

# Appendix D



**Maryland**  
Department of  
the Environment

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## **APPENDIX D**

# **Baltimore Moderate Nonattainment Area Reasonably Available Control Measures (RACM) Analysis for the 2015 Ozone National Ambient Air Quality Standards (NAAQS)**

**Prepared for:**

**U.S. Environmental Protection Agency**

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**Maryland Department of the Environment**



**Baltimore, MD Ozone Moderate Nonattainment Area**

**2015 Ozone NAAQS**

**RACM Analysis and List**

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# Executive Summary

The purpose of this document, entitled *Baltimore Moderate Nonattainment Area Reasonably Available Control Measures (RACM) Analysis for the 2015 Ozone National Ambient Air Quality Standards (NAAQS)*, is to review potential control strategies and evaluate whether the Baltimore nonattainment area will comply with the federal ozone standard as quickly as possible. Section 172(c)(1) of the Clean Air Act (“the Act”) requires a State Implementation Plan (SIP or “the Plan”) to contain Reasonably Available Control Measures (RACM) as necessary to provide for attainment as expeditiously as possible. In order for a state’s attainment demonstration to be approved by the Environmental Protection Agency (EPA), the state must address whether additional control measures exist that are reasonably available and that may advance the attainment date. This document presents a summary of analyses conducted to determine whether the SIP includes all reasonably available control measures.

The SIP is a detailed document required for states or regions that do not meet air quality standards set by the federal government. The Plan identifies how that State will attain and/or maintain the primary and secondary National Ambient Air Quality Standards (NAAQS) set forth in section 109 of the Act and 40 Code of Federal Regulations 50.4 through 50.12 and which includes federally-enforceable requirements.

In 2018, EPA designated the Baltimore metropolitan area as a “marginal” nonattainment area for the 0.70 ppm 8-hour ozone standard under Subpart 2 of part D, Title I (Effective Date August 3, 2018)<sup>1</sup>. In 2022, EPA finalized an action that reclassified the Baltimore metropolitan area to “moderate” for the 0.70 ppm 8-hour ozone standard.<sup>2</sup> To meet the federal 0.070 ppm 8-hour standard for ozone, nonattainment areas are required to develop their SIP documents to demonstrate attainment with the federal standard by August 2024<sup>3</sup>. However, the region is required to demonstrate attainment of the standard by the end of the last full ozone season prior to the listed attainment date.

The purpose of a RACM analysis is to evaluate if measures are available to advance the attainment date for the area. Because the area must demonstrate attainment by the end of the 2023 ozone season, in order for a measure to be considered RACM, the measures must be in place for the 2022 ozone season.

The Maryland Department of the Environment (MDE) collaborated with various stakeholders in the state and collected strategies from a wide array of sources in order to prepare this RACM analysis. Over 100 measures were individually evaluated against established RACM criteria.

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<sup>1</sup> 83 Fed Reg 25,776

<sup>2</sup> EPA-HQ-OAR-2021-0742

<sup>3</sup> Moderate nonattainment areas are required to meet the standard as quickly as possible, but no later than 6 years from the effective date of designation (i.e. August 3, 2024). [https://www.epa.gov/sites/default/files/2018-04/documents/placeholder\\_0.pdf](https://www.epa.gov/sites/default/files/2018-04/documents/placeholder_0.pdf)

Potential measures considered for RACM were divided up into stationary sources, area sources, and on-road mobile sources, and each measure was evaluated against the following criteria:

- Will advance the attainment date to the 2022 ozone season
- Enforceable
- Technically feasible
- Economically feasible
- Would not create substantial or widespread adverse impacts within the region
- Emissions from the source being controlled exceed a *de minimis* threshold, proposed as 0.1 tons per day

For stationary and area source control measures, a work group was formed within MDE's Air and Radiation Administration (ARA). A list of strategies that could be implemented to meet EPA's RACM criteria was developed and evaluated. For transportation control measures, a work group was formed with transportation representatives in the state from Maryland Department of Transportation (MDOT), Baltimore Regional Transportation Board (BRTB), and Baltimore Metropolitan Council (BMC), in addition to MDE ARA staff.

In the end, it was found that none of the measures could be considered RACM. The biggest constraint was time as none of the measures could be implemented expeditiously enough in order to advance the attainment date. Despite not meeting the criteria for RACM, many of these measures are worthwhile measures that reduce emissions. These measures will be considered potential control measures should the state need further emissions reductions in the future.

# Introduction

The purpose of this document, entitled *Baltimore Moderate Nonattainment Area Reasonably Available Control Measures (RACM) Analysis for the 2015 Ozone National Ambient Air Quality Standards (NAAQS)*, is to review potential control strategies and evaluate whether the Baltimore nonattainment area will comply with the federal ozone standard as quickly as possible. This analysis is designed to ensure that the Baltimore 8-hour Ozone Nonattainment Area is implementing all reasonably available control measures in order to demonstrate attainment with the 8-hour ozone standard on the earliest date possible. This document presents a summary of analyses conducted to determine whether the State Implementation Plan (SIP or “the Plan”) includes all reasonably available control measures.

## State Implementation Plans (SIP)

The SIP is a detailed document required for states or regions that do not meet air quality standards set by the federal government. The Plan identifies how that state will attain and/or maintain the primary and secondary NAAQS set forth in section 109 of the Act and 40 Code of Federal Regulations 50.4 through 50.12 and which includes federally-enforceable requirements. Each state is required to have a SIP that contains control measures and strategies that demonstrate how each area will attain and maintain the NAAQS. These plans are developed through a public process, formally adopted by the state, and submitted by the Governor's designee to the Environmental Protection Agency (EPA). The Clean Air Act (CAA or “the Act”) requires EPA to review each plan and any plan revisions and to approve the plan or plan revisions if consistent with the Act.

SIP requirements applicable to all areas are provided in section 110 of the Act. Part D of Title I of the Act specifies additional requirements applicable to nonattainment areas. Section 110 and part D describe the elements of a SIP and include, among other things, emission inventories, a monitoring network, an air quality analysis, modeling, attainment demonstrations, enforcement mechanisms, and regulations which have been adopted by the State to attain or maintain NAAQS. EPA has adopted regulatory requirements which spell out the procedures for preparing, adopting, and submitting SIPs and SIP revisions that are codified in 40 CFR part 51. EPA's action on each State's SIP is promulgated in 40 CFR part 52.

Once the Administrator of the EPA approves a state plan, the plan is enforceable as a state law and as federal law under Section 113 of the Act. If the SIP is found to be inadequate in EPA's judgment to attain the NAAQS in all or any region of the state, and if the state fails to make the requisite amendments, under Section 110(c)(1), the EPA Administrator may issue amendments to the SIP that are binding. EPA is required to impose severe sanctions on the states under three circumstances: the state's failure to submit a SIP revision; on the finding of the inadequacy of the SIP to meet prescribed air quality requirements; and the state's failure to enforce the control strategies that are contained in the SIP. Sanctions include withholding federal funds for highway projects other than those for safety, mass transit, or transportation improvement projects related to air quality improvement or maintenance beginning 24 months after EPA announcement. No federal agency or department will be able to award a grant or fund, license, or permit any transportation activity that does not conform to the most recently approved SIP.

In 2018, EPA designated the Baltimore metropolitan area as a “marginal” nonattainment area for the 0.70 ppm 8-hour ozone standard under Subpart 2 of part D, Title I.<sup>4</sup> In 2022, EPA finalized actions that reclassified the Baltimore metropolitan area to “moderate” for the 0.70 ppm 8-hour ozone standard.<sup>5</sup> The boundaries of the Baltimore nonattainment areas were defined when the area was initially designated as a marginal nonattainment area; EPA agreed with MDE’s recommendation to retain the nonattainment area boundaries set for the 2008 8-hour ozone standard.<sup>6</sup> The Baltimore nonattainment area includes the City of Baltimore, Anne Arundel, Baltimore, Carroll, Harford, and Howard counties. To meet the federal 0.070 ppm 8-hour standard for ozone, nonattainment areas are required to develop their SIP documents to demonstrate attainment with the federal standard by August 2024.<sup>7</sup> However, the region is required to demonstrate attainment of the standard by the end of the last full ozone season prior to the listed attainment date.

## Reasonably Available Control Measures (RACM) in the Clean Air Act

The Reasonably Available Control Measures (RACM) requirement is rooted in Section 172(c)(1) of the Clean Air Act (CAA or “the Act”), which directs states to “provide for implementation of all reasonably available control measures as expeditiously as practicable”. In 1992, EPA published general guidance (called the General Preamble) describing how it intended to implement the state implementation plan requirements of Title I of the CAA, including RACM analysis requirements.<sup>8</sup>

In the General Preamble, EPA explains that it interprets Section 172(c)(1) as a requirement that states incorporate in a SIP all reasonably available control measures that would advance a region’s attainment date. However, regions are obligated to adopt only those measures that are reasonably available for implementation in light of local circumstances. It was noted that its interpretation of the RACM requirement would not require the adoption of measures if they would not advance the attainment date or would cause adverse economic or other impacts. States should take into account “technological feasibility and the cost of control in the area to which the SIP applies” when evaluating measures.<sup>9</sup> Additionally, EPA indicated that it “...does not believe that Congress intended the RACM requirement to compel the adoption of measures that are absurd, unenforceable, or impracticable.”<sup>10</sup>

In its opinion on *Sierra Club v. EPA*, the U.S. Court of Appeals for the DC Circuit upheld EPA’s definition of RACM, including the consideration of economic and technological feasibility, ability to cause substantial widespread and long-term adverse impacts, collective ability of the

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<sup>4</sup> 83 Fed Reg 25,776

<sup>5</sup> EPA-HQ-OAR-2021-0742

<sup>6</sup> See Ozone Designations – 2015 Standards – Maryland State Recommendations and EPA Response.

<https://www.epa.gov/ozone-designations/ozone-designations-2015-standards-maryland-state-recommendations-and-epa-response>

<sup>7</sup> Moderate nonattainment areas are required to meet the standard as quickly as possible, but no later than 6 years from the effective date of designation (i.e., August 3, 2024). [https://www.epa.gov/sites/default/files/2018-04/documents/placeholder\\_0.pdf](https://www.epa.gov/sites/default/files/2018-04/documents/placeholder_0.pdf)

<sup>8</sup> 57 Fed. Reg. 13498

<sup>9</sup> 57 Fed. Reg. 13498

<sup>10</sup> 57 Fed. Reg. 13498



measures to advance a region's attainment date, and whether an intensive or costly effort will be required to implement the measures.<sup>11</sup>

## Methodology

Maryland Department of the Environment (MDE) collaborated with various stakeholders in the state and collected strategies from a wide array of sources in order to prepare this RACM analysis. Over 100 measures were individually evaluated against established RACM criteria described below.

The sources of strategies analyzed for the Baltimore region include the following:

- Clean Air Act Section 108(f) measures (Transportation Control Measures)
- Measures considered in previous RACM analyses for Baltimore, Washington DC, and Cecil County
- Measures considered in California, Utah, Oregon, New Jersey, Texas, Pennsylvania, Connecticut, Delaware, Indiana, and Massachusetts, as well as the Ozone Transport Committee

Potential measures considered for RACM were divided up into stationary sources, area sources, and on-road mobile sources. Stationary sources (also referred to as point sources) are primarily manufacturing businesses, such as power plants and chemical manufacturers. Area sources are smaller sources of air pollution whose emissions are too small to be measured individually, like commercial and consumer products (such as paints and hair spray), gasoline refueling stations, and autobody refinishing shops. On-road mobile sources include cars, vans, trucks, and buses.

## Criteria

Each control measure was evaluated against the following criteria:

- Will advance the attainment date to the ozone season of 2022
- Enforceable
- Technically feasible
- Economically feasible
- Would not create substantial or widespread adverse impacts within the region
- Emissions from the source being controlled exceed a *de minimis* threshold, proposed as 0.1 tons per day

A description of each criterion is included below:

### 1. *Implementation Date*

EPA has traditionally instructed regions to evaluate RACM measures on their ability to advance the region's attainment date. This means that implementation of a measure or a group of measures must enable the region to reduce ozone levels to the 70 ppb required to attain the

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<sup>11</sup> 294 F.3d 155 (D.C. Cir. 2002)

eight-hour ozone standard at least one year earlier than expected. As the Baltimore region currently expects to reduce ozone levels to 70 ppb during the 2023 ozone season, any RACM measures must enable the region to meet the 70 ppb standard by the 2022 ozone season.

## 2. *Enforceability*

When a control measure is added to a SIP, the measure becomes legally binding, as are any specific performance targets associated with the measure. If the state or local government does not have the authority necessary to implement or enforce a measure, the measure is not creditable in the SIP and therefore cannot be declared a RACM. A measure is considered enforceable when all state or local government agencies responsible for funding, implementation, and enforcement of the measure have committed in writing to its implementation and enforcement.

In addition to theoretical enforceability, a measure must also be practically enforceable. If a measure cannot practically be enforced because the sources are unidentifiable or cannot be located, or because it is otherwise impossible to ensure that the sources will implement the control measure, the measure cannot be declared a RACM. One exception is voluntary measures, such as those implemented under EPA's Voluntary Measures Guidance.

## 3. *Technological Feasibility*

All technology-based control measures must include technologies that have been verified by EPA. The region cannot take SIP credit for technologies that do not produce EPA-verified reductions.

## 4. *Economic Feasibility and Cost Effectiveness*

EPA guidance states that regions should consider both economic feasibility and cost of control when evaluating potential RACM measures. Therefore, the Baltimore region has specified a cost-effectiveness threshold for all possible RACM measures. Measures for which the cost of compliance exceeds this threshold will not be considered RACM.

A subset of RACM is the reasonably available control technology (RACT) requirements.<sup>12</sup> EPA states:

*EPA has defined RACT as the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility.*<sup>13</sup>

The region examined EPA guidance, as well as state/federal cost-effectiveness thresholds. EPA's Cross-State Air Pollution Rule (CSAPR), CSAPR Update, Revised CSAPR Update (RCU), and Proposed FIP for the 2015 Ozone NAAQS considers reasonable cost effectiveness thresholds between \$500-\$11,000 per ton of NO<sub>x</sub>; most recently EPA has settled on a cost of \$1,400-\$1,800 per ton.<sup>14</sup>

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<sup>12</sup> Connecticut's State Implementation Plan 8-Hour Ozone Attainment Demonstration (for the 1997 NAAQS), Chapter 6: Reasonably Available Control Measures (RACT) Analysis  
[https://portal.ct.gov/-/media/DEEP/air/regulations/proposed\\_and\\_reports/Section6pdf.pdf](https://portal.ct.gov/-/media/DEEP/air/regulations/proposed_and_reports/Section6pdf.pdf)

<sup>13</sup> 44 FR 53762; September 17, 1979

<sup>14</sup> 76 Fed Reg 48,250, 81 Fed Reg 74,508, 86 Fed Reg 23,058, 87 Fed Reg 20,091

The Baltimore region proposes a cost threshold of \$1,800 per ton.

#### *5. Substantial and Widespread Adverse Impacts*

Some candidate RACM measures have the potential to cause substantial and widespread adverse impacts to a particular social group or sector of the economy. Due to environmental justice concerns, measures that cause substantial or widespread adverse impacts will not be considered RACM.

#### *6. De Minimis Threshold*

In the General Preamble, EPA states that “if it can be shown that one or more measures are unreasonable because emissions from the sources affected are insignificant (i.e., de minimis), those measures may be excluded from further consideration as they would not represent RACM for that area”.<sup>15</sup>

The smallest major stationary source subject to RACT emits 25 TPY (tons per year), or approximately 0.1 TPD (tons per day)<sup>16</sup>. Following these requirements and the precedent set by the San Francisco RACM analysis<sup>17</sup>, the region will not consider control measures affecting source categories that produce less than 0.1 TPD NO<sub>x</sub> or VOC emissions.

#### *7. Advancing Achievement of 0.07ppm (70 ppb) Standard*

In order for measures to be collectively declared RACM, implementation of the measures must enable the region to demonstrate attainment of the 70 ppb ozone standard one full ozone season earlier than currently expected. As discussed in the SIP document and the relevant appendices, the Baltimore region currently expects to demonstrate attainment in 2023. Therefore, any RACM measures would need to enable the region to meet the 70 ppb standard by the 2022 ozone season.

#### *8. Intensive and Costly Effort*

EPA has stated in the General Preamble that the RACM evaluation should “consider the impact of the reasonableness of the measures on the municipal or other governmental entity that must bear the responsibility for their implementation”.<sup>18</sup> When considered together, the implementation requirements of any RACM measures cannot be so great as to preclude effective implementation and administration given the budget and staff resources available to the Baltimore region.

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<sup>15</sup> 57 Fed. Reg. 13498

<sup>16</sup> 57 Fed. Reg. 13498

<sup>17</sup> SAN FRANCISCO BAY AREA OZONE ATTAINMENT PLAN FOR THE 1-HOUR NATIONAL OZONE STANDARD (OCTOBER 24, 2001), APPENDIX C: REASONABLY AVAILABLE CONTROL MEASURE ANALYSIS

[https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2001-ozone-attainment-plan/oap\\_2001.pdf](https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2001-ozone-attainment-plan/oap_2001.pdf)

<sup>18</sup> 57 FR 13498

## Process

For stationary and area source control measures, MDE's Air and Radiation Administration (ARA) formed a list of strategies that could be implemented to meet EPA's RACM criteria. Beginning in April 2022, research was done on other states, cities, counties, and multi-state organizations to gather a variety of different measures that could be used for the State of Maryland. A list of the most relevant measures was compiled and then analyzed by ARA which involved comparing and contrasting older RACM analyses, reviewing the conducted research, and working as a group to implement or remove strategies that were not needed. A list of 18 stationary and area source control measures were finalized and evaluated against the established criteria in June 2022.

For transportation control measures, a work group was formed with transportation representatives in the state from Maryland Department of Transportation (MDOT), Baltimore Regional Transportation Board (BRTB), and Baltimore Metropolitan Council (BMC). From April to July of 2022, a series of calls were conducted amongst the representatives to develop and evaluate control measures. A list of strategies was compiled from the Clean Air Act Section 108(f) and previous RACM analyses for Baltimore, Washington DC, and Cecil County. Redundant, repetitive, and outdated strategies were then removed from the list by the group, resulting in 92 measures that were evaluated against the aforementioned criteria. Throughout the entire process, updates were given regularly to the Interagency Consultation Group (ICG) at BMC. More information, such as the meeting minutes, can be found on BMC's website.

## Conclusion

In the end, it was found that none of the measures could be considered RACM. Table D-1 below contains all the control measures and accompanying evaluations, along with an explanation of why each measure failed to meet the RACM requirements. The biggest constraint was time as none of the measures could be implemented expeditiously enough in order to advance the attainment date. Despite not meeting the criteria for RACM, many of these measures are worthwhile measures that reduce emissions. These measures will be considered potential control measures should the state need further emissions reductions in the future.

Table Appendix D-1: RACM Analysis List

List #	Measure	Description	Advance Attainment Date?	Enforceable?	Technologically Feasible?	Economically Feasible?	No Adverse Impacts?	Reductions >0.1 tons per day?	RACM: Yes / No?	RACM: Explanation
Stationary Sources										
S	1	OTC Model Rule: EGUs - Oil and Gas Boilers	Update NOx Emission Rate Limits for Oil, Oil/Gas, and Gas Boilers	No	Yes	Yes	Yes	Yes	No	Will not advance attainment date
S	2	OTC Model Rule: Municipal Waste Combustor	Amend and update NOx RACT for Municipal Waste Combustors	No	Yes	Yes	Yes	Yes	No	Will not advance attainment date
S	3	OTC Model Rule: Natural Gas Pipeline Compressors	Require Natural Gas Pipeline Compressors to Reduce NOx Emission Limits	No	Yes	Yes	Yes	No	No	Will not advance attainment date
S	4	Combustion Turbine EGUs NOx RACT - Oil and Gas	Require More Stringent Emission Limits/Restrictions for Combustion Turbines	No	Yes	Yes	Undetermined	No	No	Will not advance attainment date
S	5	Non-Emergency Engine EGUs NOx RACT - Oil and Gas	Require More Stringent Emission Limits/Restrictions for Engines	No	Yes	Yes	Undetermined	No	No	Will not advance attainment date

List #	Measure	Description	Advance Attainment Date?	Enforceable?	Technically Feasible?	Economically Feasible?	No Adverse Impacts?	Reductions >0.1 tons per day?	RACM: Yes / No?	RACM: Explanation	
S	6	Portland Cement Facilities NOx reductions	Reduce NOx Emissions Through the use of Alternative Fuel at Portland Cement Facilities	No	Yes	Yes	Yes	No	Undetermined	No	Will not advance attainment date
Area Sources											
A	1	Low Emission Asphalt Paving	Reduce VOC Emissions from Cutback and Emulsified Asphalt and Restrict the use of Asphalt Paving during Ozone Season in Order to Reduce VOC Emissions	No	Yes	Yes	Yes	Yes	Yes	No	Will not advance attainment date.
A	2	Open Burning	Expand prohibitions on open burning	No	Yes	Yes	Undetermined	No	Undetermined	No	Will not advance attainment date. Limited NOx reductions. Mainly PM and Toxics reductions
A	3	Gas Flare emission limits for Landfills and Wastewater Facilities	Reduce the NOx and VOC emissions limits for flares	No	Yes	Yes	No	Yes	No	No	Will not advance attainment date. De minimis

List #		Measure	Description	Advance Attainment Date?	Enforceable?	Technically Feasible?	Economically Feasible?	No Adverse Impacts?	Reductions >0.1 tons per day?	RACM: Yes/No?	RACM: Explanation
A	4	VOC Emission Control at Wastewater Treatment Facilities	Require Capture and Control of VOC Emissions from Facilities Treating Industrial Wastewater and Domestic Sewage. Adopt SCAQMD Rule 1176: Sumps and Wastewater Separators	No	Yes	Yes	No	No	No	No	Will not advance attainment date. De minimis.
A	5	Low-Emission Natural Gas Water Heaters	Adopt SCAQMD Rule 1121: Control of NOx from Residential Type Natural Gas Fired Water Heaters	No	Yes	Yes	Yes	No	Yes	No	Will not advance attainment date. Potential adverse impacts and de minimis.
A	6	Low-Emission Natural Gas Furnaces	Adopt SCAQMD Rule 1111: NOx Emissions from Natural Gas Fired, Fan-Type Central Furnaces (no more than 40 nanograms of NOx per joule of useful heat)	No	Yes	Yes	Yes	Yes	Yes	No	Will not advance attainment date.
A	7	OTC Model Rule: Consumer Products Phase V	Expand the Number of Products Covered by the OTC Consumer Product Rule. Require Lower VOC Content in Products Already Covered	No	Yes	Yes	Yes	Yes	Yes	No	Will not advance attainment date.
A	8	OTC Model Rule: Solvent Degreasing Phase II	Adopt OTC Solvent Degreasing Rule Phase II	No	Yes	Yes	Yes	Yes	Yes	No	Will not advance attainment date.

List #	Measure	Description	Advance Attainment Date?	Enforceable?	Technically Feasible?	Economically Feasible?	No Adverse Impacts?	Reductions >0.1 tons per day?	RACM: Yes / No?	RACM: Explanation	
A	9	OTC Model Rule: Industrial, Commercial, and Institutional Boilers	Update Rules on Standards for Industrial, Commercial, and Institutional Boilers	No	Yes	Yes	Yes	No	Yes	No	Will not advance attainment date.
A	10	OTC Model Rule: New, Small Natural Gas Boilers	Adopt Rules on Standards for Small, New Natural Gas Boilers	No	Yes	Yes	Yes	No	Yes	No	Will not advance attainment date.
A	11	Low Permeation Fuel Hoses	Adopt a Rule Requiring all GDFs to Replace Fuel Hoses with Low Permeation Fuel Hoses	No	Yes	Yes	Yes	Yes	Yes	No	Will not advance attainment date.
A	12	Dripless Gasoline Nozzles	Adopt a Rule Requiring all GDFs to Install Dripless Gasoline Nozzles to Minimize Fuel Spillage and Release of VOCs	No	Yes	Yes	Yes	Yes	Yes	No	Will not advance attainment date.
Mobile Sources											
M	1	Anti Tampering - Expanded Enforcement	Expanded enforcement of anti tampering laws regarding air pollution controls, as well as operating and distributing vehicles with tampered controls	No	Yes	Yes	-	-	No	No	Will not advance attainment date. Enforcement is resource limited.



List #	Measure	Description	Advance Attainment Date?	Enforceable?	Technically Feasible?	Economically Feasible?	No Adverse Impacts?	Reductions >0.1 tons per day?	RACM: Yes / No?	RACM: Explanation	
M	2	Improve truck fleet efficiency	Increase Encouragement Adoption of Technologies that Increase Truck Fleet Efficiency.	No	No	Yes	-	-	No	No	Will not advance attainment date. Not enforceable.
M	3	Auxiliary Power Units (APU)	Increase Market Penetration of APUs to Reduce Truck Idling.	No	No	Yes	-	-	Potentially	No	Will not advance attainment date. Not enforceable.
M	4	Bus and Truck Idling Reduction - Enhanced Enforcement	Improve enforcement of existing regulations to prevent extended bus and truck idling.	No	Yes	Yes	No	No	Potentially	No	Will not advance attainment date.
M	5	Voluntary NOx Diesel Retrofits	Implement voluntary diesel retrofit programs targeted at reducing NOx emissions. Target a variety of fleets and vehicle types, including local vehicles, school buses, transit buses, state vehicles, commercial vehicles	No	No	Yes	Yes	Yes	-	No	Will not advance attainment date. Not enforceable. Included with VW Settlement Program.
M	6	Biodiesel fuel	Expand use of biodiesel fuel for on-road vehicles.	No	No	Yes	Yes	-	No	No	Will not advance attainment date.
M	7	Remove Trash Trucks From Area Streets	Reduce use of trash trucks through transport of trash by barge.	No	No	-	-	-	-	No	Will not advance attainment date.

List #	Measure	Description	Advance Attainment Date?	Enforceable?	Technologically Feasible?	Economically Feasible?	No Adverse Impacts?	Reductions >0.1 tons per day?	RACM: Yes / No?	RACM: Explanation
M 8	Control VOC Content of Automotive Products	Windshield Wiper Fluid – lower VOC. Establish evaporative standards that are lower than those set by the EPA – 35 weight percent VOC.	No	No	No	No	–	No	No	Will not advance attainment date.
M 9	Accelerated phase-out of diesel buses	Replace with cleaner fuels such as natural gas	No	No	Yes	No	–	Yes	No	Will not advance attainment date.
M 10	Increase Private fleets hybrid, EV, and ILEV composition	Require fleets operating in the Baltimore nonattainment area to be comprised of a percentage of hybrid vehicles, Evs, and Inherently Low Emission Vehicles (ILEV)	No	No	Yes	No	No	–	No	Will not advance attainment date. Not economically feasible.
M 11	Rebate for Hybrid and Electric Vehicle Purchase	Increase issued rebates for purchase and registration of hybrid vehicles and Evs	No	No	Yes	–	Yes	–	No	Will not advance attainment date. Not enforceable.
M 12	Low-emission Vehicle Purchase Program	Accelerate voluntary adoption of EV, hybrid, and CNG buses, state vehicles, local vehicles, rental cars, taxicabs, rideshare vehicles, heavy trucks, airport shuttles, and private vehicles	No	No	Yes	–	Yes	–	No	Will not advance attainment date. Not enforceable.

List #	Measure	Description	Advance Attainment Date?	Enforceable?	Technologically Feasible?	Economically Feasible?	No Adverse Impacts?	Reductions >0.1 tons per day?	RACM: Yes / No?	RACM: Explanation	
M	13	Control Bus Emissions	Provide electrified parking spaces or APUs for tour buses.	No	No	Yes	Yes	No	No	No	Will not advance attainment date.
M	14	Discounted pre-paid transit fare instruments	Improve and promote method for employers to provide transportation vouchers (i.e., for alternatives to SOV), including expanding Commuter Choice Maryland to all public sector employees	No	No	Yes	–	Yes	–	No	Will not advance attainment date. No creditable emission reductions.
M	15	Free Transit Passes to Students	Free transit passes for high school and college students, subsidized by schools or through student registration fee.	No	No	Yes	–	Yes	–	No	Will not advance attainment date. No creditable emission reductions.
M	16	MTA College Pass Program	Expand Baltimore college bus fare program. Program allows students to receive reduced fares near 19 participating schools in the region.	No	No	Yes	–	Yes	–	No	Will not advance attainment date. No creditable emission reductions.
M	17	Discount Multi-Trip Bus Fares	Improve discount programs reducing cost of multiple bus rides through purchase of pass books.	No	No	Yes	–	Yes	–	No	Will not advance attainment date. No creditable emission reductions.

List #	Measure	Description	Advance Attainment Date?	Enforceable?	Technically Feasible?	Economically Feasible?	No Adverse Impacts?	Reductions >0.1 tons per day?	RACM: Yes/No?	RACM: Explanation
M 18	Flat Fare For All Transit Trips	Single price all public transit services with free transfers all day, 7 days per week.	No	No	Yes	-	Yes	-	No	Will not advance attainment date. No creditable emission reductions.
M 19	Half Price Fares on Feeder Bus Service	All metro bus and local bus services to Metro subway and commuter rail stations reduce fares by half.	No	No	Yes	-	Yes	-	No	Will not advance attainment date. No creditable emission reductions.
M 20	Free Bus Service Off-peak	Institute free off-peak bus service from 10-2 on weekdays and all day on weekends.	No	No	Yes	-	Yes	-	No	Will not advance attainment date. No creditable emission reductions.
M 21	Employer Metro Shuttle Bus Services	Provide incentives for businesses to provide employee shuttle service to the nearest rail or transit stop.	No	No	Yes	-	Yes	-	No	Will not advance attainment date. No creditable emission reductions.
M 22	Clean Commute/Try Transit Week	Promotes use of alternative transportation, including transit, by daily commuters for one week per year.	No	No	Yes	-	Yes	-	No	Will not advance attainment date. No creditable emission reductions.

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M 23	Additional Transit Stores	Establish additional stationary transit stores in the region.	No	No	Yes	-	-	-	No	Will not advance attainment date. No creditable emission reductions.
M 24	New surface parking at transit centers	Add new parking spaces at transit center parking lots.	No	No	Yes	-	-	-	No	Will not advance attainment date. No creditable emission reductions.
M 25	Provide Additional Transit Access and Service to Core	Increase funding for enhancing access to transit services and to expand core service.	No	No	-	-	Yes	-	No	Will not advance attainment date. Not enforceable.
M 26	Manage Roadway Dedicated Bus Lanes	Dedicate additional roadway lanes for use by buses.	No	Yes	-	-	-	No	No	Will not advance attainment date.
M 27	Transit Prioritization - Queue Jumps	Provide and improve queue jumps for buses at over-capacity signalized intersections throughout the region.	No	Yes	Yes	-	-	No	No	Will not advance attainment date.
M 28	Support Rail to Dulles and BWI Airports	Provide funding to expand metro rail services to Dulles and BWI airports.	No	No	-	No	-	-	No	Will not advance attainment date.

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M 29	Increase Commuter Rail Frequency	Increase frequency of MARC service to every 15 minutes on Penn and Camden lines and every 10 min on the Brunswick line.	No	No	-	-	-	-	No	Will not advance attainment date.
M 30	New MARC Coaches	Purchase additional coaches for MARC to accommodate increased ridership.	No	No	-	-	-	No	No	Will not advance attainment date.
M 31	Expand MARC Train Service	Expand MARC train service to include additional departures.	No	No	-	-	-	-	No	Will not advance attainment date.
M 32	Express Reverse Commuter Buses	Implement reverse commute express buses from Baltimore to major outlying work centers.	No	No	-	-	-	No	No	Will not advance attainment date.
M 33	Express Buses From Outlying Areas	Implement direct bus service from outlying Park & Ride lots and far suburbs to major work centers.	No	No	Yes	-	Yes	No	No	Will not advance attainment date. No creditable emission reductions.
M 34	Shorter Distance from Buildings to Bus Stops	For existing buildings, reroute traffic to allow buses to come closer to the building. For new buildings, alter setback requirements to allow closer bus access.	No	No	-	-	-	No	No	Will not advance attainment date. No creditable emission reductions.

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M 35	Commuter Choice Tax Credit	Employers subsidize employees' monthly transit or vanpool costs and receive a tax credit for incurred expenses.	No	No	Yes	–	Yes	No	No	Will not advance attainment date. No creditable emission reductions.
M 36	EV and Alternative Fuel financial incentives	Expand incentives to purchase Evs and vehicles	No	No	Yes	–	Yes	No	No	Will not advance attainment date. No creditable emission reductions.
M 37	Rebate for Purchase of Electric Vehicles	Expand rebates for purchase and registration of electric vehicles.	No	Yes	Yes	–	Yes	No	No	Will not advance attainment date.
M 38	Gas Tax Increase	Implement a fuel tax on onroad gasoline and diesel fuel.	No	Yes	Yes	No	No	–	No	Will not advance attainment date. Not economically feasible.
M 39	Free Parking for Carpools/Vanpools	Provide free reserved parking spaces for all carpools or vanpools.	No	No	Yes	–	–	No	No	Will not advance attainment date. No creditable emission reductions.
M 40	Episodic Parking Fee Increases	Increase fees for parking garages and meter during episodes.	No	Yes	in some cases	–	No	No	No	Will not advance attainment date.

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M 41	Employer Parking CashOut: Mandatory	Implement program requiring employers to provide the value of subsidized parking to employees who use alternative commute strategies.	No	No	Yes	No	–	–	No	Will not advance attainment date. Not economically feasible.
M 42	Employer Parking CashOut: Voluntary	Implement voluntary program encouraging employers to provide the value of subsidized parking to employees who use alternative commute strategies.	No	No	Yes	Yes	Yes	No	No	Will not advance attainment date.
M 43	Tax Parking Spaces Above Code Minimum	Discourage developers from providing parking in excess of code minimum by imposing a graduated tax on excess spaces.	No	No	Yes	No	No	No	No	Will not advance attainment date. Not economically feasible.
M 44	Establish Clean Air Fund	Sell Clean Air License Plates to fund air quality programs (similar to “Save the Bay” tags).	No	No	Yes	–	Yes	No	No	Will not advance attainment date.
M 45	Vanpool Insurance	Establish a special risk pool to underwrite the cost of vanpool insurance.	No	No	Yes	–	–	No	No	Will not advance attainment date.
M 46	Pay-as-you-drive auto insurance (\$/gal)	Offer auto insurance rates linked to number of gallons of fuel consumed by vehicle.	No	No	Yes	–	–	No	No	Will not advance attainment date.



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M 47	Congestion Pricing on Low Occupancy Vehicles	Impose a fee on vehicles containing two or fewer persons that use designated roadways, tunnels, and bridges during the peak AM periods.	No	No	Yes	No	No	Yes	No	Will not advance attainment date. Not economically feasible.
M 48	Smart Growth and Infill Development Programs	Encourage development/redevelopment of land in designated growth areas, encouraging local governments to place greater emphasis on land development near transit stations.	No	No	Yes	No	_	Possibly	No	Will not advance attainment date.
M 49	Incentives for Mixed Use at Transit Centers	Include incentives for additional mixed-use development at transit centers to reduce sprawl and VMT.	No	No	Yes	No	_	Possibly	No	Will not advance attainment date.
M 50	Convenience Commercial Centers in Residential Areas	Change zoning ordinances to allow neighborhoods serving retail establishments in residential areas.	No	No	Yes	_	_	No	No	Will not advance attainment date.
M 51	Restrict Construction of New Parking	Restrict construction of new parking at employment centers based on distance from transit and urban core.	No	No	Yes	No	No	No	No	Will not advance attainment date.

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M 52	Build additional P & R lots near selected major highway intersections and along HOV facilities		No	No	Yes	-	-	No	No	Will not advance attainment date.
M 53	Control Growth and Development	Continue to encourage mixed-use development.	No	No	-	-	-	Not in the short term.	No	Will not advance attainment date.
M 54	Safe Routes to School Program	Implement a safe pedestrian and bicycle routes to school program to reduce VMT.	No	No	Yes	-	Yes	No	No	Will not advance attainment date.
M 55	Bike Lockers at Metro Stations, Park & Ride Lots, Other Locations	Expand existing bike lockers at Metrorail stations, install bicycle storage spaces in parking lots.	No	No	Yes	Yes	Yes	No	No	Will not advance attainment date.
M 56	Bicycle Racks in Baltimore	Install bicycle racks at various locations throughout the region.	No	No	Yes	Yes	Yes	No	No	Will not advance attainment date.
M 57	Bike Racks on Transit Buses	Expand provision of external bike racks on Baltimore Link and other local transit buses.	No	No	Yes	Yes	Yes	No	No	Will not advance attainment date.

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M 58	Improvements to Bicycle and Pedestrian Access	Provide incentives to developments that speed improvements to bicycle/pedestrian access. This includes improvements to sidewalks, curb ramps, crosswalks, lighting, etc.	No	No	Yes	Yes	Yes	No	No	Will not advance attainment date.
M 59	Bike/Pedestrian Paths	Fund construction of additional bicycle/pedestrian paths in the region.	No	No	Yes	Yes	Yes	No	No	Will not advance attainment date.
M 60	Employers Provide Free Bicycles for Midday Use	Require employers to provide one bicycle per 50 employees for mid-day business or personal use.	No	No	Yes	–	–	No	No	Will not advance attainment date.
M 61	Commuter Operations Center	Expand commuter assistance services, including carpool and vanpool ridematching, as well as transit, park & ride, and telecenter information	No	No	Yes	–	Yes	No	No	Will not advance attainment date.
M 62	Free Parking for Carpools and Vanpools	Provide free reserved parking spaces for all carpools or vanpools.	No	No	Yes	–	–	No	No	Will not advance attainment date.
M 63	Vehicle Share Programs: Transit Stations	Develop a transit station car/low emission vehicle share program.	No	No	Yes	–	Yes	No	No	Will not advance attainment date.

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M 64	Vehicle Share Programs: Neighborhoods	Implement a neighborhood electric vehicle share program.	No	No	Yes	–	Yes	No	No	Will not advance attainment date.
M 65	Vanpool Programs	Expand programs and incentives designed to increase the number of vanpools in the region.	No	No	Yes	Yes	Yes	No	No	Will not advance attainment date.
M 66	Car Sharing Program	Fund incentives for new car sharing customers (i.e., Flexcar or Zipcar services)	No	No	Yes	Yes	Yes	No	No	Will not advance attainment date.
M 67	Student & staff based college & university rideshare programs	Create rideshare program focused on students and staff at regional universities.	No	No	Yes	Yes	Yes	No	No	Will not advance attainment date.
M 68	Traffic Signal Optimization	Improve optimization of traffic signals to reduce idling and low-speed emissions.	No	No	Yes	–	Yes	No	No	Will not advance attainment date.
M 69	Extend Ramp Metering	Install signals to control flow of vehicles at selected freeway ramp entrances to maintain level of service.	No	No	Yes	–	Yes	No	No	Will not advance attainment date.
M 70	Replace Traffic Signals with Lesser Controls	Install roundabouts in place of signals at low volume intersections.	No	No	Yes	–	–	No	No	Will not advance attainment date.

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M 71	Signals to Flashing Yellow 12am-5am	From midnight until 5am, set intersection signals to flashing yellow in predominant direction and flashing red in minor direction for all low volume intersections where safety permits.	No	No	Yes	-	-	No	No	Will not advance attainment date.
M 72	Implement HOV Network in the Freeway System		No	No	Yes	-	No	No	No	Will not advance attainment date.
M 73	Rush Hour Shift	Shift Metro Subway AM and PM rush hours to start 30 min earlier and end 30 min later.	No	No	No	-	-	No	No	Will not advance attainment date.
M 74	Value Pricing (HOT lanes)	Implement value pricing strategies on busy freeways during rush hour.	No	No	Yes	-	No	No	No	Will not advance attainment date.
M 75	Enhanced Enforcement: On-road Idling	Increase enforcement of regional idling restrictions for on-road vehicles.	No	Yes	No	-	-	No	No	Will not advance attainment date.
M 76	Control Vehicle Idling	No Idling Rule – Restriction. Limits idling to 5 minutes for all non-commercial, consumer operated vehicles within the Baltimore NAA. Establish exemptions where required.	No	No	Yes	-	No	No	No	Will not advance attainment date.

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M 77	Enhanced Enforcement: Speed Limits	Increase speed limit enforcement so that more vehicles are traveling at or below the posted limit, including increased automated enforcement	No	Yes	Yes	No	-	No	No	Will not advance attainment date.
M 78	Control Vehicle Speeds: Lower Limits	Speed Limit Restriction: Regional speed limit of 55 mph on all roads which previously had posted speeds of greater than 55 mph, including for heavy duty vehicles	No	No	Yes	-	-	No	No	Will not advance attainment date.
M 79	Mandatory Employee Commute Reduction	Mandatory employer trip reduction to reduce employee vehicle trips.	No	No	Yes	No	No	-	No	Will not advance attainment date. Not economically feasible.
M 80	Manage Roadway Usage: No Drive Days	Odd/Even License Plate no Drive Days. Prohibit drivers from traveling during certain periods, based on vehicle tags or other easily identifiable criteria. Can be a permanent or episodic control.	No	No	Yes	No	No	-	No	Will not advance attainment date. Not economically feasible.
M 81	Restrict Parking at Schools	Restrict high school students from driving to and parking at high schools when bus service is available.	No	Yes	-	-	No	-	No	Will not advance attainment date. Potential adverse impacts.

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M	82	Eliminate or Restrict Airport Parking	Eliminate airport parking and replace with alternative fuel shuttle buses.	No	Yes	–	–	No	–	No	Will not advance attainment date. Potential adverse impacts.
M	83	Establish Restricted Zones in Downtown Areas and Transit Centers	Restrict private vehicle use in certain areas during business hours, encouraging pedestrian, bicycle, and transit use.	No	–	–	–	No	No	No	Will not advance the attainment date.
M	84	Green Curb Initiative	Restricted Access/ “Green Curb”. Differential fees and access permits applied during periods of high congestion. Target delivery/loading zones and carpool/vanpool pickup areas.	No	No	Yes	–	–	No	No	Will not advance attainment date. No creditable emission reductions.
M	85	Clean Air Partners: Air Quality Action Days	Expand encouragement of a variety of actions on Air Quality Action Days to reduce emissions and improve air quality (free transit, telework, carpool).	No	No	Yes	–	–	–	No	Will not advance attainment date. Not enforceable.
M	86	Government Actions (air quality action day similar to snow day)	Implement a liberal leave policy for local, state and federal employees on Air Quality Action Days, permitting employees to work from home or take unscheduled leave.	No	No	Yes	–	–	–	No	Will not advance attainment date. Not enforceable.

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M 87	4 Day Work Week / Flexible Work Schedules	Encourage employers to adopt a shorter work week, with employees working 4 10-hour days.	No	No	Yes	Yes	Yes	No	No	Will not advance attainment date. Will not reduce emissions greater than 0.1 tpd Nox.
M 88	Clean Air Partners: Public Outreach and Education	Enhance Strategic Communication Campaigns to Increase Public Awareness (reduce vehicle use).	No	No	Yes	-	Yes	-	No	Will not advance attainment date. No creditable emission reductions.
M 89	School course on transportation-related air quality	Enhance dissemination of Clean Air Partners school course material on air pollution from motor vehicles	No	No	Yes	-	Yes	No	No	Will not advance attainment date. No creditable emission reductions.
M 90	Increase Intermodal Transport	Increase use of intermodal options for transporting goods.	No	No	-	-	-	-	No	Will not advance attainment date.
M 91	"Cash for Clunkers" Early Bus Engine Replacement	Replaces high-polluting diesel engines in Baltimore buses with new diesel engines.	No	No	Yes	No	Yes	-	No	Will not advance attainment date. Not economically feasible.
M 92	"Cash for Clunkers" Taxicab Replacement - Conventional Vehicles	Replace taxicabs with new "conventional" LDGVs.	No	No	Yes	No	-	-	No	Will not advance attainment date. Not economically feasible.



