 27 jobs by 2020, and generate $7.1 million in output and $3.9 million in wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Construction.* Part of this strategy's implementation is to increase state building's energy efficiency. This sector may see an increase in demand to meet these specialized retrofits and assessments.

Operation Phase—Status Quo

The average annual economic impacts of the operation phase of the *State of Maryland Initiatives to Lead by Example* strategy can be found in Figure 117.

[124] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 117: State of Maryland Initiatives to Lead by Example—Operation Phase[125]

Year	Jobs	Output	Wages
2010	0.7	$0	$7,629
2011	0.0	-$30,518	-$3,815
2012	0.1	$0	$0
2013	0.9	-$61,035	-$3,815
2014	2.8	-$183,105	$11,444
2015	1.1	-$183,105	-$19,073
2016	0.0	-$183,105	-$15,259
2017	0.8	-$183,105	-$3,815
2018	1.4	-$122,070	$0
2019	-0.2	-$183,105	-$19,073
2020	0.1	-$122,070	-$7,629
Average	***0.7***	***-$113,747***	***-$4,855***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain less than one job by 2020, result in approximately $0.1 million in forgone output and $4,855 in forgone wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Accommodations and Food Services.* The increased income to those in the region from reduced energy consumption by larger government buildings may be an indirect impact to the households' utility bill over time.

Operation Phase—Enhancement

The average annual economic impacts of the operation phase of the *State of Maryland Initiatives to Lead by Example* strategy can be found in Figure 118.

[125] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 118: State of Maryland Initiatives to Lead by Example—Operation Phase[126]

Year	Jobs	Output	Wages
2010	0.7	$0	$7,629
2011	0.0	-$30,518	-$3,815
2012	0.1	$0	$0
2013	0.9	-$61,035	-$3,815
2014	2.8	-$183,105	$11,444
2015	1.6	-$249,689	-$26,009
2016	0.0	-$249,689	-$20,807
2017	1.1	-$249,689	-$5,202
2018	1.9	-$166,460	$0
2019	-0.3	-$249,689	-$26,009
2020	0.1	-$166,460	-$10,404
Average	***0.8***	***-$146,030***	***-$6,999***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain less than one job by 2020, result in approximately $0.1 million in forgone output and $6,999 in forgone wages on average each year. The industry experiencing the greatest positive economic impacts in terms of employment due to this phase of the strategy is *Accommodations and Food Services.* The increased income to those in the region from reduced energy consumption by larger government buildings may be an indirect impact to the households' utility bill over time.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $1,863,783 during the investment phase and decrease by $17,999 during the operation phase.

If the strategy is enhanced, the total state and local tax revenues would increase by $2,539,828 during the investment phase and decrease by $25,713 during the operation phase.

3.7.7 Leadership-by-Example – Maryland University Lead-by-Example Initiatives

In Maryland, the presidents' of 23 colleges and universities—including all USM schools, Morgan, SMCM, 4 community colleges and 4 independent institutions— have signed the American College and University Presidents Climate Commitment, which requires each school to complete a GHG inventory, develop a climate action plan and implement strategies to reduce GHG emissions to achieve a set target. Schools are encouraged to commit to become climate neutral by a certain date, meaning GHG emissions sourced from the school be reduced or

[126] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

mitigated from a base year, with remaining emissions offset by purchasing carbon credits or other means.

Investment Phase

The average annual economic impacts of the investment phase of the *Leadership-by-Example – Maryland University Lead-by-Example Initiatives* strategy can be found in Figure 119.

Figure 119: Leadership-by-Example – Maryland University Lead-by-Example Initiatives—Investment Phase[127]

Year	Jobs	Output	Wages
2010	101.9	$7,843,018	$3,677,368
2011	104.3	$8,026,123	$3,967,285
2012	102.9	$7,934,570	$4,226,685
2013	101.9	$7,843,018	$4,409,790
2014	99.1	$7,781,982	$4,562,378
2015	95.0	$7,568,359	$4,684,448
2016	93.0	$7,446,289	$4,791,260
2017	91.0	$7,385,254	$4,943,848
2018	89.4	$7,385,254	$5,096,436
2019	86.5	$7,324,219	$5,157,471
2020	85.8	$7,263,184	$5,249,023
Average	***95.5***	***$7,618,297***	***$4,615,090***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 86 jobs by 2020, and generate $7.6 million in output and $4.6 million in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment due to this strategy are *Sales, office, and administrative occupations*. Universities must lead by example by obtaining high performance and energy-efficient buildings, and fleet vehicles among other measures. Environmental consultants will likely be contracted to assist and advise in the planning and implementation of building efficiency, efficient appliance purchasing, optimized operations, waste minimization, and other measures.

Operation Phase

The average annual economic impacts of the operation phase of the *Leadership-by-Example – Maryland University Lead-by-Example Initiatives* strategy can be found in Figure 120.

[127] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 120: Leadership-by-Example – Maryland University Lead-by-Example Initiatives—Operation Phase[128]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.0	$0	$0
2014	0.0	$0	$0
2015	0.0	$0	$0
2016	0.0	$0	$0
2017	0.0	$0	$0
2018	0.0	$0	$0
2019	0.0	$0	$0
2020	96.0	$5,615,234	$5,386,353
Average	***96.0***	***$5,615,234***	***$5,386,353***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain approximately 96 jobs by 2020, and generate $5.6 million in output and $5.4 million in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment due to this strategy are *Sales, office, and administrative occupations* and *Construction and extraction occupations*. Leading by example will result in higher efficiency and subsequent cost savings for universities within Maryland's higher education system, which will in turn be able to support additional employment. Other industry sectors will benefit from the ongoing sustainable purchasing by universities which are continuing implementation and operation of this strategy.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would accumulate to approximately $1,886,382 during the investment phase and $1,064,665 during the operation phase.

3.7.8 Transportation and Climate Initiative

The Transportation and Climate Initiative (TCI) is a regional effort of Maryland and 10 other Northeast and Mid-Atlantic states and Washington, D.C.[1] to reduce GHG emissions in the region's transportation sector, minimize the transportation system's reliance on high-carbon fuels, promote sustainable growth to address the challenges of vehicle-miles traveled, and help build the clean energy economy across the region.

[128] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Investment Phase

The average annual economic impacts of the investment phase of the *Transportation and Climate Initiative* strategy can be found in Figure 121.

Figure 121: Transportation and Climate Initiative—Investment Phase[129]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.0	$0	$0
2014	0.0	$0	$0
2015	0.0	$0	$0
2016	0.0	$0	$0
2017	0.0	$0	$0
2018	0.0	$0	$0
2019	0.0	$0	$0
2020	0.0	$0	$0
Average	***0.0***	***$0***	***$0***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will not have an impact on jobs, output or wages. To date, there has been no investment phase costs or benefits associated with this strategy.

Operation Phase

The average annual economic impacts of the operation phase of the *Transportation and Climate Initiative* strategy can be found in Figure 122.

[129] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 122: Transportation and Climate Initiative—Operation Phase[130]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	1.4	$87,194	$87,194
2014	1.7	$174,386	$43,597
2015	0.9	$0	$43,597
2016	2.6	$174,386	$130,789
2017	1.7	$174,386	$174,386
2018	0.6	$0	$43,597
2019	0.9	$174,386	$87,194
2020	0.6	$0	$87,194
Average	***1.3***	***$98,092***	***$87,194***

Source: REMI PI+, RESI

As shown in Figure 122, the strategy will maintain approximately one job by 2020, and generate $98,092 in output and $87,194 in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment as a result of this strategy are those with goods and services demanded by new employees and households directly related to the strategic efforts of TCI to reduce GHGs in the transportation sector.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would not be impacted during the operation phase and increase by $5,867,295 for the investment phase.

3.8.1 Greenhouse Gas Emissions Inventory Development

Emissions inventories are essential to developing environmental policies. The quality of a state-specific inventory is vital to the process if Maryland expects to set and achieve realistic pollution reduction goals. A baseline GHG inventory will pinpoint the business sectors that contribute to Maryland's GHG emissions, identifying where priorities should be placed in the development of climate policies. It also is necessary to determine what Maryland's future GHG emissions will be through the use of a forecast and modeling. Since GHG emissions may increase in the future, Maryland can take advantage of any cost-effective opportunities for early GHG reductions that may exist.

[130] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

The GGRA identified 2006 as the base year for Maryland's process and as the year for the first compliance-quality inventory. Since Maryland GHG data existed for 2006, using 2006 as the base year for Maryland's GHG inventory made sense from a resource perspective

Investment Phase

The average annual economic impacts of the investment phase of the *Greenhouse Gas Emission Inventory and Development* strategy can be found in Figure 123.

Figure 123: Greenhouse Gas Emissions Inventory Development —Investment Phase[131]

Year	Jobs	Output	Wages
2010	22.2	$1,708,984	$793,457
2011	23.2	$1,739,502	$854,492
2012	23.0	$1,800,537	$946,045
2013	22.5	$1,739,502	$976,563
2014	22.2	$1,770,020	$991,821
2015	20.9	$1,647,949	$1,022,339
2016	20.4	$1,647,949	$1,037,598
2017	20.0	$1,647,949	$1,083,374
2018	20.6	$1,647,949	$1,129,150
2019	20.0	$1,708,984	$1,144,409
2020	19.3	$1,647,949	$1,129,150
Average	***21.3***	***$1,700,661***	***$1,009,854***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will maintain approximately 19 jobs by 2020, and generate $1.7 million in output and $1.0 million in wages on average each year. Overall, the most significant gains for this strategy were recorded in the *Professional, scientific, and technical services* sector. The strategy's reliance on a well maintained and coordinated database would require skilled individuals within this sector to provide services.

Operation Phase

The average annual economic impacts of the operation phase of the *Transportation and Climate Initiative* strategy can be found in Figure 124.

[131] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 124: Transportation and Climate Initiative—Operation Phase[132]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.0	$0	$0
2014	0.0	$0	$0
2015	0.0	$0	$0
2016	0.0	$0	$0
2017	0.0	$0	$0
2018	0.0	$0	$0
2019	0.0	$0	$0
2020	0.0	$0	$0
Average	***0.0***	***$0***	***$0***

Source: REMI PI+, RESI

As shown in Figure 124, the strategy will have no discernable impact on the economy.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues would increase by $428,591 during the investment phase and have no impact during the operation phase.

3.8 Outreach

3.8.1 Outreach and Public Education

State-sponsored public education and outreach combined with community actions form the foundation for behavioral and life style changes necessary to reduce GHG emissions. This program is designed to promote new actions and encourage continuation of existing efforts such as the educational efforts and action campaigns of State agencies, such as MDE, DNR, Maryland State Department of Education, and University of Maryland; electric utilities; non-profit organizations; faith communities; and others. This combination of efforts insures that scientifically based factual information is made available through public education and outreach efforts and reaches all segments of the public.

Investment Phase

The average annual economic impacts of the investment phase of the *Outreach and Public Education* strategy can be found in Figure 125.

[132] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 125: Outreach and Public Education—Investment Phase[133]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.0	$0	$0
2013	0.0	$0	$0
2014	0.0	$0	$0
2015	0.0	$0	$0
2016	0.0	$0	$0
2017	0.0	$0	$0
2018	0.0	$0	$0
2019	0.0	$0	$0
2020	0.0	$0	$0
Average	***0.0***	***$0***	***$0***

Source: REMI PI+, RESI

As shown in the figure above, the investment phase of this strategy's implementation will have no discernable impact on the economy.

Operation Phase

The average annual economic impacts of the operation phase of the *Outreach and Public Education* strategy can be found in Figure 126.

[133] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding

Figure 126: Outreach and Public Education—Operation Phase[134]

Year	Jobs	Output	Wages
2010	0.0	$0	$0
2011	0.0	$0	$0
2012	0.1	$0	$0
2013	0.0	$0	$0
2014	0.0	$30,518	$0
2015	0.0	$0	$0
2016	-0.1	$0	$0
2017	0.4	$0	$15,259
2018	0.4	$0	$0
2019	0.3	$61,035	$30,518
2020	0.1	$61,035	$15,259
Average	***0.1***	***$13,872***	***$5,549***

Source: REMI PI+, RESI

As shown in the figure above, the strategy will maintain less than one job by 2020, and generate $13,872 in output and $5,549 in wages on average each year. The industries experiencing the greatest positive economic impacts in terms of employment due to this strategy are primarily those industries (such as *Sales, office, and administrative occupations* and *Management, business, and financial occupations)* which will experience increased consumption of goods and services as successful outreach and education create some change in consumption behavior and spending patterns for both businesses and consumers.

Fiscal Impacts

As a result of the previously discussed activities contributing to the economic impacts of the strategy, the total state and local tax revenues not be impacted during the investment phase, and would increase by $6,541,298 during the operation phase.

[134] Values are adjusted for inflation Summed impacts throughout the report may not add up exactly to totals due to rounding