

Maryland
Department of the
Environment 2019
Annual Climate
Change Report

February 2019

Table of Contents

CORE PROGRAMS	8
Program Name: The Regional Greenhouse Gas Initiative (RGGI)	10
Program Name: GHG Power Plant Emission Reductions from Federal Programs	19
Program Name: Boiler Maximum Achievable Control Technology (MACT)	19
Program Name: GHG New Source Performance Standard	20
Program Name: GHG Prevention of Significant Deterioration Permitting Program	21
Program Name: Transportation Technologies	22
Program Name: Sustainable Materials Management (SMM)	34
Program Name: Voluntary Stationary Source Reductions	35
Program Name: Federal Measures	35
RECOMMENDED NEW PROGRAMS	37
Program Name: Maryland Clean and Renewable Energy Standard (CARES) Act of 2020	39
Program Name: In-State Methane Minimization	40
Program Name: Hydrofluorocarbons (HFCs)	40
VOLUNTARY AND NON-TRADITIONAL PROGRAMS	42
Program Name: The United States Climate Alliance	42
Program Name: The Transportation and Climate Initiative (TCI)	48
Program Name: Zero Emission Vehicle (ZEV) MOU Partnership	48
Program Name: Leadership-By-Example – State	50
Program Name: Leadership-By-Example – Federal	51
Program Name: Leadership-By-Example – Local Government	52
Program Name: Leadership-By-Example – Universities and Colleges	53
Program Name: The Climate Champions Program	54
Program Name: Idle Free Maryland	56
Program Name: The Port Partnership	57
Program Name: The Volkswagen Mitigation Fund	60

Program Name: The Metropolitan Washington Council of Governments’ (MWCOG) Climate Energy and Environmental Policy Committee (CEEPC)	62
OUTREACH EFFORTS TO BUILD PUBLIC AWARENESS AND PROMOTE VOLUNTARY ACTION	65
Program Name: Education, Communication, and Outreach Working Group	65
Program Name: Climate Ambassadors	67
Program Name: Climate Champions	68

Introduction

The Maryland Department of the Environment’s (MDE) Annual Climate Change Report is written in accordance with State Government Article §2-1246, as required by §2-1305 of the Environmental Article. It details the status of programs managed by MDE that support the state’s greenhouse gas reduction and climate adaptation efforts. The report also recommends policy, planning, regulatory, and fiscal changes to existing programs.

Over the past year, MDE has been hard at work on many fronts, not only developing the 2019 GGRA Draft Plan, but also actively implementing programs and engaging in activities that support state and regional climate change response options. Greenhouse gas emission reduction efforts through mitigation have consistently been a MDE priority, but in the previous year, adaptation and resiliency have become increasingly important. These strategies are linked in multiple ways in the suite of programs that make up the 2019 GGRA Draft Plan.

The 2019 GGRA Draft Plan includes numerous strategies, programs, and initiatives to meet the emission reduction goals required by the 2016 Greenhouse Reduction Act (GGRA). The law also required MDE to develop a plan that benefits the state’s economy and creates jobs. MDE released the GGRA Draft Plan in October 2019. It includes a comprehensive set of more than 100 measures developed in coordination with other state agencies and stakeholders, including the Maryland Commission on Climate Change (MCCC). These efforts include investments in energy efficiency and clean and renewable energy solutions, widespread adoption of electric vehicles, and improved management of farms and forests. The state's Draft Plan supports new industries and technologies by encouraging investment in the energy and transportation sectors.

The 2019 GGRA Draft Plan utilizes various strategies, programs, and initiatives that the state is developing and implementing to meet the emissions reductions and economic benefit goals. Some of these strategies are already being fully implemented, while others are in an earlier phase of the implementation process. The suite of programs encompasses multiple sectors, including the electricity sector, the transportation sector, the agriculture and forestry sector, the buildings sector, the waste management sector, and additional non-specific sectors. The plan also includes numerous partnerships with key stakeholders, like the private sector, underserved communities, state universities, and the Port of Baltimore.

The core programs of the 2019 GGRA Draft Plan extend from the suite of programs developed for previous GGRA plans, specifically the state’s 25% by 2020 Plan. Based on the recently completed 2017 inventory, **the state’s GHG emissions are already below the 2020 Plan goal.**

These results are encouraging; however, continued progress is necessary to ensure we maintain reductions to 2020. The core programs contribute to the state's goal of reducing GHG emissions by 40% by 2030.

Programs of note in the Draft GGRA Plan

Clean and Renewable Energy Standard (CARES)

A major component of the 2019 GGRA Draft Plan to reduce GHG emissions from electricity generation is the proposed Clean and Renewable Energy Standard (CARES), which requires that an increasingly large share of Maryland's electricity be generated by zero- and low-carbon resources. CARES would build off the existing Renewable Portfolio Standard (RPS), and require that 100% of Maryland's electricity come from clean sources by 2040, which is among the most ambitious goals in the nation. CARES would adopt a technology-neutral approach to achieving 100% clean electricity at the lowest cost. By incorporating all available and emerging zero- and low-carbon sources in Maryland, CARES would foster greater competition among available renewable and clean energy resources, which would reduce costs for ratepayers. The broad set of eligible technologies would include solar beyond the requirements of the RPS solar carve out, new efficient Combined Heat and Power (CHP), in-state hydropower, in-state nuclear power, and natural gas with carbon capture and storage (CCS) technology. CARES would rely on electricity generators in Maryland to make progress beyond the existing goals, ensuring that Marylanders benefit from the direct job creation resulting from investments in clean energy resources.

Regional Greenhouse Gas Initiative (RGGI) Expansion

In 2017 RGGI completed a program review, and strengthened RGGI to continue steady, deeper reductions of GHG emissions by 2030. With the success of the initiative, and as a national leader in the effort to combat climate change, Maryland and the other participating RGGI states are actively working to engage new participants in the program. The first-in-the nation carbon cap-and-invest program for power plants has been strengthened by implementing the participating states' plan to secure an additional 30% reduction in power plant emissions by 2030, and expanding the program to new participating states in the region to reduce pollution from power plants supplying electricity into Maryland.

As the chair of the RGGI, Inc. board of directors since 2018, Maryland led deliberations among the RGGI states to broaden participation to include New Jersey and Virginia. In July 2019, New Jersey finalized regulations allowing it to renew its participation in January 2020. Virginia also finalized regulations, and although they are unable to participate in 2020 due to budget restrictions, MDE is hopeful that they will be able to in the near future. Other states, including Pennsylvania have taken important steps that could lead to future participation.

Transportation and Climate Initiative (TCI)

TCI is a regional effort of Maryland and 11 other Northeast and mid-Atlantic states and Washington, D.C. 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 (VMT), and help build the clean energy economy across the region.

Cooperation continues between Maryland and the other states to develop a regional cap-and-invest program for road transportation fuels that will drive investment in clean transportation infrastructure, and encourage widespread use of EVs powered by increasingly clean electricity. TCI is using many of the successful concepts from RGGI.

Hydrofluorocarbon (HFC) Regulation

Under a federal Clean Air Act program designed to identify and evaluate alternatives to stratospheric ozone depleting substances, HFCs have been one of the most common alternatives. However, HFCs are extremely potent GHG emissions. One pound of certain HFCs is potentially as potent as 1,400 pounds of carbon dioxide. After efforts have stalled at the federal level, states have begun their own phase out initiatives. MDE will develop regulations similar to those in development in California, Delaware, New York, Massachusetts, Connecticut, and other states, which would phase out the use of certain HFCs in foam products, and in refrigeration equipment in retail establishments, such as supermarkets. The phase out of HFCs will encourage the use of substances with lower GHG emissions. Products with alternatives to HFCs are already available. Other states in the U.S. Climate Alliance (Alliance or USCA), a bipartisan coalition of states committed to reducing GHG emissions consistent with the Paris Agreement, are expected to take similar actions.

Maryland is currently drafting HFC regulations with plans to adopt a final rule by fall 2020. HFCs are critical to the states' short-term and long-term emission reduction goals as they are highly potent short-lived climate pollutants.

Methane Regulation

In 2016, the U.S. Environmental Protection Agency (EPA) issued landmark regulations for new and modified natural gas processing, transmission and storage facilities. Then in 2018 and 2019, the EPA issued two proposals to weaken those standards. The plan to replace the innovative methane standards would place the responsibility of reining in natural gas emissions, one of the most potent GHGs, on the states.

Maryland recognized the responsibility to develop standards and is one-step away from finalizing regulations to reduce methane emissions from the oil and gas sector. The regulations apply to both new and existing facilities and require companies to periodically check for and repair leaks at natural gas facilities. MDE plans to finalize the rules in early 2020. This action establishes requirements to reduce vented and fugitive emissions of methane from both new and existing natural gas facilities.

Resilient Infrastructure

Maryland's average annual precipitation is projected to significantly increase by 2050. The frequency of extreme precipitation events is also anticipated to increase. Maryland's existing infrastructure may not be resilient enough to effectively manage the increased precipitation load. Local infrastructure, such as roads, bridges, and buildings are at higher risk from the impacts of sea level rise, coastal flooding, and intense precipitation events.

Maryland's infrastructure was designed and built to handle a given stressor based on historical information. Changes in temperature and precipitation patterns can be tolerated, but only within a certain range, based on the resiliency of a given infrastructure. Projecting impacts on existing infrastructure when exposed to increased stressors as a result of climate change, the effects can be irreversible and could have significant economic and potentially health-related impacts.

With consideration of Maryland's extensive coastline (3,100 miles), damage from hazards such as flooding, salt-water intrusion, storm surge, and erosion need to be addressed. In 2019, MDE, (DNR), and other partners have assessed the state of the science of projected climate change impacts on precipitation, to help Maryland communities better assess their localized flood risks and become more resilient.

As precipitation increases it is vital to ensure Maryland dams are also resilient to the effects of climate change. In 2019, MDE prioritized inspections of significant and high hazard dams, assessed their condition, and required repair or removal of dams where necessary to protect life and property. MDE, in consultation with (MEMA) and other partners, will ensure adequate emergency preparedness by requiring owners to complete routine updates of dam Emergency Action Plans and by providing technical assistance to dam owners to implement table-top exercises for these Emergency Action Plans. MDE is developing intra-agency standard operating procedures for emergency response to individual and multiple dam failure incidents.

The Maryland Commission on Climate Change

The MCCC has played a fundamental role in Maryland's efforts to combat climate change, beginning with its 2008 Climate Action Plan. One of the most significant roles of the MCCC is 2019 was to serve in an advisory capacity to MDE and other state agencies as MDE developed the Draft 40 by 30 Plan. This role will continue through 2020, as the final GGRA Plan is developed.

The MCCC is important because it provides invaluable bipartisan input to the Governor and the General Assembly on ways to mitigate and adapt to climate change. MDE Secretary Grumbles serves as the chair of the MCCC. The body includes six additional members of the Governor's Cabinet, two members from the General Assembly, the State Treasurer and several representatives of environmental advocacy groups, state/local government, the private sector, labor, academia and nonprofits. The MCCC embodies both public and private sector interests to ensure well-balanced direction and broad expertise. The MCCC is supported by a Steering Committee and four Working Groups.

The Mitigation Working Group (MWG) focuses on regulatory, market-based and voluntary programs to reduce GHGs while supporting economic development and job creation. The MWG builds on the ongoing work of MDE, contractors and other state agencies, while using the unique expertise of MWG members. The MWG sources subject matter experts to inform analyses and discussion of mitigation measures.

The Adaptation and Resiliency Working Group (ARWG) develops adaptation strategies for reducing Maryland's vulnerability to climate change, provides tools to plan for and adapt to the more extreme weather and sea level rise. The ARWG has formed a number of sector-based working groups to assist with implementation of programs to promote improved human health; regenerative agriculture; adapting to sea level rise and coastal storms; restoring forest and terrestrial ecosystems; bay and aquatic ecosystems; water resources; and making Maryland's infrastructure more resilient. The mitigation and adaptation strategies put forth by the MCCC help local governments plan for and adapt to the consequences of climate change such as more extreme weather and a rise in sea levels.

Another working group of the MCCC is the Science and Technical Working Group (STWG). This body is responsible for updating and informing the MCCC on the science of climate change. The local govts benefit from the work of the STWG when they plan and implement programs in their jurisdictions.

Additionally, the Education, Communication and Outreach (ECO) Working Group assists the state with public outreach and public meetings on climate change as well as educating Marylanders on what they can do to be part of the solution.

Maryland is one of several states leading on climate. The strategies and actions that are increasingly necessary for achieving the swift and far-reaching emissions reductions that the state has committed to will eventually require federal support. Maryland already has a legally binding, economy-wide, GHG target. We are developing a Clean and Renewable Energy Standard for our electricity sector. We are requiring manufacturers to deliver zero emission vehicles, and building the infrastructure to support them. We need to attract clean energy investors to provide the private capital to solve some of our larger, more complex energy problems. If we are to succeed, we need to continue to bridge any partisan divide that tends to slow progress on climate related issues, and partner with other states to maintain momentum on climate and economic progress and job growth.

The United States Climate Alliance

In January 2018, Governor Hogan proudly committed Maryland to participation in the USCA. When President Trump announced his intention to withdraw from the Paris Climate Agreement, Governor Hogan disagreed with the decision. Over the course of 2019, Maryland has worked with the USCA states to share insights, experiences, and strategies in order to meet and excel beyond the requirements of the Paris Climate Agreement. Maryland has encouraged all participating states to adopt clean air standards and greenhouse gas goals as strong and aggressive as Maryland's. Through collaborative efforts, the USCA states are demonstrating leadership in addressing climate change and inspiring climate action throughout the United States.

Maryland has consistently been a leader and active participant in the Alliance, contributing our experience, knowledge, and research. Many participating states have looked to Maryland to learn from our collaborative and ground-breaking work on the Greenhouse Gas

Emissions Reduction Act - Reauthorization of 2016, Healthy Soils Initiative, the Climate Leadership Academy, MCCCe, the RGGI, TCI and CARES. The USCA has played an integral role in helping Maryland launch a regulatory initiative to phase out Hydrofluorocarbon (HFCs) and also work to strengthen our forest and agricultural carbon sequestration programs. Collaborations with the Alliance and other alliance states increases Maryland's capacity to deal with the challenges of climate change.

CORE PROGRAMS

Program Name: The Regional Greenhouse Gas Initiative (RGGI)

Lead Agency: MDE

Program Description

RGGI comprises nine states in the Northeast and mid-Atlantic regions. These states adopted market-based carbon dioxide (CO₂) cap and trade programs designed to reduce emissions of CO₂, a GHG, from fossil fuel-fired electricity generators with a nameplate capacity of 25 megawatts or greater. RGGI currently comprises Connecticut, Delaware, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, and Maryland. Participating RGGI states each require electricity generators to have acquired, through regional auction or secondary market transactions, one CO₂ allowance for every ton of CO₂ emitted over a three-year compliance period. Auction proceeds fund a number of state programs, including energy efficiency programs that result in lower CO₂ emissions through reduced electricity demand. Further, auction proceeds fund renewable energy projects that reduce the amount of CO₂ emissions generated by fossil fueled electricity generators.

The Maryland Healthy Air Act was signed into law on April 6, 2006, and required Maryland to join RGGI by July 2007. MDE subsequently adopted COMAR 26.09.01 to .03, implementing the "Maryland CO₂ Budget Trading Program," which became effective on July 17, 2008. COMAR 26.09.04 ("Auctions") became effective as a permanent regulation on August 25, 2008.

The RGGI program has several unique features unlike other cap-and-trade programs in the U.S. The allowances are controlled by the states and can be allocated or sold to sources. Most states have opted to auction the allowances to sources through quarterly auctions. Proceeds from the auctions are used to fund energy efficiency programs to reduce demand for electricity and provide a means to lower CO₂ emissions. The states conducted the first quarterly regional auction in September 2008, and the program officially began in January 2009.

RGGI originally set a cap of 188,076,976 tons of CO₂ emissions for the region, based on average 2000 to 2002 CO₂ emissions from eligible electricity generators subject to the program, and Maryland received 37,503,983 CO₂ allowances each year through 2013. After the 2012

Comprehensive RGGI Program Review, changes to the cap resulted in Maryland receiving 20,360,944 CO₂ allowances in 2014. Between 2015 and 2020, Maryland will annually receive 2.5% fewer CO₂ allowances as the RGGI cap reduces by 10% during that time. Maryland originally set aside 7,388,491 allowances in four different set aside accounts to account for special needs or programs, but this number and the number of set aside accounts was reduced through the 2016 Comprehensive Program Review.

Table 1. Maryland CO₂ Allowance Allocation By Year.

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

RGGI is composed of individual CO₂ Budget Trading Programs in each RGGI participating state. Each participating state's CO₂ Budget Trading Program is based on the 2008 RGGI Model Rule, which was developed to provide guidance to states as they implemented the RGGI program. RGGI participating states have completed a 2016 Comprehensive Program Review, which is a comprehensive evaluation of program successes, program impacts, the potential for additional reductions, imports and emissions leakage, and offsets.

Amendments to the Model Rule were developed by the RGGI state staff as part of the Program Review. This effort was supported by an extensive regional stakeholder process that engaged the regulated community, environmental nonprofits, and other organizations with technical expertise in the design of cap-and-trade programs.

Implementation Milestones

Auctions

Maryland has successfully participated in all 45 regional auctions of CO₂ allowances with RGGI. Auction proceeds go to the Strategic Energy Investment Fund (SEIF), which is administered by (MEA). To date, Maryland has generated \$669,571,907.26 in cumulative proceeds.

RGGI 2016 Comprehensive Program Review

On August 23, 2017, after completing a comprehensive 1.5-year review, Maryland and the other RGGI participating states announced a consensus agreement on proposed program changes. A regional emissions cap trajectory is proposed that will provide an additional 30% cap reduction by the year 2030 with important new features and innovations. This announcement can be found at: rggi.org/docs/ProgramReview/2017/08-23-17/Announcement_Proposed_Program_Changes.pdf

The 2016 Program Review culminated in the 2017 Model Rule, originally released in December 2017, and revised a year later in December 2018. The Model Rule represents a list of implementation milestones:

- It was required by RGGI Memorandum of Understanding
- The RGGI states then updated their individual CO₂ Budget Trading Programs with guidance from the 2017 Model Rule
- Summary of Big Changes:
 - The regional emissions cap in 2021 will be equal to 75,147,784 tons and will decline by 2.275 million tons of CO₂ per year afterward, resulting in 30% total reduction from 2020 to 2030.
 - The Third Adjustment for Banked Allowances would adjust the base budget for 100% of the pre-2021 vintage allowances held by market participants as of the end of 2020 that are in excess of the total 2018-2020 emissions. The third adjustment timing and algorithm is spelled out in the Model Rule and would be implemented over 2021-2025.
 - The Model Rule contains language for the continued use of a Cost Containment Reserve (CCR). The CCR would consist of a fixed quantity of allowances in addition to the cap. These would be held in reserve and only made available for sale if allowance prices exceed predefined price levels.
 - In a similar vein, the Model Rule created the Emissions Containment Reserve (ECR), a mechanism designed to respond to supply and demand if emission reductions costs are lower than projected.
 - The Model Rule eliminates two offset categories: the Sulfur hexafluoride (SF₆) Offset Category and the End-Use Energy Efficiency Offsets Category and the End-Use Energy Efficiency Offsets Category

The Cap

The RGGI cap was first established during the period from 2005-2007. The participating states decided upon a generation-based program rather than a consumption-based program because the states had authority to control electric generating sources within their jurisdiction. The initial cap was based on the average of 2000-2002 CO₂ emissions and the initial cap was set at 188,076,976 short tons of CO₂. After a stabilization period, the cap would be reduced starting in 2015 by 2.5% each year until 2018 for a 10% reduction. When New Jersey left the program after 2011, the end of the first control period, the cap was adjusted to 165,184,246 short tons of CO₂ to remove New Jersey's emissions.

As the states tracked emissions to evaluate reductions, the downward trend in emissions became evident. The drop in allowance sales at the regional auctions also signaled an oversupply of allowances, and so the participating states elected to revise the cap as part of the 2012 Comprehensive Program Review. During the review, the states considered a number of potential caps in short tons of CO₂, but ultimately the cap was set at 91 million short tons of CO₂ (91M).

The 91M cap put downward pressure on carbon emissions, while receiving support from a wide variety of stakeholders and many generators.

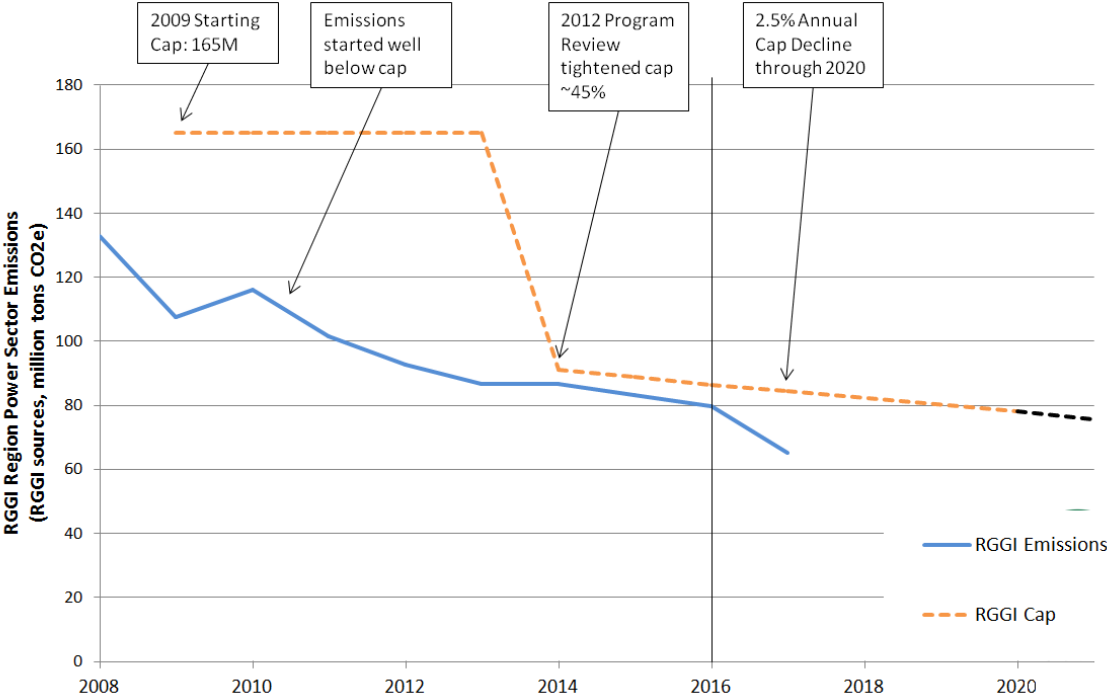


Figure 1. 2012 Program Review Cap Change.

The RGGI program started in 2009. The figure above shows the actual CO₂ emissions from the participating states and the original and revised cap.

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

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

The selection of a regional cap of 75,147,784 tons of CO₂ in 2021, which will decline by 2.275 million tons of CO₂ per year thereafter, resulting in a total 30% reduction in the regional cap from 2020 to 2030, was a difficult but well thought-out decision.

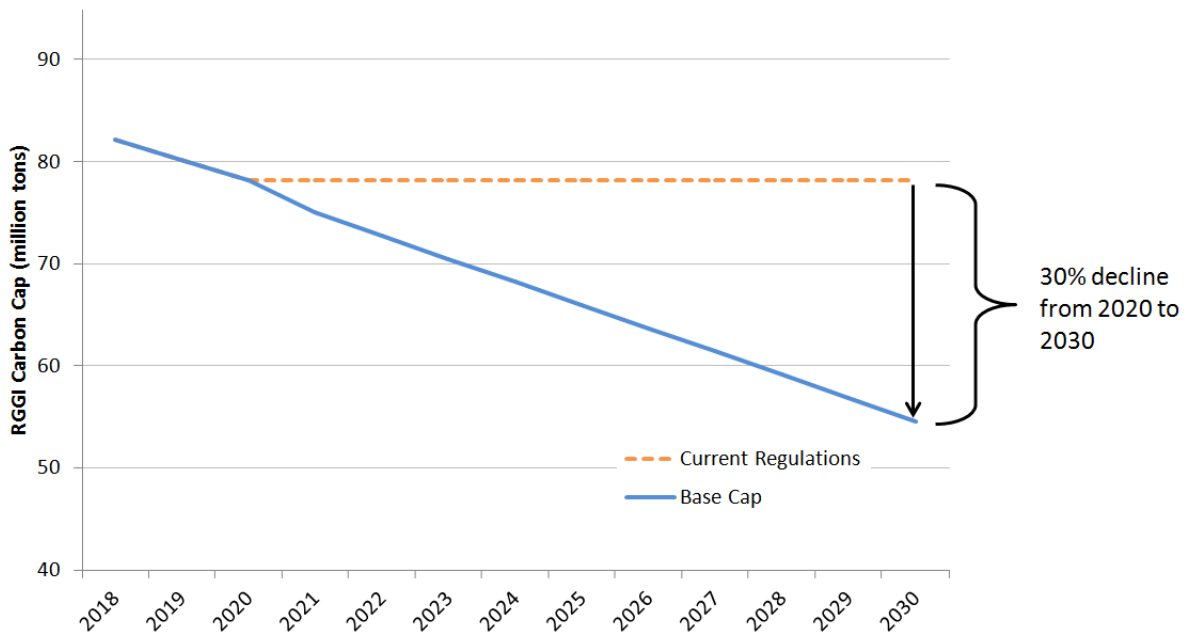


Figure 2. 2016 Program Review Cap Change.

The Cost Containment Reserve (CCR)

The participating states recognized the possibility of price volatility for allowances. To provide flexibility to affected sources, the participating states developed an offset program and allowed sources to use offset allowances for up to 3.3% of their compliance obligation. Additionally, if the cost of allowances exceeded certain prices and remained at those levels for extended periods of time, affected sources could purchase greater percentages of offsets in lieu of purchasing higher priced allowances. Under the condition of even higher prices, international offsets could be purchased instead of allowances. The low price for CO₂ allowances during the first two control periods did not encourage the development of a RGGI offset market, as the cost of sequestering a ton of CO₂ through offsets is significantly more expensive than the cost of a RGGI allowance. A second shortcoming to mitigating price volatility through an offset program is the length of time that may be necessary to achieve price relief. A faster, more effective method of reducing price volatility was needed.

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

The CCR is more effective when allowances are added to the cap than when the CCR is included under the cap. If the CCR is triggered, the added allowances do raise the cap for that year, but only for that year. The following year the cap returns to its adopted regulatory limit for that year. Emissions from electric generating units do fluctuate due to differences in demand and weather conditions. In an extremely hot or cold year, emissions fluctuations could increase demand for allowances greatly producing price spikes. The CCR helps to lower extreme price spikes.

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

Table 2. Maryland CCR Allocation By Year.

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

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

Following the 2016 Comprehensive Program Review, the CCR trigger prices have been further calculated to include 2018 through 2030. From 2018 to 2020, the CCR trigger price is calculated as 1.025 multiplied by the CCR trigger price from the previous calendar year, rounded to the nearest whole cent. In 2021 the CCR trigger price is calculated to be \$13. From 2022 to 2030, the CCR trigger price is calculated to be 1.07 multiplied by the CCR trigger price from the previous calendar year, rounded to the nearest whole cent. The calculated values of the CCR trigger prices are outlined in the following table:

Table 3. CCR Trigger Price By Year.

Year	CCR Trigger Price Amount
2018	\$10.25
2019	\$10.51
2020	\$10.77
2021	\$13.00
2022	\$13.91
2023	\$14.88
2024	\$15.93
2025	\$17.04
2026	\$18.23
2027	\$19.51
2028	\$20.88
2029	\$22.34
2030	\$23.90

The Emissions Containment Reserve (ECR)

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

Table 4. Maryland ECR Allocation By Year.

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

The annual ECR allowance withholding limit would be 10% of Maryland's budget. The ECR trigger price, the price that allowances must fall below for the ECR to be utilized, will be \$6.00 in 2021 and rise at 7% per year, so that the ECR will only trigger if emissions reduction costs are

lower than projected. The calculated value of the ECR trigger prices are outlined in the following table:

Table 5. Maryland ECR Trigger Price By Year.

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

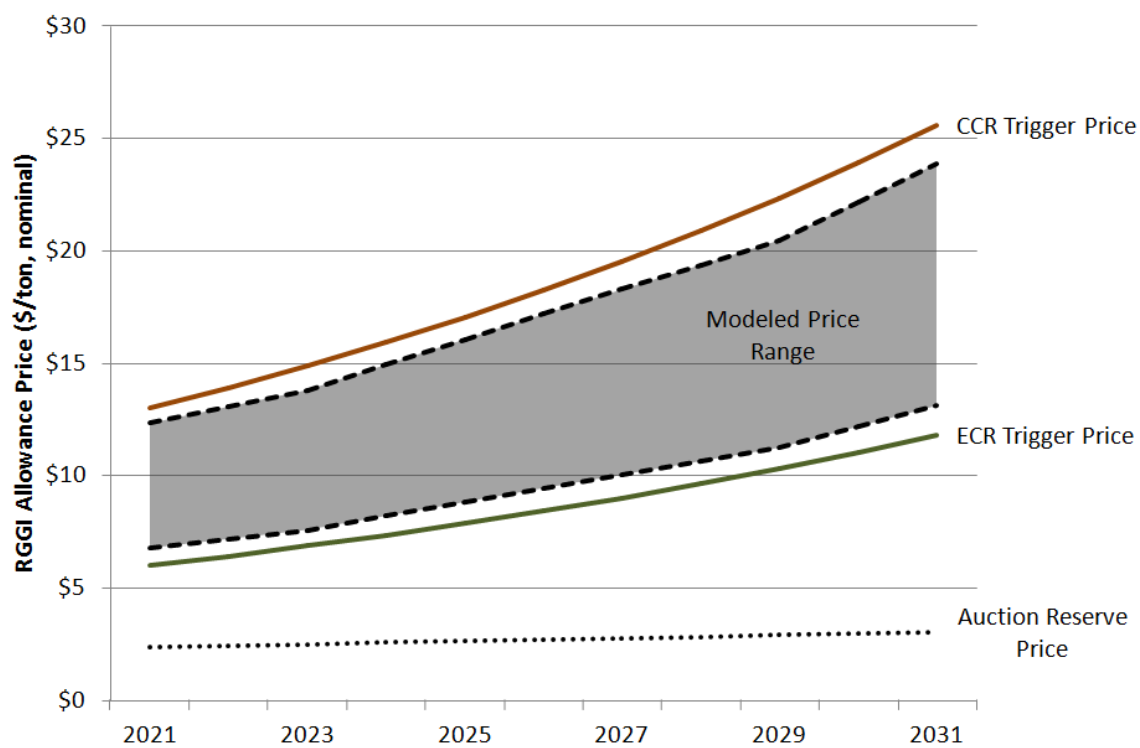


Figure 3. CCR and ECR Price Triggers.

Budget Adjustments

RGGI allows sources to bank allowances in two ways. Sources can use current vintage allowances to satisfy future compliance obligations. The participating states have also auctioned

future vintage allowances in the past. These allowances often sell at prices lower than they would in the future.

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

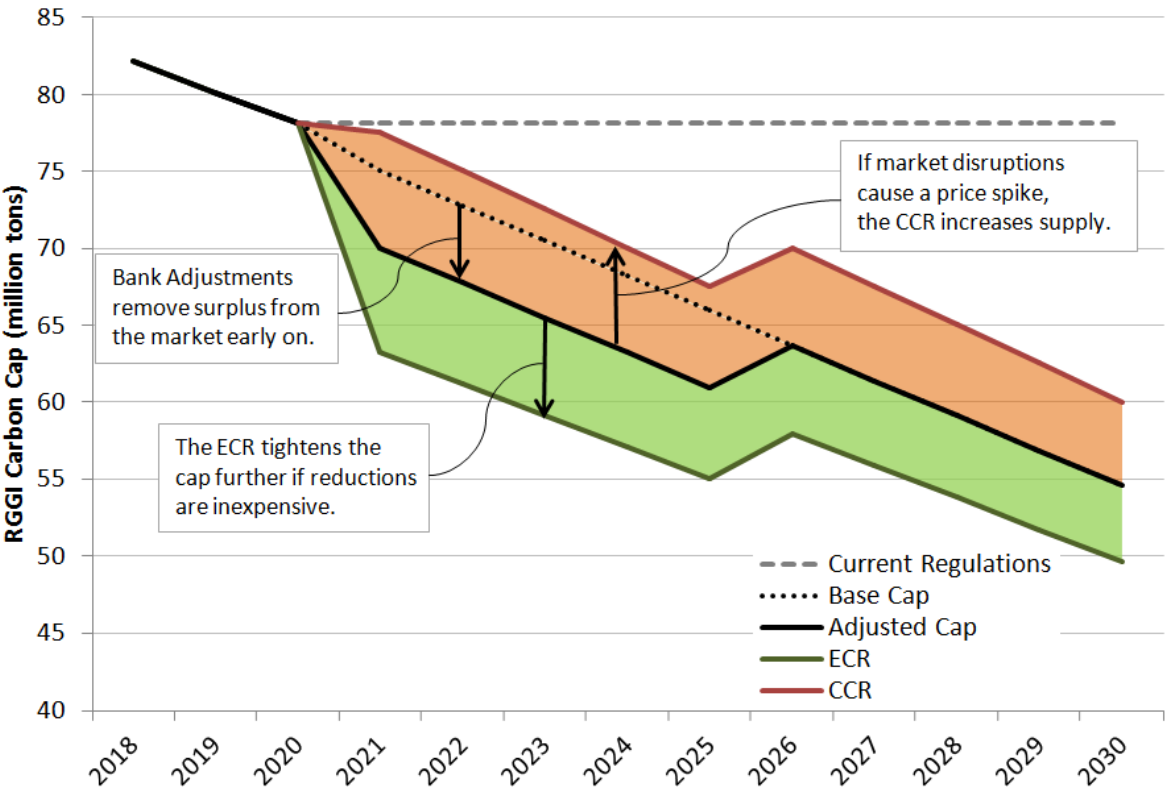


Figure 4. Adaptive Cap.

Offsets

The RGGI regulations contain language that eliminates two of the five current offset categories; 1) Reduction in Emissions of Sulfur Hexafluoride (SF₆) due to obsolescence, and 2) Reduction or Avoidance of CO₂ Emissions from Natural Gas, Oil, or Propane End-Use Combustion Due to

End-Use Energy Efficiency due to improvements and availability of energy efficiency technologies. While these two offset categories were removed, the three remaining offset categories were maintained and updated. Any awarded offset allowances would remain fully fungible across the participating states.

Continually Stronger RGGI with Geographic Expansion

In 2017 RGGI completed a program review, and strengthened RGGI to continue steady, deeper reductions of GHG emissions by 2030. With the success of the initiative, and as a national leader in the effort to combat climate change, Maryland and the other participating RGGI states are actively working to engage new participants in the program. The first-in-the nation carbon cap-and-invest program for power plants has been strengthened by implementing the participating states' plan to secure an additional 30% reduction in power plant emissions by 2030, and expanding the program to new participating states in the region to reduce pollution from power plants supplying electricity into Maryland.

As the chair of the RGGI, Inc. board of directors since 2018, Maryland led deliberations among the RGGI states to broaden participation to include New Jersey and Virginia. In July 2019, New Jersey finalized regulations allowing it to renew its participation in January 2020. Virginia also finalized regulations, and although they are unable to participate in 2020 due to budget restrictions, MDE is hopeful that they will be able to in the near future. In October 2019, Pennsylvania's Governor took the first big step to joining RGGI – he signed an executive order stating that Pennsylvania was to join RGGI as an initiative to fight climate change.

Program Name: GHG Power Plant Emission Reductions from Federal Programs

Lead Agency: MDE

Program Description

GHG emissions from the energy supply sector in Maryland include emissions from fossil fuel-fired electricity generation and represent a substantial portion of the State's overall GHG emissions. Electricity demand in Maryland is expected to increase over time and thus, if unmitigated, GHG emissions will also likely increase. Due to the fact that approximately 40% of electricity consumption in Maryland is generated out-of-state in the surrounding PJM electricity grid region, state programs alone cannot effectively control GHG emissions from power consumed in Maryland.

Existing and proposed federal rules summarized below (Boiler Maximum Achievable Control Technology; New Source Performance Standard; and GHG Prevention of Significant Deterioration Permitting Program) are expected to reduce GHG emissions from Maryland and out-of-state power generators.

Program Name: Boiler Maximum Achievable Control Technology (MACT)

Lead Agency: MDE

Program Description

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 Hazardous Air Pollutant (HAP) or 25 tons per year of any combination of HAPs. The Boiler MACT rules require operators to conduct a boiler tune-up to improve efficiency, minimize fuel consumption, and reduce emissions.

Program Objectives

The Boiler MACT program's purpose is to reduce GHG emissions from both Maryland and out-of-state power generators.

Estimated Emission Reductions

The potential emission reductions from the Boiler MACT program in 2020 are estimated to be 0.07 MMtCO₂e.

Coal and oil-fired boilers located in Maryland, which will be affected by the Boiler MACT currently have the potential to emit approximately 9.7 million tons of CO₂ per year. Actual emissions from this sector have been calculated as roughly 1.45 MMtCO₂e per year assuming the affected boilers operate at an average of 15% capacity factor. Using MDE's inventory of boilers that would be subject to the Boiler MACT, MDE has calculated that implementation of the Boiler MACT tune-up requirement could result in CO₂ reductions from 98,000 to 14,700 tons per year. This is based on the total CO₂ emissions for impacted boilers being reduced by 1%. Accounting for overlap, emissions reductions are reduced to .07 MMtCO₂e.

Challenges and Enhancement Opportunities

This program has the potential to be enhanced as new control technology is developed through new regulations and standards. It remains open to future opportunities.

Program Name: GHG New Source Performance Standard

Lead Agency: MDE

Program Description

EPA is using the New Source Performance Standard's authority under the federal Clean Air Act (CAA) to promulgate new regulations to reduce GHG emissions from fossil fuel-fired power plants. These standards apply to new electric generating units and are based on existing technologies. EPA is coordinating this action on GHGs with a number of other required regulatory actions for other pollutants, thereby enabling electric 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.

Program Objectives

The GHG New Source Performance Standard is designed with the intent to lower GHG pollution from fossil fuel-fired power plants.

Implementation Milestones

The New Source Performance Standard is fully enforceable through the federal CAA. MDE will implement the federal rules by adopting it into Maryland state regulations. The MDE Air Quality Compliance Program will then insure that the utilities comply with the requirements. Based on certified emissions reports, MDE will be able to determine the amount of GHG reductions achieved.

EPA has proposed a revision for the New Source Performance Standard in December 2018. This rule has not yet been made final. If approved, it will replace the previous 2015 determination that partial carbon capture and storage (CCS) technology was the best system of emission reduction (BSER) for new coal units. This shift is defended by citing high costs and limited geographic availability of CCS. EPA is also proposing separate standards of performance for new and reconstructed coal refuse-fired units and revisions to standards for reconstructed fossil-fuel fired steam units. These can be read about in more detail on EPA's website (epa.gov/sites/production/files/2018-12/documents/fs-111b_proposal_12-6-2018f.pdf).

Challenges and Enhancement Opportunities

The New Source Performance Standard is tied to the Clean Air Act, thus, any enhancements are likewise tied to the authority granted by the CAA.

Program Name: GHG Prevention of Significant Deterioration Permitting Program

Lead Agency: MDE

Program Description

The Prevention of Significant Deterioration (PSD) program is a federal preconstruction review and permitting program. It applies to new major stationary sources and major modifications at existing sources. The PSD requires the application of Best Available Control Technology (BACT) to control emissions of certain pollutants, which now include GHGs. Sources subject to the requirements of the PSD program must evaluate and apply currently available measures and future technology as it develops to reduce GHG emissions.

The PSD program's "increment" is the amount of pollution an area is allowed to increase. The PSD program's increments prevent the air quality in clean areas from deteriorating to the level set by the National Ambient Air Quality Standards. The National Ambient Air Quality Standards is a maximum allowable pollution amount. A PSD program increment, on the other hand, is the maximum allowable increase in concentration that can occur above a baseline concentration for a pollutant. The baseline concentration is defined for each pollutant and, in general, is the ambient

concentration at the time that the first complete PSD permit application affecting the area is submitted. Significant deterioration is said to occur when the amount of new pollution would exceed the applicable PSD increment. It is important to note, however, that the air quality cannot deteriorate beyond the concentration allowed by the applicable National Ambient Air Quality Standards, even if not all of the PSD increment is consumed.

Program Objectives

The PSD program aims to limit the emissions of pollutants and GHGs by mandating that stationary sources use BACT. BACT determination is designed to be fair, as it considers the cost-effectiveness and relative energy and environment impacts of the controls.

Implementation Milestones

MDE has adopted regulations to implement and enforce the federal PSD program, and has issued several PSD approvals requiring the regulated sources to implement BACTs for GHGs.

Enhancement Opportunities

The PSD will be naturally enhanced as new control technologies are developed. As the BACT changes with new advances, the PSD requirements will adjust and improve.

Program Name: Transportation Technologies

Lead Agency: MDE, MDOT, and MEA

Program Description

State and federal initiatives in transportation technologies that affect fuel economy standards significantly contribute to the 2030 transportation sector GHG reductions. The technology advances are designed to improve vehicle fuel economy, reduce average GHG emissions per mile, and develop lower GHG transportation options. The federal emission standards have been adopted through EPA Final Rulemakings, and include light-duty vehicles, medium- and heavy-duty trucks, and fuel standards. Benefits from these programs represent the largest contributor to GHG reductions in the transportation sector. The benefits will increase over time as newer vehicles enter the fleet and older vehicles are removed from the fleet.

Additionally, Maryland has adopted the California Clean Cars Program, ensuring that Maryland receives the cleanest fossil fuel burning vehicles on the market as well as a growing percentage of ZEVs. The adoption of California's GHG Program by thirteen other states and the District of Columbia has proven to be an effective driver for many of the federal GHG and fuel economy programs.

Maryland, through the combined efforts of MDE, Maryland Department of Transportation (MDOT) and MEA, has made significant progress in advancing the deployment of plug-in electric hybrid vehicles and battery EVs.

Light-Duty Vehicle (Passenger Cars and Trucks) Standards

- **The Maryland Clean Car Program (Model Year 2011)** – The Maryland Clean Cars Act of 2007 required MDE to adopt regulations to apply California’s Low-Emission Vehicle (LEV) standards to vehicles purchased in Maryland. The California program also includes a mandate for the sale of ZEVs (adopted 2007).
- **Corporate Average Fuel Economy (CAFE) Standards (Model Years 2008-2011)** – Vehicle model years through 2011 are covered under existing CAFE standards that will remain intact under the new national program.
- **National Program (Model Years 2012-2016)** – The light-duty vehicle fuel economy standards for model years between 2012 and 2016. The fuel economy improvements increase over time until an average 250 gram/mile CO₂ standard is met in the year 2016. This equates to an average fuel economy near 35 mpg (published May 2010).
- **National Program Phase 2 (Model Years 2017-2025)** – The light-duty vehicle fuel economy standards for model years between 2017 and 2025. The standards are phased-in and projected to result in an average 163 gram/mile of CO₂ by model year 2025. This equates to an average fuel economy of 54.5 mpg (published October 2012).

Medium/Heavy-Duty Vehicle (Trucks and Buses) Standards

- **Phase 1 National Medium and Heavy Vehicle Standards (Model Years 2014-2018)** – Fuel efficiency and GHG standards for model years 2014 to 2018 medium- and heavy-duty vehicles. The new rulemaking adopted standards for three main regulatory categories: combination tractors, heavy-duty pickups and vans, and vocational vehicles. (published September 2011)
- **Phase 2 National Medium and Heavy Vehicle Standards (2018 and Beyond)** – The Phase 2 fuel efficiency and GHG standards for medium- and heavy-duty vehicles for model year 2018 and beyond. The standards apply to four categories of medium- and heavy-duty vehicles: combination tractors, heavy-duty pickups and vans, vocational vehicles and trailers to reduce GHG emissions and improve fuel efficiency. The standards phase in between model years 2021 and 2027 for engines and vehicles, and between model years 2018 and 2027 for trailers. (published October 2016)

Fuel Standards

- **Tier 3 vehicle and fuel standards** – The rule establishes more stringent vehicle emissions standards and will reduce the sulfur content of gasoline from current average level of 30 ppm to 10 ppm beginning in 2017. The gasoline sulfur standard will make emission control systems more effective for both existing and new vehicles and will enable more stringent vehicle emission standards. The vehicle standards will reduce both tailpipe and evaporative emissions from gasoline-powered vehicles, yielding minor improvements in vehicle efficiency, resulting in GHG emission reductions. (published April 28, 2014)
- **The Federal Renewable Fuel Standard Program** – Mandates the use of 36 billion gallons of renewable fuel annually by 2022 (published March 2010). Based on an approach utilized by the Metropolitan Washington Council of Governments, the use of renewable fuels will represent a 2% reduction in total on-road gasoline CO₂ emissions in 2030.

- **Electric Vehicles (EVs)** – Initiatives to encourage the use of electric and other low and zero-emitting vehicles are part of Maryland’s efforts to reduce emissions of GHGs and other air pollutants from mobile sources by providing alternatives to conventional internal combustion engine vehicles. EVs include plug-in all-electric vehicles, battery EVs (BEVs), and plug-in hybrid EVs.

MDOT, working with MEA, has assumed a leadership role in facilitating the deployment of EVs and EV charging infrastructure in the state. With the passage of the Clean Cars Act of 2017, the new law provided the following changes:

- Extended the Electric Vehicle Recharging Equipment Rebate Program and authorization to issue motor vehicle excise tax credits for qualified PEV vehicles through FY20.
- Increased the total amount of equipment rebates from up to \$600,000 to a maximum of \$1,200,000 per fiscal year, increasing the amount required to be transferred from the Strategic Energy Investment Fund to the Transportation Trust Fund.
- Increased the amount of motor vehicle excise tax credits that may be issued during a fiscal year. The credit value was reduced to \$100 per kilowatt-hour (kWh) of battery capacity of the vehicle up to \$3,000.
- Added additional eligibility requirements, capping qualifying vehicle purchase prices at \$60,000, and requiring a minimum battery capacity of 5 kWh.
- Drivers of approved plug-in EVs can use Maryland’s high occupancy vehicle (HOV) lanes even if they are traveling solo.

Program Objectives

Maryland is a leader in adopting strategies to advance cleaner vehicles and fuels, via the Maryland Clean Car Program. The Clean Cars Program continues to be the driver for many of the federal motor vehicle standards that have recently been adopted. Further improvements in vehicle technologies and fuels are anticipated to play a key role in significantly improving air quality and GHG emissions.

MDE, MDOT, and MEA have different roles in reducing GHG emissions from the transportation sector. The three agencies work together to facilitate programs that promote advanced technology vehicles and alternative fuels.

MDE implements the Clean Cars Program, ensuring Maryland stays in compliance with the requirements to maintain California’s emission standards and updating the regulations as necessary to remain consistent with California. MDE enforces the GHG and ZEV requirements of the program and ensures the vehicle manufacturers remain in compliance.

Implementation Milestones

Maryland Clean Cars Program/Federal Vehicle and Fuel Standards

Implementation of these state and federal vehicle and fuel standards yields a significant GHG emissions benefit for on-road emissions from cars and trucks through 2030. Ultimately, vehicle turnover rates, vehicle purchase and operating costs, and other economic factors will impact exactly what the on-road fleet looks like in 2030. The federal programs are managed by EPA and the National Highway Transportation Safety Administration (NHTSA) through partnerships with vehicle manufacturers.

Electric Vehicles (EVs)

Vehicle manufacturers will attain fleet-wide GHG emission requirements through a mix of different vehicle models and technologies. The fleet-wide mix will include PHEVs and BEVs, along with traditional gasoline and diesel-powered vehicles. Achieving the goals within Maryland's participation within the ZEV mandate reflects a commitment to a low-emissions fleet that goes beyond what the federal standards require. The path from nearly 20,000 PHEVs and BEVs registered in Maryland in April 2019 to 300,000 vehicles by 2025, and 600,000 vehicles by 2030 will require a combination of challenging factors to come together. Maryland is rising to this challenge through an aggressive approach to the deployment of EVs and the charging stations necessary to support their adoption.

Maryland has also been a leader in offering incentives for the purchase and use of plug-in EVs. Plug-in vehicles are allowed to use the HOV lanes in Maryland regardless of the number of passengers. Time-of-use (TOU) energy rates are available to some residents of the state depending on their energy provider. TOU rates allow plug-in vehicles to charge during off-peak hours at a reduced energy rate, thereby saving on the cost of energy to recharge their vehicle. Certain utilities throughout the state have begun a program to provide rebates to customers who purchase a qualifying smart EV charger. This program will complement MEA's Electric Vehicle Supply Equipment (EVSE) rebate program by providing an additional incentive for the purchase of residential and multi-unit dwelling charging stations. Owners and operators of EVSE are not subject to regulations as an electricity supplier and therefore are allowed to sell the electricity they provide to vehicle owners.

Maryland also offers an excise tax credit for the purchase of a plug-in EV. Financial incentives have proven to be one of the most effective means for increasing the adoption rate of EVs and Maryland has consistently offered this incentive. Recently, two pieces of legislation have worked to improve the excise tax credit as well as the charging station rebate by extending and increasing the amount of funding available for both incentives.

The Clean Cars Act of 2017 extended the EVSE rebate and vehicle excise tax credit through FY20. The total amount of funding available for the charging equipment rebate increased from \$600,000 to \$1,200,000. The amount available for the vehicle tax credit increased from \$1,800,000 to \$3,000,000, and vehicles with an MSRP over \$60,000 were no longer eligible for the tax credit.

The Clean Cars Act of 2019 increased the amount of funding available for the vehicle tax credit from \$3,000,000 to \$6,000,000, and included fuel cell vehicles for the first time as an eligible vehicle to receive the tax credit. The law increased the MSRP cap for vehicles to \$63,000.

The Zero Emission Vehicle Memorandum of Understanding (ZEV MOU)

On June 20, 2018, nine Northeast and West Coast states reaffirmed their strong commitment to a clean, low-carbon transportation sector with the release of a new Multi-State ZEV Action Plan for 2018-2021 to support the successful implementation of the states' ZEV programs.

The Action Plan, which builds on the successes and lessons learned from implementation of an earlier 2014 ZEV Action Plan, presents 80 market-enabling action recommendations for states, automakers, dealers, utilities, charging and fueling companies and other key partners to rapidly accelerate mainstream consumer adoption of ZEVs, including plug-in hybrid, battery electric and hydrogen fuel cell vehicles.

The updated ZEV Action Plan is the work of the Multi-State ZEV Task Force, which was formed in 2013 under a Memorandum of Understanding (MOU) signed by the Governors of California and seven other states that have adopted California's ZEV program – Connecticut, Maryland, Massachusetts, New York, Oregon, Rhode Island and Vermont. New Jersey became the ninth ZEV state to join the coalition when they signed the MOU in May. Together, the nine ZEV MOU states represent nearly 30% of the new car sales market in the United States.

Key Action Plan Recommendations

While many of the recommendations in the 2014 Action Plan remain valid today, the new Action Plan represents a redoubling of state efforts to accelerate electrification of the light-duty vehicle market, and recognition of the important role that public-private partnerships involving the automakers, dealers, utilities and others play in the effort. Recommendations for states and other key partners in the updated Action Plan are focused on five priority areas:

1. Raising consumer awareness and interest in EV technology;
2. Building out a reliable and convenient residential, workplace and public charging/fueling infrastructure network;
3. Continuing and improving access to consumer purchase and non-financial incentives;
4. Expanding public and private sector fleet adoption; and
5. Supporting dealership efforts to increase ZEV sales.

In his support of this Action Plan, Governor Hogan stated, "The new Multi-State ZEV Action Plan recognizes the catalytic role utilities can play in advancing transportation electrification through investments in charging infrastructure, consumer outreach programs and new rate structures that benefit the grid and reduce charging costs for consumers." Governor Hogan also added that "Maryland's four largest utilities have proposed major investments in a statewide portfolio of infrastructure and other transportation electrification programs totaling more than

\$100 million. If approved, these utility investments will go a long way toward closing the existing charging gap in Maryland.”

The full Multi-State ZEV Action Plan is accessible at: nescbaum.org/documents/2018-zev-action-plan.pdf

Figure 5 below presents the projected ZEV deployment curve through 2030 based on a 2017 base year. Maryland costs to facilitate this level of deployment includes up to \$1.2 million annually through 2030 for the Electric Vehicle Recharging Equipment Rebate Program and other costs associated with matching federal grants to expand public EV charging infrastructure throughout Maryland.

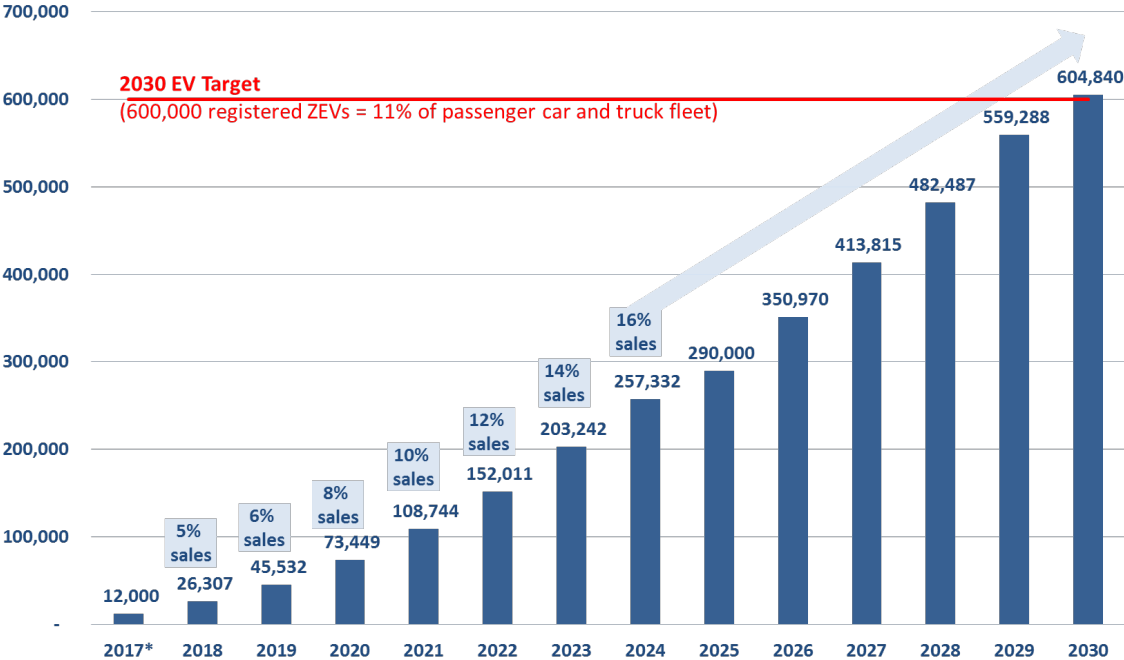


Figure 5. Electric Vehicle Deployment Approach.

The Clean Cars Act of 2019 made changes to the Electric Vehicle Infrastructure Council (EVIC), renaming it the Zero Emission Electric Vehicle Infrastructure Council (ZEEVIC) and broadened the focus of the Council to include hydrogen fueling stations and fuel cell vehicles. The law charged the Council with developing a plan to facilitate the integration of hydrogen fuel cell vehicles along with plug-in EVs into the state’s transportation network. MDOT chairs the legislatively established body, comprised of a diverse group of stakeholders who are dedicated to attaining Maryland’s ZEV goals. ZEEVIC brings this group together with the goal of creating opportunities, developing financial incentives, promoting ZEVs, and the installation of the infrastructure necessary to support the State’s ZEV goals.

- ZEEVIC has made progress on several vital initiatives and is continuing to work on removing barriers to the adoption of ZEVs. In 2018, the Electrification Coalition recognized Maryland’s work by designating Maryland as a top tier, or Tier 1, EV State when they issued their inaugural,

[ZEV Scorecard](#). Maryland was second only to California and ranked highly based on the State's work on incentives, publicly available EVSE, and public outreach.

- ZEEVIC produces annual reports on the progress of developing, evaluating and recommending strategies to facilitate the successful integration of ZEVs and ZEV infrastructure into Maryland's existing transportation infrastructure.
- ZEEVIC supported the passage of the Clean Cars Act of 2017, which increased and extended funding that support rebates and incentives for EV purchases.
- MDOT is working to complete an EV Signage Plan, focusing first on the acquisition, installation, and maintenance of EV signage on Maryland's 10 Federal Highway Administration designated alternative fuel corridors.

PC44 EV workgroup

With a goal of ensuring that Maryland's electric grid is customer-centered, affordable, reliable and environmentally sustainable, the Public Service Commission (Commission or PSC) initiated a proceeding, titled Public Conference 44 (PC44) to launch a targeted review of electric vehicle (EV) distribution systems in Maryland.

The Commission outlined a series of potential actions that could be pursued by a newly-formed EV Work Group in the context of a statewide grid modernization proceeding (i.e. PC44). Specifically, the Commission tasked the PC44 EV Work Group with, at a minimum, pursuing desired outcomes that generally correspond to the following goals: (1) increasing and diversifying EV tariff offerings across multiple service territories and customer classes; (2) planning for a limited utility infrastructure investment in EVSE; (3) developing a strategy to address grid-related costs associated with vehicle fleet electrification; (4) facilitating and encouraging equitable access to benefits derived from vehicle fleet electrification, especially in underserved market segments; and (5) developing a customer education, outreach, and engagement strategy in coordination with other state agencies to promote the outcomes of the PC44 EV Work Group proceeding.

The utilities were then tasked with developing programs that would accomplish these goals. Once developed, the utilities presented their proposed plans for review and approval. These proposals were reviewed and finalized in 2018, and will begin implementation in the 2019/2020 timeframe.

The Volkswagen Mitigation Plan

As a result of a 2016 settlement between EPA, the California Air Resources Board (CARB) and Volkswagen for violations of the CAA that involved software designed to defeat emissions standards, Volkswagen is required to spend \$2.7 billion on emission reduction programs nationwide. This software or "defeat device" allowed cars to meet emissions standards in a laboratory or a testing station, but during normal operation those vehicles emitted nitrogen oxide at up to 40 times the standard. Approximately 16,000 of the affected vehicles were sold in Maryland, negatively impacting our air quality.

Under the Environmental Mitigation Trust established in the 2016 settlement, Maryland is eligible to receive \$75.7 million for use on specifically defined mitigation projects to remediate the excess nitrogen oxide emissions. MDE was the lead agency tasked with developing Maryland's mitigation plan in accordance with the list of eligible projects and matching fund requirements required under Appendix D-2 of the Settlement. The draft plan placed priority on EV charging infrastructure – allocating the full 15% that is allowed for this category – and the replacement of older, dirty diesel engines with new, cleaner technologies. Electric buses and heavy-duty equipment such as trucks, boats and locomotives are potential projects that are eligible for funding.

MDE requested public comments on the draft plan and held public meetings in August 2018. Changes made to the draft plan in response to public comments include an increase in funding for local government projects, and the addition of a pilot program of electric school buses. The plan has been finalized and approved by the Trustee. Vehicle replacement project proposals were accepted until May 6th, 2019 and are currently being evaluated for funding potential.

Additional information on Maryland's Plan can be found at:

<https://mde.maryland.gov/programs/Air/Mobile-Sources/Pages/MarylandVolkswagenMitigationPlan.aspx>

Maryland participates on the Transportation and Climate Initiative's (TCI) Clean Vehicles and Fuels Workgroup that supports the deployment of clean vehicles and fueling infrastructure to maximize the economic opportunities and emissions reductions that these vehicles bring to the region.

Enhancement Opportunities

Emerging and innovative technology strategies will require additional investments to expand or accelerate deployment of previously planned strategies, deployment of new best-practice strategies, and capitalizing on the opportunities created by new transportation technologies. Potential enhancement opportunities include:

- **Arterial System Operations and Management** strategy includes expansion of signal coordination and control, consistent with the Maryland State Highway Administration (SHA's) current Integrated Corridor Management approach on most urban principal and minor arterials by 2030. Only urban arterials are being assumed to be covered as part of this strategy through 2030 as they experience the majority of non-highway congestion in Maryland.
- **Managed Lanes (I-270/I-495 Traffic Relief Plan Implementation)** adds express lanes to the routes of three of Maryland's most congested highways — the Interstate 495 Capital Beltway, the I-270 spur connecting Frederick to D.C., and the Baltimore-Washington Parkway between the two cities. The congestion affects 260,000 motorists daily on I-270, 240,000 motorists daily on I-495 and 120,000 motorists each day on the Baltimore-Washington Parkway.
- **Lead by example - Alternative Fuel Usage in State Fleet** is tracked as part of MDOT's Excellerator program and includes deployment of alternative fuel vehicles and fuels including ultra-low Sulphur diesel, biodiesel, and E-85 as the proposed alternatives. It is assumed that the

program continues to be implemented at current levels resulting in reduced diesel and gasoline fuel use as it is replaced by blended fuels.

- **Regional Clean Fuel Standard** provides a similar approach to the 2015 TCI analysis, with implementation of a regional clean fuels standard to achieve a 15% reduction in the carbon intensity of carbon-based fuels by 2030.
- **Additional 100K EV Ramp Up (total of 704,840 EVs)** are assumed to be rolled-out into Maryland's fleet from 2025 along the same splits of BEV and PHEV shares to make up a total of 704,840 total EVs on the road in the year 2030.
- **Variable Speeds/Speed Management on Freeways** is a strategy of speed limit enforcement and enhanced awareness and signage on urban restricted roadways. This assumes applying speed management strategies during both peak and non-peak periods. Enforcement may come about more through automated vehicle technology rather than traditional means.
- **Zero-Emission Trucks/Truck Corridors** strategy to establish infrastructure and vehicle replacements for implementation of zero emission corridors connecting to the Port of Baltimore, comparable to electrification technologies deployed in the I-710 Calstart Corridor at the Ports of Los Angeles and Long Beach. This strategy assumes participation of 700 dray trucks in Maryland that operate in the Port of Baltimore area only.
- **Connected and Automated Vehicles (CAV):** MDOT is developing Maryland's vision for a CAV future and deploying technologies to manage congestion. MDOT has established a CAV Working Group, including MDOT's Transportation Business Units (TBUs) and other planning partners, as the central coordination point for these emerging technologies. The Aberdeen Test Center has been recognized as a federal testing location for AV and US 1 was selected to pilot an innovative technology corridor. Maryland is emerging as a national leader in CAV technology and is building on this progress by developing CAV strategic plans that provide opportunities, challenges, priorities, strategies, and recommendations to help guide the state in planning and implementing CAV technology.
- **Ride-hailing/Mobility-as-a-Service (MaaS)** services not only encourage cost-saving and emission reducing measures like carpooling (the price savings of services like Uber pool and Lyft Line), but also as a first/last mile connection between users and other modes, reducing the needs for single occupancy vehicle ownership, such as through bike share and electric scooters (or other forms of micro-mobility). Impacts could include reduced vehicle ownership and reduced travel activity, with national literature pointing to a range of anywhere between 10% to 20% adoption of car sharing by 2030.

Funding

The transportation technology standards are implemented by the vehicle manufacturers at no cost to the State of Maryland. There may be additional costs to the consumers purchasing new vehicles, but the costs can be offset by reduced fuel costs over the life span of the vehicle.

In the near-term, Maryland will continue to invest in EV and EVSE incentives while exploring the potential of hydrogen fuel cell vehicles. Under the federal Volkswagen Settlement, Maryland has submitted proposals and is seeking opportunities to enhance EVSE availability through the National ZEV Investment Plan and the Maryland Volkswagen Mitigation Plan.

As part of Volkswagen settlement resulting from their excess nitrogen oxide emissions, Volkswagen created a subsidiary company, Electrify America that is installing DC Fast Chargers throughout the county for use by EVs. Electrify America has announced two cycles of funding for which it outlined cities and other locations it targeted for fast charging installations. The Washington D.C. area was targeted during the first cycle of funding and the Baltimore Metro Area was targeted during the second cycle of funding.

MDOT has committed \$15.8 million for FY18, and \$111.2 million over the next six years to improve, maintain, and enhance the CHART program with on-road operational technologies and strategic capacity as well as operational enhancements. In total, throughout 2018-2023, MDOT estimates that \$330.2 million is committed to projects that will enhance transportation technologies, including CHART, or relieve critical bottlenecks at intermodal facilities, which will result in overall better management and operations of Maryland's multimodal transportation system.

In addition, in the 2018-2023 CTP, there is \$1.82 billion committed to MDOT SHA projects that relieve key bottlenecks on Maryland's roadway network through strategic capacity enhancements and operational improvements. In the short term, these projects are expected to mitigate delay and the additional GHG emissions generated by inefficient and low-speed travel by passenger and commercial vehicles.

The projected scenario for funding is based on the best information we have at this time (over the next six years), which may be subject to change as the state responds to changes in mobility choices and travel patterns, and technological advancements that may alter some funding priorities and allocations. These assumptions are based on trends from the last few CTPs and are modeled on the latest version of the adopted CTP. Major technology projects and programs funded include:

- \$405 million for Traffic Relief Plan implementation, including Phase 1 innovative congestion management on the I-270 corridor and, Phase 2 implementation of smart traffic signals on 14 corridors throughout Maryland, and Phase 3 implementation of peak hour shoulder use on I-695.
- Over \$300 million for MDOT MTA bus procurement for fleet replacement and efficiency improvements.
- \$63.6 million in funding to implement the next generation electronic tolling system that would represent the technology platform enabling a conversion to all-electronic tolling (AET), which brings a significant opportunity to eliminate vehicle idling and delay at Maryland's toll plazas.

Challenges

While technologies offer the most significant GHG emissions reduction potential for the transportation sector, the full potential of GHG benefits will not be fully achieved until the fleet turns over with newer fuel efficient and GHG beneficial vehicles. The federal technology standards will not be fully implemented until model years 2025 and 2027 for light-duty and medium- / heavy-duty vehicles, respectively. That pace of adoption of new technologies is the primary determinant for emissions reductions from the transportation sector by 2030.

EPA issued a proposed rulemaking in August 2018, *The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks*. This rule will roll back the national fuel economy standards for post-2020 model years to 2020 standards. This will reduce the GHG benefits as the fleet continues to turnover. By freezing at the 2020 fuel economy standard, the fleet will not meet the 54.5 mpg equivalent standard by 2025. This could result in a loss of two million metric tons of GHG benefits in Maryland alone. Many states, including Maryland, have sued EPA to block the weakening of vehicle emissions standards. It is also unclear how manufacturers, who have generally been supportive of the Federal standards, would respond to this change.

When EPA released their roll back rulemaking in 2018, California updated their Clean Cars Program to remove a “deemed to comply” provision that allowed manufacturers to meet California’s GHG standard by meeting the EPA’s GHG One National Program. Removing this provision means vehicle manufacturers will now have to meet California’s GHG standard, independent of the One National Program should EPA’s SAFE rule be adopted. At the end of 2018, MDE adopted the regulatory changes necessary to remove the “deemed to comply” provision as well, ensuring Maryland will receive the GHG benefits it needs.

While we have made significant progress in EV adoption and the installation of EVSE, our work is not complete. We must continue to address known barriers to EV acceptance including ensuring that charging is available to those who live in urban environments, multi-unit dwellings, or in homes governed by homeowner’s associations.

Technological strategies, including EVs, CAVs, and MaaS, are at various points along their technological maturity for widespread adoption. For example, EV technology continues to grapple with barriers like range anxiety, perceptions about availability of charging infrastructure, and cost parity. While barriers for EVs are slowly being overcome, newer technologies like CAVs are still undergoing a transition from the research realm to the real-world. Continued advancements in these technologies are critical to ensuring that the GGRA goals are met.

Economic growth or decline and its impact on personal and commercial travel activity, choice, and vehicle ownership can influence GHG emissions. Innovation in new technologies is often fostered in times of higher economic output, when increased investment in research and development are more typical.

Estimated Emission reductions, Costs, and Cost Effectiveness

- With the full implementation of final federal vehicle and fuel standards through 2030, total on-road GHG emissions could decrease by 7.04 MMtCO₂e, bringing 2030 emissions 20% below 2006 emissions.
- If the federal rulemaking of the SAFE Vehicles Rule for rolling back or freezing the federal light-duty vehicle standards to 2020 standards is approved, the GHG emissions for 2030 may increase by 2.07 MMtCO₂e. This result represents a potential worst-case scenario associated with the SAFE Vehicles Rule. Ultimately, the emissions impact of this potential standard change is highly uncertain given that auto manufacturers may choose to exceed federal standards, particularly in states like Maryland that are committed to the California standards.

- Presuming the current federal vehicle standards are fully implemented, and Maryland meets the ZEV mandate market share goals by 2030, total on-road GHG emissions could decrease another 1.61 MMtCO_{2e}, bringing 2030 emissions to 25% below 2006 emissions.

The following table shows estimated GHG emission reduction potential of the innovative and emerging transportation technology strategies and estimated costs for implementation:

Table 6. Transportation Technologies Estimated Emission Reductions and Costs.

Strategy	GHG Emission Reduction (mmtCO _{2e})	Estimated Costs (\$M)
Funded “On-the-books” Strategies		
Federal and State Vehicle Fuel Economy Standards	7.04	Nominal[§]
Electric Vehicles	1.61	\$16
On-Road Technology (CHART, Traveler Information)	0.163	\$246
Freeway management/Integrated Corridor Management	0.052	\$506 to \$760
Arterial System Operations and Management	0.049	\$453 to \$680
Limited Access System Operations and Management	0.023	\$108 to \$152
Managed Lanes (I-270/I-495 Traffic Relief Plan Implementation)	0.051	\$6,650 to \$9,840
Lead by example – Alternative Fuel Usage in State Fleet	0.004	Nominal[§]
Regional Clean Fuel Standard	0.382	\$148
Additional 100K Ramp Up (total of 704,840 EVs)	0.322	\$54
Emerging and Innovative Strategies (unfunded)		
Autonomous/Connected Vehicle Technologies	0.647	\$43 to \$62
Variable Speeds/Speed management on Freeways	0.083	\$7 to \$14
Zero-Emission Trucks/Truck Corridors	0.059	\$34 to \$128
Ride-hailing/Mobility-as-a-Service (MaaS)	0.256	Nominal[§]
Pay-As-You-Drive (PAYD) Insurance	0.062	Nominal[§]
Total Transportation Technologies	2.245	\$8,265 to \$12,100

§ Nominal costs are program implementation, regulatory facilitation, and support costs for implementing emission reduction strategies, where MDOT has limited control.

Program Name: Sustainable Materials Management (SMM)

Lead Agency: MDE

Program Description

On June 27, 2017, Governor Hogan signed Executive Order 01.01.2017.13, Waste Reduction and Resource Recovery Plan for Maryland. The order adopts a first-ever sustainable materials management (SMM) policy for Maryland that aims to minimize the environmental impacts of

the materials' use throughout the entire lifecycle. The policy emphasizes environmentally and economically sustainable methods to capture and reinvest resources into our economy, including everything from metals and plastics to energy, nutrients, and soil. It initiates a stakeholder consultation process to establish ambitious, but achievable goals and to ensure tracking of complete materials management data. It also empowers new partnerships across state and local agencies, the agricultural, energy, and transportation sectors, environmental organizations, and recycling innovators.

New Program Initiatives

- Minimize the environmental impacts of materials management over their entire life cycles, including product design, production, consumption, and end-of-life management;
- Conserve and extend existing in-state disposal capacity through source reduction, reuse, and recycling;
- Capture and make optimal use of recovered resources, including raw materials, water, energy, and nutrients;
- Work toward a system of materials management that is both environmentally and economically sustainable.

In April 2019, MDE released recommendations of metrics and goals for the Waste Reduction and Resource Recovery Program. These goals are to be achieved by 2035.

- Reduce the amount of waste generated by 10% - down to 5.5 lbs/person/day
- Annual reduction of 1.2 mmtCO₂e in 2035 (GHG emissions) from materials management
- Annual reduction of 4.3 trillion BTUs in 2035 from materials management
- Voluntary recycling rate goals for each county of:
 - Food Scraps – 60%
 - Yard Trimmings – 85%
 - Glass – 55%
 - Metal – 75%
 - Paper Products – 65%
 - Plastic – 25%
- Maintain the goals of 55% recycling and 60% waste diversion currently in the statute with an extended timeframe to 2035

Additional goals were made for Business Waste Diversion Data and the Source Reduction Credit System, which you can read about in more detail here:

<https://mde.maryland.gov/programs/LAND/RecyclingandOperationsprogram/Documents/Waste%20Reduction%20and%20Resource%20Recovery%20Plan%20Goals%20and%20Metrics%20Recommendations.pdf>.

Future Challenges

The new order replaces Executive Order 01.01.2015.01 Executive Order for Maryland. The new approach recognizes that SMM efforts require collaboration, and the specifics of the initiatives conducted under the order will be shaped by stakeholder input. As MDE initiates the new

partnerships and consultation processes included in the order, it will work to better quantify the GHG emissions benefits and jobs impacts of the initiatives for inclusion in the final GGRA Plan.

Program Name: Federal Measures

Lead Agency: MDE

The GGRA of 2016 requires that MDE report on the state of any federal program designed to reduce GHG emissions. The following initiatives are specific to EPA. but there are additional federal programs being implemented by other federal agencies such as U.S. Housing and Urban Development, Department of Energy, United States Department of Agriculture (USDA), etc. that are not specifically discussed in this chapter. Many of the rules and initiatives below are being challenged by states and industry in the U.S. Courts.

Affordable Clean Energy Rule and The Clean Power Plan

The Affordable Clean Energy Rule (ACE)

In August 2018, EPA proposed the ACE Rule to replace the Clean Power Plan (CPP) in reducing GHG emissions throughout the country. In reviewing the burdens of environmental legislation EPA determined the CPP to be too burdensome on industry. Instead, the EPA claims the ACE Rule will empower states, promote energy independence, and facilitate economic growth and job creation.

EPA proposed the ACE Rule under section 111(d) of the CAA, only addressing standards for existing sources. The framework allows states to develop plans that establish standards of performance for their states' existing sources. Once the plan is submitted, EPA will determine the "best system of emissions reductions" (BSER) based on the state's established performance standards. Under the ACE Rule, EPA also proposes to redefine BSER as being limited to emission reduction measures that can be applied to or at an individual stationary source instead of an action outside the facility.

The Clean Power Plan (CPP)

The federal CPP addressed both new and existing power plants under separate regulations through CAA Section 111. CAA Section 111 provides direction for setting standards for stationary sources from a specific source sector such as power plants. Section 111(b) allows EPA to set standards for new sources while Section 111(d) applies to existing sources. Under Section 111(d) EPA may establish guidelines for states to set standards for existing sources. EPA formulates the guidance by considering systems of emission reductions that have been adequately demonstrated and the degree of emission limitation achievable considering cost, environmental impact, compliance time periods and other factors. In this case, EPA has interpreted the best system of emission reductions broadly. States then formulate emission limits following the guidance.

Temporary Abeyance of the CPP

In 2016, both the D.C. Circuit Court of Appeals and the U.S. Supreme Court placed an abeyance or stay on the CPP. The D.C. Circuit Court of Appeals abeyance was temporary and had to be requested by the petitioners for renewal every 60 days. The abeyance is still in place by both courts; however, the D.C. Circuit Court of Appeals is predicted to continue moving forward. With the proposed CPP replacement, the ACE Rule, released in August 2018, the outcome of the court proceedings and abeyances, is unknown at this time.

Other EPA Regulatory Initiatives

Stationary Sources

The New Source Review (NSR) program requires industrial facilities to install updated pollution control equipment when they are newly built or when a change is completed that increases the facility's emissions significantly. There are three types of NSR programs. First, the Prevention of Significant Deterioration program applies to major new sources or major modifications to a source within an attainment area, and requires the source install the best available control technology. Second, the Nonattainment NSR program applies to major new sources or major modifications to a source within a nonattainment area, and requires the source install the lowest achievable emission rate system. Third, the Minor NSR program applies to minor new sources or minor modifications to major or minor sources within both an attainment or nonattainment area, and requires the source meet any emission control measures required by the state.

Along with the proposal of the ACE Rule in 2018, the EPA proposed a change to the NSR program. The change to the NSR program would allow sources to exceed annual emissions, as long as their hourly emission rates are not exceeded. The new exemption allows electric generating units (EGUs) to extend their life and increase their use of fossil fuels, leading to increased release of CO₂ and other pollutants. EPA's regulatory impact assessment projected substantial increases in sulfur dioxide (SO₂) and nitrogen oxide under the ACE Rule compared to the CPP.

Transportation/Mobile Sources

The EPA proposed the *SAFE Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks*. The proposed SAFE Vehicles Rule, would replace the existing federal 2021-2025 light-duty vehicle GHG emission standards that matched the California standards. The proposed SAFE Vehicles Rule would roll back these existing federal light-duty vehicle emissions standards for model years 2021-2025. The proposed Rule also curtails the authority for states to adopt California's standards by limiting states in adopting more stringent rules than the federal government.

Renewable Fuel Standard (RFS) Program

EPA is also responsible for developing and implementing regulations to ensure that transportation fuel sold in the U.S. contains a minimum volume of renewable fuel. By 2022, the RFS program will reduce GHG emissions by 138 million metric tons, about the annual emissions

of 27 million passenger vehicles, replacing about 7% of expected annual diesel consumption and decreasing oil imports by \$41.5 billion.

Heavy-Duty Trucks

The EPA and the Department of Transportation's National Highway Traffic Safety Administration jointly finalized standards for medium- and heavy-duty vehicles that would improve fuel efficiency and cut carbon pollution. The vehicle and engine performance standards would cover model years 2018-2027 for certain trailers and model years 2021-2027 for semi-trucks, large pickup trucks, vans, and all types and sizes of buses and work trucks. The final standards are expected to lower CO₂ emissions by approximately 1.1 billion metric tons, save vehicle owners fuel costs of about \$170 billion, and reduce oil consumption by up to two billion barrels over the lifetime of the vehicles sold under the program.

Other Related Actions

- Landfill Air Pollution Standards
- Oil and Natural Gas Air Pollution Standards
- Geologic Sequestration of Carbon Dioxide
- Emissions Reporting

Greenhouse Gas Reporting Program

The Greenhouse Gas Reporting Program collects GHG data from large emission sources across a range of industry sectors, as well as suppliers of products that would emit GHGs if released or combusted. GHG data are available through the Greenhouse Gas Reporting Program Data Publication Tool: <https://www.epa.gov/ghgreporting>.

Short-Lived Climate Pollutants

SNAP was established under Section 612 of the CAA to identify and evaluate substitutes for ozone-depleting substances. The program looks at overall risks to human health and the environment of existing and new substitutes, publishes lists and promotes the use of acceptable substances, and provides the public with information. Based on a partial vacatur and remand to EPA of EPA's Rule 20, the EPA plans not apply the HFC listings from the 2015 Rule 20, pending a rulemaking.

RECOMMENDED NEW PROGRAMS

Program Name: Maryland Clean and Renewable Energy Standard (CARES) Act of 2020

Lead Agency: MDE/MEA

Program Description

Comprehensive Climate Action

A major component of the *2019 GGRA Draft Plan* is to reduce GHG emissions from electricity generation is the proposed Clean and Renewable Energy Standard (CARES), which requires that an increasingly large share of Maryland's electricity be generated by zero- and low-carbon resources.

MDE and other state agencies are currently developing a full CARES proposal. The *2019 GGRA Draft Plan* includes an illustrative example of how the program would work.

Why CARES?

- *100%Clean Electricity*
 - CARES would build off the existing RPS, and require that 100%of Maryland's electricity come from clean sources by 2040, which is among the most ambitious state goals in the nation.
- *Technology-Neutral*
 - CARES would adopt a technology-neutral approach to achieving 100%clean electricity at the lowest cost. By incorporating all available and emerging zero- and low-carbon sources in Maryland, CARES would foster greater competition among available renewable and clean energy resources, which would reduce costs for ratepayers. The broad set of eligible technologies would include:
 - Additional Maryland solar beyond the requirements of the RPS carve out
 - New efficient Combined Heat and Power (CHP), cogeneration systems in Maryland
 - Hydropower in Maryland
 - Nuclear power in Maryland
 - Natural gas power with carbon capture and storage (CCS) technology in Maryland
- *Homegrown Energy and Jobs*
 - CARES would rely on electricity generators in Maryland to make progress beyond the existing goals, ensuring that Marylanders benefit from the direct job creation resulting from investments in clean and renewable resources.

Program Name: In-State Methane Minimization

Lead Agency: MDE

Program Description

Methane Emissions from New Sources in the Oil and Gas Industry

Maryland, through MDE, and thirteen other states filed a motion to intervene in a lawsuit against EPA's actions to halt regulation of leaks of GHG emissions and other harmful air pollutants from new sources in the oil and gas industry. EPA asked that this lawsuit be held by the court due to EPA's related action on the proposed rulemaking discussed below.

MDE submitted written comments opposing EPA's proposed rule on amendments to the methane new source performance standards for the oil and natural gas sector. EPA proposed to reduce the monitoring frequency of fugitive emissions at compressor stations and to extend the allotted time for owners and/or operators of compressor stations to repair fugitive emission components. Additionally, EPA sought comment on extending the time period for owners and/or operators of well sites or compressor stations to conduct an initial monitoring survey and reoccurring leak inspections. MDE strongly opposed these proposed amendments. The EPA has not yet finalized this proposal.

Methane Emissions from Existing Sources in the Oil and Gas Industry

Maryland and 14 other states filed a lawsuit against the EPA for failing to perform a legal duty to control emissions of methane from existing oil and gas operations. Specifically, the suit charges that the EPA has violated the CAA by 'unreasonably delaying' its mandatory obligation under the Act to control methane emissions from these operations.

Methane Emissions from New and Existing Landfills

A coalition of eight states, including Maryland, filed a lawsuit against the EPA over its failure to implement and enforce a critical landfill methane regulation. The regulation would reduce landfill emissions of volatile organic compounds, hazardous air pollutants, CO₂, and methane. It went into effect on October 28, 2016, but the EPA has not implemented or enforced it. EPA proposed a new rule on this topic that would delay the compliance date for states to file a plan.

Program Name: Hydrofluorocarbons (HFCs)

Lead Agency: MDE

Program Description

Under a federal CAA program designed to identify and evaluate alternatives to stratospheric ozone-depleting substances, HFCs have been one of the most common alternatives. However, HFCs are extremely potent GHGs. One pound of certain HFCs is potentially as potent as 1,400

pounds of CO₂. After efforts have stalled at the federal level, states have begun their own phase out initiatives. Maryland is developing regulations similar to regulations and laws enacted in California, Washington, and Vermont, which would phase out the use of certain HFCs in multiple end uses, such as foam products and in refrigeration equipment in retail establishments, such as supermarkets. The phase out of HFCs will encourage the use of substances with lower GHG emissions. Products with alternatives to HFCs are already available. Other states in the United States Climate Alliance are expected to take similar steps.

MDE is working to adopt these regulations by the Fall of 2020. More information on the rule adoption process may be found on MDE's website.

Emission reductions from this effort are not included in the *2019 GGRA Draft Plan*. Maryland and other states in the United States Climate Alliance are developing emission reduction quantification tools and MDE expects to include emission reductions in the final plan. The reductions from this measure are expected to be significant and provide several million metric tons of CO₂e reduction by 2030.

VOLUNTARY AND NON-TRADITIONAL PROGRAMS

Program Name: The United States Climate Alliance

Lead Agency: MDE

The USCA is a bipartisan group of states and territories committed to meeting their obligations under the Paris Climate Agreement, while continuing to grow their economies. Currently, there are 25 participating states and territories, and the Alliance is eager to grow larger as more states begin to prioritize climate action. The Alliance formed in 2017 in response to President Trump announcing his intention to withdraw from the Paris Agreement. The states in the Alliance represent 40% of the U.S. population, and account for nearly \$9 trillion in combined economic activity.

2018 marked the first full year of accomplishment for the Alliance, as the group established a structure and added an executive director. On June 1, 2018, the USCA celebrated their one-year anniversary by announcing a wave of initiatives to accelerate and increase climate action across the Alliance states. The states worked together at the end of 2017 and in early 2018, to establish priorities that would return economic benefits while reducing the impacts of climate change. Despite federal efforts to repeal many federal climate and GHG policies, the Alliance states are projected to achieve a combined 18-25% reduction in GHG emissions below 2005 levels by 2025. This is thanks to the hard work of each of the participating states, the USCA staff, and technical support from nonprofits.

Current USCA initiatives include:

- Reducing emissions of short-lived climate pollutants
- Mobilizing financing for climate projects (green banking initiative)
- Modernizing the electric grid
- Increasing deployment of solar projects (solar soft costs initiative)
- Coordinating state adoption of energy efficiency standards
- Natural and working lands
- Increasing state resilience to climate impacts
- Decreasing carbon emissions from the transportation sector

Maryland's Role

In January 2018, Governor Hogan proudly committed Maryland to participation in the USCA. When the President announced his intention to withdraw from the Paris Climate Agreement, Governor Hogan disagreed with the decision. It is important that there is aggressive, but balanced action in states, communities, and businesses and the need for multi-state collaboration and international leadership on climate change grows stronger every day.

Over the course of 2018 and 2019, Maryland has worked with the USCA states to share insights, experiences, and strategies in order to meet and excel beyond the requirements of the Paris Climate Agreement. Maryland has encouraged all participating states to adopt clean air standards and GHG goals as strong and aggressive as Maryland's. Through collaborative efforts, the USCA states are demonstrating leadership in addressing climate change and inspiring climate action throughout the United States.

Since joining the Alliance, Maryland has been a leader and active participant, contributing our experience, knowledge, and cutting-edge research. Many participating states have looked to Maryland to learn from our collaborative and ground-breaking work on the Healthy Soils Initiative, the Climate Leadership Academy, the Maryland Commission on Climate Change (MCCC), RGGI, and TCI. The USCA has played an integral role in helping Maryland launch a regulatory initiative to phase out HFCs and also work to strengthen our forest and agricultural carbon sequestration programs.

Alliance Initiatives

The Alliance and participating states know there are significant actions needed to reduce GHG emissions. For this reason, the participating Governors have committed to accelerating climate action that is based on collaborative and consistent efforts across the USCA states. Together the states developed initiatives for 2018 and have continued to work on those initiatives in 2019: reducing short-lived climate pollutants, mobilizing financing for climate projects (green banking initiative), modernizing the electric grid, increasing deployment of solar projects (solar soft costs initiative), coordinating state adoption of energy efficiency standards, increasing state resilience to climate impacts, increasing carbon sequestration on natural and working lands, decreasing carbon emissions from the transportation sector. Work groups on these priorities have met regularly to discuss roadmaps, develop model rules, and provide technical support to one another.

Maryland continues to encourage all participating states to adopt cleaner air standards and GHG goals as strong and aggressive as Maryland's. In addition, Maryland has found the Alliance's coordination helpful and encouraging as we advance actions and partnerships in our own state.

Reducing Super Pollutants

Short-lived climate pollutants (SLCPs) such as black carbon, methane, tropospheric atmospheric ozone, and HFCs, act as powerful GHGs. USCA states are stepping up with state-level rules and programs to backstop against federal efforts to unwind reasonable regulations that reduce methane from oil and gas and landfills, HFCs, and black carbon from woodstoves and other sources. The Alliance states challenged all national and subnational jurisdictions to work to reduce SLCPs at the Global Climate Action Summit in September of 2018. This year the Alliance's main SLCP focus was reducing HFC emissions.

In Maryland, we accepted the SLCP Challenge and are working to reduce black carbon, methane, tropospheric atmospheric ozone, and HFCs. Maryland has had a head start in addressing many of the SLCP initiatives, thanks to our accelerated climate action already in

place. Maryland is using its knowledge and experience to help other states reduce their SLCP emissions, while also learning how we can further reduce SLCP emissions in Maryland.

Black Carbon

States are working to reduce black carbon emissions through local and state efforts to improve air quality and cut diesel pollution. Maryland has taken significant efforts to reduce black carbon through our work to meet the 40%GHG emissions reductions by 2030 in the GGRA of 2016 and our anti-idling campaign for diesel trucks. Maryland's Volkswagen mitigation plan will also reduce black carbon emissions and help protect public health. Maryland is sharing our accomplishments with the other Alliance states, to ensure states are doing the most they can to reduce black carbon emissions.

Methane

To address methane, states are actively working to determine better techniques to capture and utilize methane from natural gas. To reduce methane pollution in the atmosphere, Maryland collaborated with the participating states to learn how states are cutting methane in the oil and gas transmission sector, as well as how to reduce methane release on farms. Maryland is currently working with stakeholders to reduce methane emissions from compressor stations and landfills, with future plans to address methane from wastewater treatment plants. These three categories represent the largest sources of in-state methane emissions. Maryland is looking forward to sharing our experiences as the Alliance expands their work to reduce methane emissions.

Tropospheric Atmospheric Ozone

With the many SLCP initiatives, the Alliance did not make significant strides to develop a plan to reduce tropospheric atmospheric ozone. Maryland looks forward to being a model as the Alliance begins to reduce tropospheric atmospheric ozone in the future. In 2015, Maryland developed a requirement that provided important immediate nitrogen oxide reductions. The 2015 requirements alone have achieved approximately 10 tons of additional nitrogen oxide reductions on hot, peak energy demand days. Maryland also continues to pursue opportunities to reduce nitrogen oxide in up-wind states through the Ozone Transport Commission and petitions to EPA.

In May 2019, Maryland petitioned the Ozone Transport Commission (OTC) under Section 184c of the CAA to make recommendations for additional nitrogen oxide emission control requirements on several coal-fired energy generating units (EGU) in Pennsylvania. The coal-fired EGUs significantly contribute to ozone formation in Maryland and other downwind states. The results of air dispersion modeling indicate that the coal-fired EGUs in Pennsylvania with existing control equipment are not being operated in an optimal manner during the summer ozone season causing significant nitrogen oxide impacts in Maryland. This analysis is very similar to the 126 petition analysis that indicated that significant pollution reductions would occur with optimization of EGUs. Our experience in reducing nitrogen oxide will be valuable to the other participating Alliance states.

Hydrofluorocarbons (HFCs)

HFCs are used as refrigerants and in air conditioning, foams, aerosols, and other applications. Maryland joined the first group of Alliance states to announce they would pursue HFC phase-out rules in 2019. Alliance states are working together to develop consistent rules that would follow the 2015 and 2016 EPA Significant New Alternatives Policy (SNAP) rules concerning HFCs. California, Washington, and Vermont have enacted HFC regulations and laws. Maryland is working with other Alliance states to develop similar rules. MDE has drafted regulations and is currently starting the regulatory process to phase out HFCs.

Mobilizing Financing for Climate Projects (green banking initiative)

The Alliance states are collaborating on an initiative to expand clean energy finance opportunities and create new Green Banks that can be supported by centralized capacity and resources. Alliance states are collaborating on potential new avenues to establish Green banks. States are actively engaging with the Alliance for Green Capital, as well as consultants, foundations and educational nonprofits to advance and scale new green bank models. States are further exploring opportunities to leverage existing internal infrastructure to expand and scale green bank financing nationally.

Power Sector Investment and Modernization

In September 2017, the USCA established a Power Sector Working Group to develop new tools and resources that benefit the electric grid and help meet renewable energy and emission reduction goals. USCA States are actively collaborating on grid modernization strategies, including non-wires alternatives, and will work together to synthesize lessons learned from non-wires procurement approaches around the United States.

USCA States are further collaborating to create an implementation “playbook” to help regulators and utilities implement non-wires approaches and best practices. States are working with the Rocky Mountain Institute to develop the non-wires alternatives playbook and support broad dissemination and implementation of the findings and resources.

Increasing Deployment of Solar Projects (Solar Soft Costs Initiative)

USCA states are acting to accelerate solar adoption and soften the impact of the federal solar tariff by collaborating on characterizing and lowering solar soft costs. States worked together to develop a national solar-ready community guidebook to support solar deployment and reduce costs. The guidebook synthesizes existing solar market best practices and lessons learned, provides sample policy and program frameworks, and identifies additional key state, federal, and private resources. The guidebook was released in December 2018, and is aimed at elevating crucial strategies and tools for state and local governments to reduce the non-hardware costs of solar development.

Energy Efficiency

Various Alliance states are collaborating to advance energy efficiency standards for consumer products and appliances to save Americans billions in energy costs and cut GHG emissions. This new initiative is still developing. Maryland is excited to begin collaborating with participating states on new energy efficiency rules. By creating consistent rules, the participating states hope to ease the transition for industry and residents and help provide leadership across the nation.

Natural and Working Lands

The USCA states are pursuing a wide range of actions and measures that support land conservation, improve ecosystem health, and sequester carbon. Alliance states have programs in place to support the rural economies, wildlife habitat, and water infrastructure that depend on healthy forests, which provide water resources to cities, towns, and farms. The Natural and Working Lands initiative of the USCA is identifying best practices for land conservation, management and restoration to develop a carbon storage policy framework for implementation. At the Global Climate Action Summit, the USCA challenged all national and subnational jurisdictions to reduce GHG emissions and protect and enhance carbon sequestration across all natural and working lands.

NGO Partnerships

Through the support of the Doris Duke Charitable Foundation (DDCF), the participating states worked with leading non-governmental organization (NGO) partners American Forests (AF), TNC, World Resources Institute (WRI), American Farmland Trust (AFT), the Coalition on Agricultural Greenhouse Gases (C-AGG), and Trust for Public Land (TPL) to pursue shared goals. Maryland and other states benefited from the technical expertise to support comprehensive action on natural and working lands for climate goals. The first product of the innovative partnership with leading NGOs was a series of Opportunity Assessments to support natural and working lands climate mitigation in Alliance states. The Opportunity Assessments identified the carbon sequestration and emissions reduction potential of land and coastal conservation, restoration, and management practices for land types.

National Learning Lab: Natural and Working Lands

American Forests hosted a Learning Lab in Washington, D.C. staffed by more than 50 leading experts – from government, academia, nonprofits, landowners and industry - in the field of land-based carbon mitigation. Alliance states were able to build on their Opportunity Assessments to create detailed, state-specific strategies that activate the best opportunities for carbon sequestration on natural and working lands. Maryland actively participated, sharing our experience with the Healthy Soils Program. Since the Learning Lab, Maryland has assisted many states as the move forward with programs similar to our State's Healthy Soils Program.

Climate Resilience

Improving the resilience of our communities, infrastructure, and natural resources has long been a priority in the USCA states. The participating states are now taking steps to better understand the human, physical and economic impacts of severe weather and climate change on their

communities, especially those most vulnerable, to help plan and respond to a changing climate. This analysis will ensure the participating states are investing in mitigation and adaptation actions that deliver benefits that far exceed the costs of inaction.

All of the Alliance states have conducted state impact assessments, and the vast majority has a climate resilience plan in place or under development. Maryland has shared with the other states our CoastSmart Communities Program, which assists coastal communities to address short- and long-term coastal hazards, such as coastal flooding, storm surge, and sea level rise by connecting local planners to essential resources, information, tools and trainings. In addition, states are following our Maryland Climate Leadership Academy, to learn from the successes of the program. Coordinated action with the other Alliance states builds on Maryland's leadership in helping to protect our residents from climate impacts.

Clean Transportation

Alliance states continue to lead the nation in reducing passenger vehicle emissions by implementing policies and programs that advance the deployment of ZEVs. Maryland is participating in the Clean Transportation work-group as they work to reduce the carbon footprint of the transportation sector. The Alliance states know that by shifting towards ZEVs, and working to reduce vehicle miles travelled, we can dramatically reduce our carbon pollution, create jobs, and protect the health of our communities.

Maryland, along with other participating Alliance states, is a member of the ZEV program, which is working to increase ZEV sales and distribution, as well as increase our charging infrastructure. While a member of the USCA , Maryland has worked to educate others on the work of TCI, and encouraged others to participate. Being a member of the USCA is another opportunity for Maryland to continue the conversation of cleaning-up our transportation system. Individually, all Alliance states invested as much as they could from the Volkswagen settlement funds in charging infrastructure. This effort will grow electrified corridors across the country. In addition, the Alliance states opposed recent efforts by the EPA and NHTSA to weaken the nation's clean car standards.

Conclusion

Maryland appreciates the opportunities for collaboration and assistance in the USCA . Member states are working together to meet GHG reduction goals outlined in the Paris Climate Agreement. Maryland is proud to be a part of the Alliance and to be a leader in reducing GHG emissions nationwide.

MDE expects that many of the USCA efforts will evolve quickly and there may be significant additional reductions by 2030 linked to Maryland's participation in the Alliance. Most of the potential GHG emission reductions from potential USCA initiatives have not been included in the *2019 GGRA Draft Plan*.

Program Name: The Transportation and Climate Initiative (TCI)

Lead Agency: MDE/MDOT/MEA

Program Description

TCI is a regional effort of Northeast and mid-Atlantic states and Washington, D.C. 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 VMT, and help build the clean energy economy across the region.

Cooperation continues between Maryland with other mid-Atlantic and Northeastern states to develop a regional cap-and-invest program for transportation fuels that will drive investment in clean transportation infrastructure and encourage widespread use of EVs powered by increasingly clean electricity.

More information on this program can be found at:

- www.transportationandclimate.org
- www.georgetownclimate.org/

Implementation Milestones

TCI is a multi-state collaborative and voluntary initiative.

Program Name: Zero Emission Vehicle (ZEV) MOU Partnership

Lead Agency: MDE

On June 20, 2018, nine Northeast and West Coast states, including Maryland, reaffirmed their strong commitment to a clean, low-carbon transportation sector with the release of a new Multi-State ZEV Action Plan for 2018-2021 to support the successful implementation of the states' ZEV programs.

The Action Plan, which builds on the successes and lessons learned from implementation of an earlier 2014 ZEV Action Plan, presents 80 market-enabling recommendations for states, automakers, dealers, utilities, charging and fueling companies and other key partners to rapidly accelerate mainstream consumer adoption of ZEVs, including plug-in hybrid, battery electric and hydrogen fuel cell vehicles.

Release of the new Action Plan follows the 2017 expiration of the "travel" provision in the participating states' ZEV regulations, which allowed automakers to get compliance credit in Oregon and Northeast ZEV states for fully EVs placed in California, and to use that credit to meet their ZEV obligations. Automakers are now required to deliver fully EVs to meet specific sales goals in Oregon and the Northeast ZEV states for the first time.

Background

The updated ZEV Action Plan is the work of the Multi-State ZEV Task Force, which was formed in 2013 under a Memorandum of Understanding (MOU) signed by the governors of California and seven other states that have adopted California's ZEV program – Connecticut, Maryland, Massachusetts, New York, Oregon, Rhode Island and Vermont. New Jersey became the ninth ZEV state to join the coalition when they signed the MOU in May 2018. Together, the nine ZEV MOU states represent nearly 30% of the new car sales market in the United States.

The transportation sector is now the largest single source of GHG emissions across the nation. Light duty vehicles alone contribute almost 25% of total emissions. Transportation electrification is essential to deliver the deep reductions in emissions that are needed to meet state climate goals. The state ZEV programs, which require automakers to deliver increasing numbers of ZEVs between now and 2025, are a key strategy in state climate plans.

To support successful implementation of the ZEV programs, the MOU states committed to the collaborative development and implementation of the first 2014 Multi-State ZEV Action Plan.

A New Market Phase

The ZEV market is entering a new phase of development. In the four years since the release of the first ZEV Action Plan, the cumulative number of ZEV sales in the United States has grown from 200,000 cars to more than 750,000 cars today. During that same time in Maryland, sales of plug-in EVs have almost tripled. Market changes and technology developments have laid a strong foundation for rapid growth of the emerging EV market. Battery costs are continuing to decline and the electric range of lower-cost battery EVs is three times what it was in 2014. Consumers can now choose from more than 40 different plug-in and fuel cell models, and all the major automakers have announced plans to significantly expand EV offerings across multiple market segments in the next several years.

Key Action Plan Recommendations

While many of the recommendations in the 2014 Action Plan remain valid today, the new Action Plan represents a redoubling of state efforts to accelerate electrification of the light-duty vehicle market, and recognition of the important role that public-private partnerships involving the automakers, dealers, utilities and others play in the effort. Recommendations for states and other key partners in the updated Action Plan are focused on five priority areas:

- Raising consumer awareness and interest in EV technology;
- Building out a reliable and convenient residential, workplace and public charging/fueling infrastructure network;
- Continuing and improving access to consumer purchase and non-financial incentives;
- Expanding public and private sector fleet adoption; and
- Supporting dealership efforts to increase ZEV sales.

The full Multi-State ZEV Action Plan is accessible at: nescaum.org/documents/2018-zev-action-plan.pdf

Maryland has been a leader in working to implement the ZEV Action Plan recommendations in our state. For years Maryland has had various incentives, financial and other, for purchasing EVs. In 2018, Governor Hogan elected to not only extend the incentive for both EVs and infrastructure, but to significantly increase these incentives. Under the Clean Cars Act of 2017, Maryland offers a tax credit of up to \$3,000 for electric and plug-in vehicles with a sale price up to \$60,000. Governor Hogan increased the funding for this program from \$1.8 million to \$3million annually. In addition to vehicles, the Clean Cars Act allows both residential and commercial entities to receive a rebate of 40%of the purchase and installation of electric recharging equipment. Governor Hogan doubled the funding available for this program from \$600,000 annually to \$1.2 million. In addition to these programs, the State has many other incentives available such as the Alternative Fuel Infrastructure Program and offering HOV access to plug-in vehicles. Through these efforts, Maryland now has over 1,500 public level 2 and 3 chargers throughout the state. In addition to these incentive based programs, the State has been active in promoting EVs by performing outreach to build consumer awareness. Some of these efforts include hosting workplace charging events and staffing informational booths at events across the state.

Additionally, the Clean Cars Act of 2019 increases the transfer amount from SEIF to (TTF) to \$6 million and adds fuel cell vehicles to be eligible for the excise tax credit and adds them to EVIC.

- Effective July 1, 2019:
 - For FY20 the lesser of \$6 million or the actual total amount of credits allowed against the excise tax shall be transferred from SEIF to the TTF
- Effective July 1, 2026:
 - The bill defines fuel cell vehicles
 - Adds fuel cell vehicles to the excise tax credit provision and amends the provision to read “the credit allowed may not exceed the lesser of the amount of excise tax paid for the purchase of the vehicle; or \$3,000”
 - Adds fuel cell vehicles to EVIC’s purview and changes the name of EVIC to the Zero Emission Electric Vehicle Infrastructure Council
 - Adds a fuel cell EV manufacturer representative and a fuel cell EV equipment representative to the Council
 - Adds fuel cell considerations to the Council’s action plan

Program Name: Leadership-By-Example – State

Lead Agency: MDE/DGS

Program Description

Through lead-by-example programs, the 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
- Maryland RPS

Implementation Milestones

The State’s lead-by-example programs in high performance buildings and procurement are statutorily driven.

- DGS shares responsibility with the Board of Public Works, MDE, DBM, Maryland Green Building Council, and Maryland Green Purchasing Committee for administering them.
- Programmatic progress is tracked in annual reports that both the Maryland Green Building Council and the Maryland Green Purchasing Committee are required to submit to the General Assembly.

DGS is working with the Governor’s Office on reduction goals:

- A schedule for the State government’s purchase of electricity from renewable sources that meets the State’s RPS interim and final (2022 targets)

Program Name: Leadership-By-Example – Federal

Lead Agency: MDE

Program Description

The Federal Green Challenge is a lead-by-example program for the federal government aimed at improving energy efficiency, reducing waste, and integrating renewable energy practices in all of its agencies’ operations and facilities, as well as their purchasing practices.

Program Objectives

The program’s objective is for federal facilities located in Maryland to use environmentally friendly techniques and methods to “lead by example.” Such techniques include energy reduction in public buildings, facilities, and lands, improved efficiencies in fleet vehicles and fuels, water conservation, waste reduction, waste recycling, purchasing of products/services with lower life-cycle impacts, and greater use of renewable energy.

Implementation Milestones

Executive Order 13834 was replaced in 2018 by President Trump’s Executive Order 13834: “Regarding Efficient Federal Operations.” This Executive Order states that federal agencies “shall meet statutory requirements in a manner that increases efficiency, optimizes performance, eliminates unnecessary use of resources, and protects the environment.”

Enhancement Opportunities

This lead-by-example program can be enhanced at the federal level by making specific goals for energy efficiency and water management.

Funding

The state has allotted \$40,094,750 for the lead-by-example – federal program between 2010 and 2020.

Program Name: Leadership-By-Example – Local Government

Lead Agency: MDE

Program Description

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. The policies also aim to reduce the carbon footprint in procurement and other government operations.

Some jurisdictions have conducted GHG inventories, adopted climate action plans and targets, and implemented tracking protocols such as those provided by the International Council for Local Environmental Initiatives.

Program Objectives

Lead-by-example programs for local government aims to improve energy efficiency, reduce waste, and integrate renewable energy practices in all local government operations and facilities, as well as their purchasing practices.

Implementation Milestones

These programs combine both voluntary and mandatory initiatives. There are a wide range of implementation tools being used at the local level including ordinances, resolutions, and voluntary sustainability plans.

Six counties and three cities have prepared climate plans using the methods developed by the International Council for Local Environmental Initiatives. Parts of these plans identify emissions that result from government operations. Using baseline data in the plans, the benefits are calculated for 25% and 50% reductions from the base year, respectively.

Enhancement Opportunities

These lead-by-example programs can be enhanced by increasing public awareness of local governments' efforts. Although Maryland achieves obvious emission reductions from the programs themselves, if the government is more vocal about its efforts, it adds credibility when it asks the general public and companies to reduce their emissions/energy usage.

Funding

The lead-by-example local government programs are allocated funds by counties. Baltimore County had a budget of \$250,000 for energy conservation tax credits, but it was expanded to \$750,000 for future years after it exceeded the initial budget. Frederick County used a federal grant from the U.S. Department of Energy for \$659,800. Harford County and Prince George's County had a budget of \$250,000, which they have also exceeded. Howard County uses a tax credit program that provided 565 credits equal to over \$2.5 million for renewable energy systems. Queen Anne's County is expected to save \$350,000 on power due to a new lower rate, and also was awarded an EmPOWER fund of \$15,000. Washington County received a similar \$15,000 grant from the EmPOWER program. Talbot County received a grant from the American Recovery and Reinvestment Act, and also made \$132,158 from the sale of surplus carbon and RECs. Wicomico County collects gases from their Newland Park Landfill, selling them for carbon credits (\$183,000 worth in 2012). It also sells power from solar arrays, and Salisbury (a city within Wicomico) received an \$80,000 grant from EmPOWER.

Program Name: Leadership-By-Example – Universities and Colleges

Lead Agency: MDE

Program Description

In Maryland, the presidents' of 23 colleges and universities, including all University System of Maryland (USM) institutions, Morgan State University, St. Mary's College of Maryland, four community colleges and four independent institutions, have signed the American College and University Presidents Climate Commitment (now called the Carbon 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 would be reduced or mitigated from a base year, with remaining emissions offset by purchasing carbon credits or other means.

University-Based Climate Efforts

Higher education institutions are actively engaged in addressing climate change. The State, through MDE, has reached out to public and private Maryland colleges and universities to aid in their efforts, recognize their accomplishments, and account for their actions in meeting the state's GGRA of 2016 goals. Several Maryland universities and colleges are represented and play an active role in the various MCCC Working Groups. Higher education institutions have a key role in building awareness of the impacts from climate change and identifying actions that both individuals and organizations can implement. MDE staff have met with students as part of their curricula requirements at both Frostburg State University and University of Maryland, Baltimore County. These discussions were very informative and engaging for both the students and staff.

Benefit

Building awareness and understanding of the significance of climate change as well as State programs being implemented to satisfy the goals of the GGRA of 2016 among college students is important. These are the individuals that will manage and guide future efforts to mitigate GHG emissions as well as implement adaptation and response measures. Engaging with college students also aids them in their career development path as they consider job opportunities related to addressing climate change. Working with university and college administrators aids in ensuring coordination with these institutions to ensure their programs and priorities are consistent with the policy objectives of the GGRA of 2016.

Partners

Maryland higher education institutions represented on the MCCC or its Working Groups include; University of Maryland Center for Environmental Science, University of Maryland; College Park, University of Maryland; Baltimore County; Washington College; and Johns Hopkins University. MDE sent a letter to the presidents of all private and public sector colleges and universities in Maryland to further facilitate partnerships. USM is a charter signatory of the American College and University Presidents' Climate Commitment (now called the Carbon Commitment). By its leadership and through the implementation of its Climate Action Plan, USM is taking actions to reduce its carbon footprint and achieving its goal of carbon neutrality for all types of emissions by 2050. The State looks forward to working with all Maryland universities and colleges in meeting their campus/system-wide goals related to climate change.

Conclusion

The universities and colleges that are active members of the MCCC and its Working Groups have provided valuable expertise to the Commission and aided in the Commission's work. Emission reductions from this effort have not been included in the *2019 GGRA Draft Plan*. Should the program evolve to the point of having additional quantitative estimates of GHG emission reductions for the 2030 to 2050 time frame, MDE plans to include these reductions in future updates to the plan. The GGRA allows for reductions from voluntary programs and partnerships to count towards the goals of the Act.

Program Name: The Climate Champions Program

Lead Agency: MDE

Program Description

The Climate Champions program provides an opportunity for organizations to voluntarily commit to actions related to climate change and be recognized for their actions. These actions include, but are not limited to; mitigating the release of GHGs, building awareness on the issue, and adaptation and response measures. Participants document actions taken and outcomes. This documentation includes quantifiable or non-quantifiable metrics. Members are recognized for their participation in the program and successful actions are publicly recognized.

In 2018, MDE implemented the Maryland Climate Champion Challenge as part of the Maryland Green Registry. Participants identified a minimum of five actions that they implemented related to addressing climate change. Organizations entering the Challenge include businesses, state and local government agencies and universities. Participants were recognized at an event on June 28, 2018.

Benefit

Providing an opportunity for interested stakeholders to participate in a program where their actions are recognized helps build awareness of the issue. Oftentimes organizations taking voluntary actions do not have a forum or outlet to report their activities and build awareness among their own stakeholders about how they are addressing climate change. For businesses, the Climate Champion program is an opportunity to show employees and customers their commitment to the issue. Similarly, for government agencies the program is a way to demonstrate to citizens, “government taking action”. For educational institutions such as colleges and universities, participating in the program is a way to build awareness among the faculty and student body. For all organizations that participate, having a voluntary program where participants are recognized creates a competitive atmosphere around a very notable cause where actions that are noteworthy are publicly recognized. This in turn results in a positive image for the participating organization. Having a voluntary program such as Climate Champions is a way for Maryland’s citizens to see the commitments of a variety of stakeholders across the State.

The GGRA of 2016 allows for voluntary actions to be credited towards meeting the State’s goals. The Climate Champions program allows MDE to capture those voluntary actions that may be credited, including recognizing those organizations implementing those actions. To satisfy the GGRA of 2016 goals related to the economic benefits resulting from addressing climate change, the Climate Champions program is a way to capture and document those benefits.

Partners

MDE has engaged with government agencies, businesses and business associations, as well as universities and colleges. The agency will continue to work with these organizations as well as additional stakeholders to refine and build on the Maryland Green Registry’s Climate Champion Challenge. Identification of and engagement with new stakeholders to participate in the Climate Champion program is a goal of MDE.

Conclusion

Maryland will continue to implement the Climate Champions program. With input from stakeholders, MDE will build upon previous efforts to ensure the Climate Champions program is transparent, implementable for participants and for MDE, the commitments by participants are meaningful and the recognition provided is notable.

Emission reductions from the Climate Champions program have not been included in the *2019 GGRA Draft Plan*. Should the program evolve to the point of having quantitative estimates of

GHG emission reductions for the 2030 to 2050 time frame, MDE plans to include these reductions in future updates to the plan. The GGRA allows for reductions from voluntary programs and partnerships to count towards the goals of the Act.

Program Name: Idle Free Maryland

Lead Agency: MDE

Program Description

Idle Free Maryland is a partnership between the State, the private sector and Maryland schools, which is designed to reduce unnecessary idling through outreach, education and voluntary action. For now, the initiative focuses on three types of idling activities:

- Motorists who idle their cars for a variety of reasons,
- Idling by truckers, and
- Idling around schools.

Idling emits about 11 million tons of CO₂, 55,000 tons of nitrogen oxides, and 400 tons of particulate matter in the U.S. each year. These pollutants contribute to climate change and can cause cancer, respiratory issues, reproductive effects, birth defects and other serious illnesses. Idling also impacts the health of Maryland streams, rivers, lakes, bays and coastal waters, increasing the levels of nitrogen in the Chesapeake Bay. Reducing vehicle idling is increasingly seen as a way to improve air quality and to help meet climate change goals.

The goal of the Idle Free program is to significantly reduce idling by building awareness of its impact on Maryland communities. The program establishes partnerships with motorists, communities, and the transportation industries with the intention of reducing emissions from unnecessary idling by decreasing the social tolerance of idling through fact-based education.

Resources have been created to help spread the word about idling's impact on health and the environment. The tools developed are aimed at educating motorists, schools, and transportation industries on ways to implement an idle-reduction plan. The campaign includes a toolkit of more than 30 products, including fact sheets, social media materials, pledge sheets, signage, policies and other communications media. This includes resources developed specifically for implementation in schools. [<https://mde.maryland.gov/idlefreeMD>]

Benefits

If every driver who took the pledge to be idle free could reduce their idling by just five minutes a day, it would prevent 25 pounds of harmful air pollutants and 260 pounds of CO₂ from entering the atmosphere each year. Idle Free Maryland reductions will help the State meet its climate change goals by reducing GHG emissions. The initiative will also reduce emissions of other air pollutants and help the State better protect public health by continuing to make progress on ground-level ozone and fine particulate air pollution. If half of Maryland drivers would make that "five minutes a day" commitment, more than 50 million pounds of pollutants per year could

be prevented from entering Maryland's air. Idle Free MD will not only improve the air quality in Maryland communities, but also reduce the negative impact of air pollution on streams, rivers, lakes, bays and the Chesapeake Bay.

Partners

MDE and its State partners, MDOT, MEA, and the Maryland State Department of Education, are working with several key partners to implement Idle Free Maryland. These include the Maryland Motor Truck Association. MDE is working with individual schools, many of which are Green Schools, to assist in implementing their own idle reduction strategies. Green Schools is a program administered by the Maryland Association for Environmental & Outdoor Education (MAEOE) so that schools and their communities can evaluate and improve their efforts in environmental sustainability. So far, over fifty five partner schools and five State Green Centers, which work with schools to achieve their educational and environmental goals, have signed on as partners. MDE has participated in Green School evaluations, made presentations to teacher conferences, and had a booth at MAEOE's year-end Youth Summit where students could play games and get stickers while teachers could sign up their schools to become Idle Free partners. Opportunities for further engagement with communities, local governments, school systems and additional transportation industry sectors are continually being sought.

Conclusion

The tools and resources to launch Idle Free MD have been completed. Additional outreach and stakeholder engagement are planned to increase awareness of the program. MDE will continue to evaluate potential recognition and incentive programs to encourage involvement. There will also be increased emphasis on tracking the results from the Idle Free MD campaign and identifying avoided emissions due to the implementation of the program.

Projected emission reductions from the Idle Free MD initiative through 2030 have not been included in the *2019 GGRA Draft Plan*. MDE expects the GHG emission reduction from this effort to exceed 100,000 metric tons of CO₂e by 2030. As the program matures, MDE may include reductions in future updates to the plan.

Program Name: The Port Partnership

Lead Agencies: MDE/MDOT

Program Description

In December 2015, MDE, MDOT, and MDOT MPA entered into a voluntary agreement (the Agreement) that commits the agencies to work cooperatively to identify, develop, and, when appropriate, implement voluntary projects that will reduce emissions and increase energy efficiency at the Port of Baltimore (Port). Since signing the Agreement, a workgroup of representatives from the participating agencies has been meeting monthly to efficiently and effectively leverage resources and pool their knowledge to implement the Agreement's goals.

The partnership is primarily focused on reducing emissions at the Port to help the state meet air quality and climate change goals, but also acknowledges the role that the Port plays in driving economic growth and creating jobs. The Port is often referred to as one of the most important economic engines for the State of Maryland. The partnership recognizes this critical role for the State and works to have a clean and green Port for both environmental and economic reasons.

Benefits

As a result of this unique collaboration, Maryland has made great strides in implementing Port-related projects that have supported a number of emissions reduction grant-supported initiatives, such as projects funded by the Diesel Emission Reduction Act (DERA) Grants. DERA-funded projects have supported the replacement of drayage trucks, cargo handling equipment, and installation of idle reduction equipment on switcher locomotives. To date, over \$18 million has been invested into diesel emission reduction activities at the Port. Agreement-supported projects to date will, over the lifetime of the equipment, reduce in excess of 2,500 tons of air pollutants, including nitrogen oxides, particulates, hydrocarbons and carbon monoxide. The emission reduction activities at the Port will also result in significant reductions in GHG emissions, primarily CO₂ and black carbon.

The Port-related emission reduction projects continue through 2019 and 2020. The partnership was successful in obtaining a \$2.4 million grant, as part of the 2018 DERA process, which will be used to upgrade drayage trucks, cargo handling equipment, and marine engines. In addition to the 2018 DERA initiative, there are several Port projects that will be funded as part of the Volkswagen Mitigation Plan (see Section 4.5.11). Funding from the Volkswagen Mitigation Plan will be used to reduce diesel emissions from the legacy fleet, including drayage trucks and cargo handling equipment. All of the 2019/2020 projects will not only reduce key air pollutants, like nitrogen oxide and fine particulates but will continue to provide significant reductions of CO₂ and black carbon.

The Partnership also supports research opportunities. MDOT MPA sponsored Fellows from the Environmental Defense Fund's (EDF) Climate Corps Program in the summers of 2018 and 2019 on two different research projects. The first project involved studying the potential effectiveness of natural gas fuel cell technology to reduce emissions. This fuel cell study provided guidance for the workgroup as it seeks cost effective reduction projects. MDOT MPA is deploying a natural gas fuel cell to help with peak energy savings in one of its maintenance buildings as a result of this work. The second project looked at carbon sequestration at restored wetlands on dredged material and used Hart Miller Island as the case study (see additional information below).

The partnership plans to continue to implement new emission reduction programs every year between now and 2030.

Partners

In addition to the primary partners, MDE, MDOT, and MDOT MPA, the workgroup's projects and initiatives have benefited greatly with the active involvement of others, including the

Environmental Defense Fund, MEA, the Maryland Clean Energy Center, the U.S. Maritime Administration, and private port businesses. The workgroup also continues to place a high priority on involving key stakeholders, especially those in underserved areas and has received direct input from residents of the Turner Station, Curtis Bay, and Brooklyn communities. As part of this partnership, for the past three years, MDOT MPA has sponsored graduate students from the Environmental Defense Fund's Climate Corps Program. Through this fellowship program, each student researched opportunities for technology deployment at Port facilities to reduce GHG emissions. This included, but was not limited to, the use of fuel cells and shore power.

Conclusion

The workgroup will build on its initial successes by continuing to pursue ways for the Port to grow sustainably. Specifically, the workgroup will focus on developing future innovative emission reduction and energy-saving projects and has already identified potential funding sources for these projects.

Over the past 17 years, the state, through MDOT MPA has worked diligently to identify and implement a variety of environmental programs, with a focus on climate initiatives for MDOT MPA and its tenants' operations, including the following items:

- Quantifying GHG and criteria air pollutant emissions from Port operations through land-side and water-side air emission inventories, which began in 2008 with the 2006 Comprehensive Baseline Inventory of Landside Air Emissions. Inventories help identify target areas for GHG reductions and track the progress of those programs.
- Promoting energy efficiency and grid resiliency through Port-wide energy audits and engaging with energy service companies (ESCOs) to design, build, and fund projects that save energy (thereby reducing GHGs), reduce energy costs, and decrease operations and maintenance costs at Port and tenant facilities.
- Securing over \$18 million in federal and state funding to replace or retrofit older, less-efficient diesel engines in drayage trucks, cargo-handling equipment, harbor craft, and switcher locomotives. A highlight of the diesel emission reduction program is the Dray Truck Replacement Program, which provides funds to truck owners to help defray the cost of replacing older trucks with newer, more efficient models. Approximately 200 trucks have been replaced through this program. While primarily focused on reducing criteria pollutant emissions, the newer trucks are more efficient, resulting in reduced GHG emissions as well as fuel consumption.
- Reusing dredged materials for wetland and coastal habitat restoration projects. Along with providing habitat and water quality benefits, wetlands help store carbon and decrease storm surges, helping to enhance coastal resiliency in adjacent waterways.
- Instituting new technologies at Port terminals, such as optical character recognition cameras/software to track container movements at the terminal and instituting chassis pooling to reduce the number of truck moves, thereby, reducing trips, idling, and emissions.
- Partnering with community groups to promote environmental awareness and funding projects, such as the Schoolyard Greening Program, which replaces pavement at local schools with trees and planting to reduce stormwater runoff, provide greenspace, and promote carbon uptake.

GHG emission reductions from the Port Partnership have not been included in the *2019 GGRA Draft Plan*. The partnership's goal is to implement new emission reduction projects through 2030 and beyond. By 2030, this partnership could achieve an additional reduction in GHG emissions approaching the 500,000 metric tons of CO₂e level. The Port initiatives will not only help reduce emissions of CO₂, but it will also help reduce emission of black carbon, a very potent GHG. As this effort continues to grow, MDE plans to include GHG reductions in future plan updates.

Hart Miller Island Carbon Sequestration

Hart-Miller Island (HMI) is a State-owned former dredged material placement site located within the Chesapeake Bay near the mouth of Back River. The site was originally two separate islands, Hart Island and Miller Island, which were both eroding at a rapid pace. The Maryland Geologic Society predicted that Miller Island would be gone by 2008 and Hart Island by 2045. In 1970, Congress approved deepening of the Port of Baltimore navigation channels, and MDOT MPA began placing dredged material to join and restore Hart and Miller Islands. HMI now includes wetlands, forests, trails, and sand beaches managed by DNR. The restored south area opened to the public in 2016 for wildlife viewing and recreation.

Along with restoring nearshore habitat and creating a resource for recreational activities, HMI serves as a potential CO₂ sink. MDOT MPA is currently investigating the amount and rate of carbon sequestration in the site to assess if HMI could be a significant carbon capture and storage opportunity. Closure and restoration of former dredged material sites, such as HMI, may provide sustainable and long-term sequestration of carbon through vegetation growth and creation of wetlands and marshes.

Program Name: The Volkswagen Mitigation Fund

Lead Agency: MDE

Program Description

On Sept. 18, 2015, the EPA and the California Air Resources Board (CARB) issued a Notice of Violation of the CAA to Volkswagen AG (VW), Audi AG and Volkswagen Group of America, Inc. alleging that model year 2009-2015 Volkswagen and Audi diesel cars equipped with 2.0 liter and 3.0 liter engines included software that circumvents EPA and CARB emissions standards for nitrogen oxide. Approximately 550,000 vehicles in the United States had "defeat devices" installed; approximately 16,000 were delivered to Maryland.

On October 25, 2016, the U.S. District Court for the Northern District of California approved a Partial Consent Decree between the U.S. Justice Department and VW regarding excess emissions of nitrogen oxide due to the installation of "defeat devices" on 2.0 liter diesel engines. The use of "defeat devices" has increased vehicle emissions of nitrogen oxide, resulting in adverse affects on air quality. The Consent Decree established an Environmental Mitigation Trust of \$2.7 billion to fully remediate the excess nitrogen oxide emissions from the affected 2.0 and 3.0 liter vehicles. The State of Maryland is eligible to authorize spending \$75.7 million from the VW

Trust to use for specifically defined eligible mitigation projects. To guide the use of funds over the Trust's 10-year lifetime, Maryland has developed a Mitigation Plan that outlines the eligible projects Maryland will use to reduce excess nitrogen oxide emissions. More information on the Mitigation Plan can be found on MDE's website.

Benefit

Strategies for reducing nitrogen oxide emissions will in most cases also result in reductions of GHG emissions. Many of the programs to be implemented under the VW Mitigation Plan will reduce both CO₂ emissions and emissions of black carbon. Black carbon is a potent short-lived climate pollutant. Applicants seeking funds from the VW Trust must submit a proposal to MDE that specifies, among other things, emission reductions from the planned project(s). The evaluation criteria for awarding funds includes benefits from reducing other pollutants such as CO₂. As projects receiving funds from the VW Trust are implemented, MDE will track avoided/reduced CO₂ emissions resulting from these projects. The evaluation criteria for proposed projects also includes identifying benefits to environmental justice and underserved communities. Addressing the needs of underserved communities is a priority for the MCCC.

Partners

MDE has conducted extensive outreach with citizens, advocacy groups, local & state government and the private sector with a focus on communities that bear a disproportionate share of the air pollution burden. Citizen and advocacy group engagement is a priority for Maryland. MDE has met with citizens at community meetings to discuss the opportunities for funding, as well as, to obtain input on project opportunities. MDE has also worked closely with MEA and MDOT and its business units such as the MD Port and Transit Administrations, as well as, the Baltimore Port Alliance to identify projects to implement at Port facilities and in communities near the Port of Baltimore.

Conclusion

The use of funds from the VW Trust to implement projects will provide air quality benefits, including reductions in GHG emissions, which contribute to meeting the policy goals in the GGRA of 2016. Projected emission reductions have not been included in the *2019 GGRA Draft Plan*. MDE will be tracking these important emission reductions and including them in the final GGRA Plan and in updates to the GGRA Plan.

Program Name: The Metropolitan Washington Council of Governments' (MWCOG) Climate Energy and Environmental Policy Committee (CEEPC)

Lead Agency: MDE

Program Description

In November 2008, MWCOG's Board of Directors adopted the *National Capital Region Climate Change Report*, committing the region to meeting GHG emission reduction goals of 80% by

2050. COG brings area leaders together to address major regional issues in the District of Columbia, suburban Maryland, and Northern Virginia. COG's membership is comprised of 300 elected officials from 24 local governments, the Maryland and Virginia state legislatures, and the U.S. Congress. MDE was a member of the Climate Change Steering Committee (CCSC) that developed the regional climate initiative.

COG's Climate, Energy and Environment Policy Committee (CEEPC) was created by the COG Board on April 8, 2009 through Resolution R18-09. The Committee serves as the board's principal policy adviser on climate change, energy, green building, alternative fuels, solid waste and recycling policy issues, and other environmental issues as the board may assign. CEEPC is responsible for managing the implementation of the *National Capital Region Climate Change Report*. This responsibility includes development of a regional climate change strategy to meet the regional GHG reduction goals adopted by the board.

CEEPC includes representatives from COG's member governments, state environmental, energy, and transportation agencies, state legislatures, the Air and Climate Public Advisory Committee (ACPAC), federal and regional agencies, electric and gas utilities, environmental organizations, business organizations, and members of the academic community. In addition to the local county and city government members of COG, MDE, MEA, and MDOT are members of CEEPC. Stakeholders from Maryland also regularly participate in CEEPC and regional actions, including the Maryland Clean Energy Center (MCEC).

Climate change activities in the region are guided in part by CEEPC's Regional Climate and Energy Action Plan, a tool first developed in 2009 to help the region achieve its regional GHG emission reduction goals. The plan puts forth recommended actions for local governments aimed at reducing the carbon impact of the built environment, energy, and transportation sectors, while increasing resiliency and improving education and outreach.

Regional efforts are also supported by COG's Built Environment and Energy Advisory Committee (BEEAC), regional working groups (EVs, tree canopy, agriculture, urban heat island), and the COG Solid Waste and Recycling Committee. Policies and actions are also closely coordinated with COG's Transportation Planning Board (TPB), Metropolitan Washington Air Quality Committee (MWAQC), and Chesapeake Bay and Water Resources Policy Committee, among other committees.

COG and its partners base their climate actions on pillars of economic development, innovation, and finance, while also focusing on issues such as resilience, equity, and competitiveness. COG supports action plan implementation, manages a voluntary data sharing agreement with electric and natural gas utilities, and regularly tracks and shares progress on leading climate and energy indicators through a [Regional Climate and Energy Progress Dashboard](#). COG, state agencies, local members, and other stakeholders routinely collaborate to identify and develop programs and projects to support key activities to reduce emissions and manage efforts to transition to cleaner low-emitting technologies and solutions.

Benefits

As a result of this strong framework for regional collaboration, COG, member governments, and regional stakeholders have made great strides in implementing programs to address climate change. Some of the more impactful programs have included Sustainable Maryland, Maryland Smart Energy Communities, U.S. Department of Energy programs, including the Better Buildings Residential network, the Rooftop Solar Challenge and Solar Market Pathways initiatives, combined heat and power and microgrid development partnerships, efficient outdoor lighting programs, the Fleets for the Future initiative and the Mid-Atlantic Property Assessed Clean Energy Financing Alliance.

COG's regional dashboard shows that regional climate initiatives through COG and its partners have resulted in significant outcomes across Charles, Frederick, Montgomery, and Prince George's counties, including:

- GHG emission reductions of 16% between 2005 – 2015.
- High performance buildings increased from just over 20 in 2005 to more than 500 as of 2016.
- Grid-connected renewables have grown from 275 systems with 2,900 kilowatts of capacity in 2009 to more than 28,000 systems with 272,000 kilowatts of capacity as of 2017.
- EV charging stations have increased from 47 stations in 2012 to 243 stations in 2018.
- As of 2016, there are more than 40,000 hybrid and EV owners.

Partners

The following organizations and agencies coordinate and collaborate climate program activities with COG: MDE, MEA, MDOT, Maryland Clean Energy Center (MCEC), and the University of Maryland Environmental Finance Center (UMD/EFC). Local government members of COG with representation on CEEPC include Prince George's, Montgomery, Charles, and Frederick Counties, and the cities of Takoma Park, Rockville, Frederick, Bowie, Greenbelt, College Park, Mt. Rainier, and Gaithersburg.

The Greater Washington Regional Clean Cities Coalition, the mid-Atlantic Combined Heat and Power Technical Assistance Program, the Maryland National Capital Park and Planning Commission (MNCPPC), the mid-Atlantic Purchasing Team (MAPT), and the Greater Washington Board of Trade also participate in and support regional climate activities. Other stakeholder partners include the Georgetown Climate Center and the National Capital Planning Commission (NCPC).

COG is also a member of the Northeast States for Coordinated Air Use Management (NESCAUM) NE Corridor EV Investment Strategy Steering Committee. COG has had great success in coordinating activities with other regional councils, particularly on solar market development, alternative fueled vehicles, and green cooperative purchasing through the National Association of Regional Councils (NARC). Capacity building and leadership development also occur through collaboration with the Mid-Atlantic Sustainability Network (MASN), the Urban Sustainability Directors Network, the Star Communities Program, the Rockefeller Brothers and Bloomberg climate programs, and the Institute for Sustainable Communities (ISC).

Conclusions

COG's regional climate program celebrated 10-years of success in November of 2018. Building on these early accomplishments, CEEPC will continue to focus regional action and leverage partner activities to foster the transition to a clean low-carbon economy. High priority actions for the next 10 years will include a continued focus on widespread deployment of renewable energy, grid modernization and resilience, distributed generation, high performance buildings, energy financing initiatives, electric and alternative fuel vehicle initiatives, tree canopy protection and urban heat island mitigation, and smart cities/smart region initiatives.

Specific additional emission reductions from the COG Climate Action Plan through 2030 and beyond have not been included in the *2019 GGRA Draft Plan*. MDE will be working with COG to calculate and may include reductions in future updates to the plan.

OUTREACH EFFORTS TO BUILD PUBLIC AWARENESS AND PROMOTE VOLUNTARY ACTION

Program Name: Education, Communication, and Outreach Working Group

Lead Agencies: MDE, DNR, DHMH

Program Description

The MCCC and the State have identified underserved communities as a priority for building awareness on issues related to climate change. To pursue this goal, the State, through MDE, DNR, and DHMH, has made an effort to ensure that residents living in underserved communities are aware of the impacts of climate change, the actions that can be taken to address those impacts, and the available programs that can help fund some of the actions.

MDE Efforts

As part of this initiative, MDE has presented at community meetings and met with individual representatives from the Turner Station, Curtis Bay, West Baltimore, eastern Baltimore County and northern Anne Arundel County communities as well as with air and public health advocacy groups that interact directly with underserved communities. These meetings have presented good opportunities for MDE to learn about residents' air quality concerns, provide overviews on the impacts of climate change, and establish relationships and processes for sharing information in the future.

Also, as part of this initiative, fact sheets developed by MCCC have been distributed to citizens and other stakeholders throughout Maryland, including in underserved communities. Additionally, as part of this initiative, MDE supports the MCCC's Education, Communications & Outreach (ECO) Working Group to coordinate and leverage the work in underserved communities being performed by the Commission on Environmental Justice and Sustainable Communities as well as the Children's Environmental Health & Protection Advisory Committee.

Benefits

All Maryland residents need to hear about the potential impacts of climate change and the actions that they can take to reduce their GHG emissions. MDE's initiative works to ensure that underserved communities are not left out of this important dialogue. The meetings with communities and individuals in underserved areas have enabled MDE to convey important information about climate change to these audiences. In the meetings, MDE has explained how GHG is emitted into the atmosphere, the severe weather events and sea level rise that these emissions cause, and in turn, the threats to human health and their quality of life that result.

Actions communities can take to reduce emissions and how they can protect themselves from the impacts of climate change are also explained. Perhaps most importantly, underserved communities are made aware of the programs that can help pay for some of the measures they can take, such as to help them make their homes more energy efficient. A further benefit is that MDE's understanding of why some of these programs are not as effective in underserved communities has been enhanced and attempts are being made to modify the programs to better serve these communities. Working with citizens in these communities is an opportunity to build awareness of state policies and programs that focus on the impacts from climate change. It also enables MDE to raise awareness of MCCC's efforts. As agencies conduct outreach with citizens, the feedback received is invaluable in the consideration of new policies and programs to aid these communities.

Partners

MDE has met with citizens at community meetings and/or meetings with the leadership of various community associations and organizations active in underserved communities. These include, but are not limited to:

- Greater Baybrook Alliance
- Bon Secours Community Works
- Turner Station Conservation Teams
- North Point Peninsula Council
- St. Helena Community Association
- Safe Alternative Foundation for Education
- MD Environmental Health Network
- Greater Pasadena Council
- Dundalk Renaissance Corporation
- Community of Curtis Bay Association

MDE looks forward to continued engagement with these partners, as well as developing productive relationships with other communities and advocacy groups. Additional information on this MDE initiative can be found in Section 6.5.1.

DNR Efforts and DHMH Efforts

DNR and DHMH have both implemented extensive efforts to reach out and get input from communities overburdened with environmental issues. DNR's efforts have focused on adaptation and resiliency. DHMH's effort addressed the health implications associated with climate change. Both of these efforts are described in more detail in Sections 6.5.4 and 6.5.6.

Conclusion

Through these efforts, the State is hoping to better address the needs of communities that are overburdened with pollution problems. Many of the strategies described in this Chapter specifically address how underserved communities are addressed. Chapter 6 specifically addresses social equity issues.

Program Name: Climate Ambassadors

Lead Agency: MDE

Program Description

The Climate Ambassador Pilot Program is an effort to educate key stakeholders on climate change, and the important actions Maryland is taking to address climate issues, in a way that allows these stakeholders to educate others on the same issues. In 2016, the ECO Working Group of the MCCC identified the need for a voluntary program that allows for education and training on the causes of climate change, its consequences, and actions that can be taken at the local level. The program will train Climate Ambassadors on climate science and how to inform others of climate change and the adaptation and mitigation measures the State is using to address the issue.

Programmatic Approach

The Climate Ambassador Program gauges the success of and interest in a climate education program, and incorporates improvements for future implementation. MDE, in partnership with Maryland Delaware Climate Change Education Assessment and Research center (MADE CLEAR), is implementing the initial Climate Ambassadors training program with Bon Secours Community Works in West Baltimore. The curriculum is designed to train stakeholder participants around locally specific climate change concerns, impacts, and action steps. A “train the trainer” approach is used so that individuals can train and educate others, particularly among their peers. This approach will encourage information sharing throughout communities and strengthen climate change action in Maryland. Individuals that become Climate Ambassadors are recognized for their participation.

The program endeavors to provide a deep knowledge base on climate change that reflects the interest of the community or organization receiving the training. The Climate Ambassador program can provide training on a variety of issues, including, but not limited to: changing climate patterns, health impacts, social and economic impacts, equity, policy implications, and job creation. Specific frameworks and lessons learned will be shared between the Climate Ambassadors. The ECO Working Group serves as a conduit for this information sharing.

The development and implementation of Climate Ambassador Programs are supported by various agencies, including MDE, Maryland Department of Health (MDH) and DNR, through their existing stakeholder engagement efforts. In addition, community organizations, non-profits, and environmental advocacy programs have shown interest in the training. MADE CLEAR has also played a key role in the Ambassador program.

Additionally, MDE has also engaged with the Executive Director of SAFE Alternative Foundation for Education to implement a Climate Ambassador Program for their students. MDE has conducted extensive outreach in underserved communities to identify opportunities to further implement the Climate Ambassador Program. MDH is also implementing a Community Ambassador program in Prince George’s County tailored to middle and high school students.

Program Name: Climate Champions

Lead Agency: MDE

Program Description

The Climate Champions program provides an opportunity for organizations to voluntarily commit to actions related to climate change and be recognized for their actions. These actions include, but are not limited to; mitigating the release of GHG, building awareness on the issue, and adaptation and response measures. Participants document actions taken and outcomes. This documentation includes quantifiable or non-quantifiable metrics. Members are recognized for their participation in the program and successful actions are publicly recognized.

In 2018, MDE implemented the Maryland Climate Champion Challenge as part of the Maryland Green Registry. Participants identified a minimum of five actions that they implemented related to addressing climate change. Organizations entering the Challenge include businesses, state and local government agencies and universities. Participants were recognized at an event on June 28, 2018.

Benefit

Providing an opportunity for interested stakeholders to participate in a program where their actions are recognized helps build awareness of the issue. Oftentimes organizations taking voluntary actions do not have a forum or outlet to report their activities and build awareness among their own stakeholders about how they are addressing climate change. For businesses, the Climate Champion program is an opportunity to show to employees and customers their commitment to the issue. Similarly, for government agencies the program is a way to demonstrate to citizens, “government taking action”. For educational institutions such as colleges and universities, participating in the program is a way to build awareness among the faculty and student body.

For all organizations that participate, having a voluntary program where participants are recognized creates a competitive atmosphere around a very notable cause where actions that are noteworthy are publicly recognized. This in turn results in a positive image for the participating organization. Having a voluntary program such as Climate Champions is a way for Maryland’s citizens to see the commitments of a variety of stakeholders across the State.

The GGRA of 2016 allows for voluntary actions to be creditable towards meeting the state’s goals. The Climate Champions program allows MDE to capture those voluntary actions that may be creditable, including recognizing those organizations implementing those actions. To satisfy the GGRA goals related to the economic benefits resulting from addressing climate change, the Climate Champions program is a way to capture and document those benefits.

Partners

MDE has engaged with government agencies, businesses and business associations, as well as universities and colleges. The State will continue to work with these organizations as well as additional stakeholders to refine and build on the Maryland Green Registry's Climate Champion Challenge. Identification of and engagement with new stakeholders to participate in the Climate Champion program is a goal.

Conclusion

MDE will continue to implement the Climate Champions program. With input from stakeholders, MDE will build upon previous efforts to ensure the Climate Champions program is transparent, implementable for participants and for MDE, the commitments by participants are meaningful and the recognition provided is notable.