

# **Maryland Volkswagen Draft Mitigation Plan**

**Prepared by the  
Maryland Department of the Environment  
in consultation with the  
Maryland Energy Administration and  
the Maryland Department of Transportation**

**August 1, 2018**

# **Executive Summary**

## **Background**

In September 2015, the United States Environmental Protection Agency (EPA) and California Air Resources Board (CARB) notified Volkswagen AG of violations of the Clean Air Act, alleging that Volkswagen diesel vehicles sold between 2009 and 2016 were equipped with defeat devices that allowed these vehicles to emit multiple times more nitrogen oxide (NOx) emissions than were legally allowed. The Partial Consent Decree (hereinafter referred to as the Settlement Agreement) that settled this violation created an Environmental Mitigation Trust fund of \$2.7 billion to remediate the excess NOx emissions from the affected vehicles. Maryland, as a beneficiary to the settlement, is eligible to receive approximately \$75.7 million to use on specific projects to reduce diesel emissions from the transportation sector. Maryland has up to ten years to spend these funds. A complete list of eligible projects and matching fund requirements is outlined in Appendix D-2 of the Settlement.

On August 1, 2018, Maryland released this draft “Volkswagen Mitigation Plan” (hereinafter referred to as the Draft Plan) and is requesting public comment through August 31, 2018. Maryland will also hold regional public meetings on the draft plan. Additional information on the public comment process may be found on the Maryland Department of the Environment’s web site at:

<http://mde.maryland.gov/programs/Air/MobileSources/Pages/MarylandVolkswagenMitigationPlan.aspx>

This process is consistent with the public comment provisions of the Settlement Agreement.

## **Environmental Benefits**

This Draft Plan focuses on reducing NOx emissions which is in keeping with the settlement agreement. By implementing the measures in this Draft Plan, Maryland will also experience significant co-benefits such as reductions in diesel particulates, reductions in greenhouse gases, and reductions in pollution from volatile organic compounds.

Therefore the Draft Plan will allow Maryland to make meaningful additional progress on some of the State’s most critical environmental challenges including:

- Meeting and maintaining air quality standards for ground level ozone (or smog) and fine particle air pollution
- Cleaning up the Chesapeake Bay (air deposition)
- Meeting the State’s greenhouse gas emissions reduction goals
- Reducing air pollution risks in some of Maryland’s most affected communities
- Improving visibility under the regional haze program
- Moving the state toward greater electrification of the transportation sector which will continue progress on all of the issues identified above

## The Draft Plan

The Maryland Department of the Environment (MDE) partnered with the Maryland Department of Transportation (MDOT) and the Maryland Energy Administration (MEA) to develop this Draft Plan. Once the public comment period is over and Maryland finalizes the Draft Plan, it must be submitted to the Trustee overseeing the mitigation funds. No projects can be submitted to the Trustee for funding until the Draft Plan is approved. On March 15, 2017 the court appointed Wilmington Trust, N.A. to serve as the Trustee.

The Draft Plan maximizes the environmental benefits described above through a primary goal of achieving the most NOx emissions reductions possible. This is done by targeting high emitting sectors that are projected to grow through the next decade or longer. It includes a balanced approach with projects in the following areas:

- Electric vehicle infrastructure and vehicle electrification
- Clean diesel initiatives
- Clean fuel and emerging technology initiatives
- Public sector projects
- Private sector projects
- Community-based efforts

These projects fall into the following categories:

**Electric Vehicle Charging Infrastructure (15%):** The Trust Fund guidelines allow a maximum of 15% of the funds to be used for electric vehicle charging infrastructure. Maryland intends to utilize the full 15% (approximately \$11.3 million) for installing a mix of charging and fast charging stations. This part of the Draft Plan will be coordinated with other existing electric vehicle infrastructure initiatives to maximize the benefits of our investment. Installing charging stations across the State will help facilitate the growth of the electric vehicle market in Maryland and assist in meeting environmental goals in the transportation sector.

**Private Businesses and Federal Government (37.7%):** A portion of the funds available will be allocated for private business and federal government projects. Maryland will open a competitive process for project submissions for entities interested in using Trust Funds to replace vehicles and equipment they own.

**Local Governments and Communities and Environmental Justice (15.8%):** Local governments and communities will be given a chance to submit project ideas for funding. Funding will be awarded on a competitive basis based on the primary goals of this spending plan. Proposals from highly affected communities (communities with heightened levels of ground-level ozone) will be weighted. A portion of the funds will be set aside specifically for transit bus and school bus replacements.

**State Agency Projects (30.2%):** MDOT has identified a number of potential projects within their Transportation Business Units that would help the state continue to demonstrate leadership in pollution reduction. The Maryland Transit Administration (MDOT MTA), the Maryland Port Administration (MDOT MPA), the Maryland Aviation Administration (MDOT MAA) as well as the State Highway Administration (MDOT SHA) have each proposed vehicle-specific projects.

**Administrative Costs (1.3%):** The Draft Plan sets aside \$1 million of the Trust Funds for administrative costs associated with overseeing and managing the Draft Plan.

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## **I. Background**

On September 18, 2015, the United States Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) issued a Notice of Violation of the Clean Air Act to Volkswagen AG (VW), Audi AG, and Volkswagen Group of America, Inc. (collectively “VW”) alleging that model year 2009-2015 Volkswagen and Audi diesel cars equipped with 2.0 liter engines included software that circumvented EPA and CARB emissions standards for nitrogen oxides (NOx). This software is considered a “defeat device” as defined by the Clean Air Act. Approximately 500,000 vehicles in the United States had “defeat devices” installed including approximately 16,000 that were delivered to Maryland.

On October 25, 2016, the Court approved a Partial Consent Decree (Settlement Agreement) between the United States Department of Justice and VW regarding excess emissions of NOx due to the installation of “defeat devices”. The use of “defeat devices” has increased vehicle emissions of NOx, resulting in adverse effects on air quality. NOx emissions contribute to the formation of ground-level ozone.

The Partial Consent Decree established an Environmental Mitigation Trust of \$2.925 billion (VW Trust or the Trust) to fully remediate the excess NOx emissions from the affected vehicles. The State of Maryland is eligible to receive approximately \$75.7 million. This includes \$71 million from the VW Trust for 2.0 liter vehicles and an additional settlement of \$4.7 million for affected 3.0 liter vehicles. The Trust allocates funding to state, territorial, and tribal government beneficiaries to use for eligible mitigation projects. This Draft Plan will guide the use of these funds over the Trust’s 10-year lifetime and will be continually updated.

## **II. Beneficiary's Goal**

The Maryland Department of the Environment (MDE) has developed this Draft Plan in coordination with the Maryland Energy Administration (MEA) and the Maryland Department of Transportation (MDOT) on behalf of the State of Maryland. The primary goal of the Draft Plan is to maximize NOx emissions reductions through the strategic use of the mitigation funds by targeting high emitting sectors that are projected to grow through the next decade or longer. This will allow Maryland to realize benefits for many years after the funding source has been depleted.

Another goal will be to prioritize highly affected communities (areas of the State that historically and currently experience high levels of ground level ozone). Working to improve the environment for highly affected communities will further the state's efforts to address environmental justice issues and enhance our ability to ensure that all of Maryland benefits from this Plan.

Priority will be given to projects that advance these goals. The State reserves the right to adjust the objectives and eligible actions identified for inclusion in this Plan as necessary. Any changes to this Plan will be provided to the Trustee and will be posted on MDE's public website.

## **III. Funding and Eligible Applicants**

Maryland has been allocated \$71,045,824.78 through the VW Trust for the 2.0L violations and \$4,668,413.23 for the 3.0L violations for a total of \$75,714,238.01 in Trust Funds.

MDE may request up to one-third of the total allocated amount during the first year and another one-third in the second year. Funds are not awarded directly to a state for deposit into a fund for general redistribution. Instead, the Lead Agency (MDE) and the Trustee must approve each project and then funds are distributed by the Trustee. All Maryland proposals must be submitted to MDE. Awards made and updates to the Plan will be made publicly available on MDE's website on a regular basis. Expenditures from the Trust will be publicly available on an annual basis.



## **IV. Funding Priorities for Eligible Mitigation Projects**

Maryland will make sure the projects selected for funding through the Trust support the Plan's goals as outlined above. Funding priority will be centered on long-term NOx reductions from high emitting mobile source sectors based on current NOx emissions, as well as highly affected communities (areas of the State that historically and currently experience high levels of ground level ozone). NOx emissions data relevant to this consent decree is provided in Appendix B. Funds will be prioritized for areas that are projected to experience the greatest impact from improved air quality, with consideration for the ability to complete projects in a timely manner and, where required, the ability to provide matching funds for projects. Projects that provide benefits to the State and its citizens beyond NOx reductions will be given funding priority. Please see Appendix B for more information on diesel NOx emissions throughout the State.

All emission calculations for project proposals submitted for funding under this settlement shall be done using the EPA approved Diesel Emission Quantifier (DEQ) model. Using the DEQ model for each project will ensure transparency and make it easier to compare projects for effectiveness.

Please see the EPA's website for more information and to access the DEQ:  
<https://www.epa.gov/cleandiesel/diesel-emissions-quantifier-deq>

Funding priorities are subject to change based on public input, changes in air quality and/or as needed to meet state goals.

## **V. Environmental Benefits**

### **A. Background**

This Draft Plan will allow Maryland to make meaningful additional progress on some of the State's most critical environmental challenges. These include attaining and maintaining air quality standards for ground level ozone and fine particle air pollution, cleaning up the Chesapeake Bay (air deposition), meeting the State's greenhouse gas emissions reduction goals, reducing air pollution in some of Maryland's most affected communities, improving visibility under the regional haze program, and moving the state toward greater electrification of the transportation sector.

The Draft Plan, driven by the settlement agreement, focuses on reducing NO<sub>x</sub> emissions from three basic types of emission reduction strategies: (1) investment in electric vehicle infrastructure and electric vehicles, (2) clean and efficient diesel initiatives, and (3) other programs that focus on clean fuels and emerging technologies. Each of these strategies will result in NO<sub>x</sub> emission reductions and significant reductions of other air pollutants. For example, electric vehicle strategies will also result in significant greenhouse gas, volatile organic compound (VOC), and air toxics emission reductions. Clean diesel initiatives also reduce diesel particulate, black carbon, and other fine particle emissions.

### **B. Clean Air Progress**

The State of Maryland has made significant progress in improving air quality over the past ten years. Ground level ozone, or smog, levels are the lowest they have ever been. Maryland came into compliance with the health-based standard for fine particle pollution in 2012 and fine particle levels continue to trend downwards. Over the past 10 years, the state has cut exposure to toxic air pollutants, like benzene, in half. Maryland's efforts to reduce greenhouse gas emissions are on track to achieve the 25% reduction by 2020 required in State law. The draft plan for the next phase in Maryland's law, a 40% reduction by 2030, is due by the end of 2018. For the MDE 2017 Clean Air Progress Report please go the following link:

<http://mde.maryland.gov/programs/Air/Documents/MDCleanAirProgress2017.pdf>

### **C. Ground Level Ozone**

The States most pervasive air pollution problem is ground level ozone. Ground level ozone forms under hot and sunny conditions as NO<sub>x</sub> and VOCs undergo chemical reactions. While ozone in the upper atmosphere blocks the sun's harmful rays, ground level ozone can be harmful to human health and may cause shortness of breath, coughing, wheezing, and aggravation of asthma. MDE research shows that NO<sub>x</sub> reductions are the most effective way to further reduce ground level ozone.

Over the past 30 years, Maryland has struggled to meet the health-based standard for ozone. We are pleased to report that 2015 was the first year that the entire state met the air quality standard for the ground level ozone (based on the 2008 standard). The U. S. Environmental Protection Agency (EPA) has since strengthened that ozone standard and a formal implementation process will begin in 2018. A few areas in the State have levels that are above this new standard which means Maryland will need to make further reductions to NO<sub>x</sub> and VOC emissions. This Draft Plan will help the State make those reductions and meet the new ozone standard.

#### **D. Fine Particle Air Pollution**

As with ozone, Maryland has seen substantial reductions in fine particle air pollution. The EPA has established two primary air quality standards for fine particulate -- annual and daily -- to provide public health protection from both long- and short-term effects of exposure to fine particle pollution. Fine particulates are also formed through chemical reactions in the atmosphere and NO<sub>x</sub> is one of the key pollutants linked to high fine particle levels. Sulfur dioxide is also a major contributor to this key air pollutant.

Since 2012, Maryland has been in compliance, statewide, with the health-based standard for fine particle air pollution. This is a major success story that continues to get better. Measurements of fine particles have continued to get lower every year. The NO<sub>x</sub> reductions from this Draft Plan will help Maryland continue to reduce exposure to this very significant air pollutant.

#### **E. Chesapeake Bay Restoration**

About one third of the nitrogen pollution in the Bay originates as air pollution that is eventually deposited into the Bay. Some of the recent progress in cleaning up the Bay is linked to NO<sub>x</sub> emission reductions achieved over the past 20 years. These reductions have come from both stationary and mobile sources. The NO<sub>x</sub> reductions in this Draft Plan will help the State continue to make progress on restoring the Chesapeake Bay.

#### **F. Climate Change**

Maryland is one of the most aggressive states in the country on addressing climate change. MDE and other State agencies are working together to implement the Greenhouse Gas Emission Reduction Act of 2016. This law requires the State to develop a plan to reduce greenhouse gas emissions by 40 percent by 2030.

Transportation electrification and other transportation-related advancements such as intelligent transportation will be key components of critical greenhouse gas reductions now and into the future. Although driven by NO<sub>x</sub> reductions, this Draft Plan will generate significant co-benefits including reductions of carbon dioxide and other greenhouse gases.

## **G. Particulates**

Many of the projects identified in this Draft Plan will result in a co-benefit of reducing diesel particulates and fine particle emissions in general. This benefit is of particular significance for highly affected communities where there is a higher than average amount of diesel truck traffic. Through partnerships with these communities, MDE and other agencies have been working to clean up a wide variety of diesel equipment, including school buses, tug boats, trash haulers, dump trucks, emergency response vehicles, and drayage trucks. In total, these efforts are reducing NOx emissions by 1,351 tons and PM<sub>2.5</sub> emission by 61 tons over the course of their life.

One of the most successful examples of these partnerships involves the Port of Baltimore, MDE, MDOT, and several communities around the Port. More than \$1 million has already been invested in clean diesel projects at the Port of Baltimore, with an additional \$900,000 worth of new clean diesel projects in the works. These efforts to date have reduced NOx emissions by 3,088 tons and PM<sub>2.5</sub> emissions by 140 tons.

This Draft Plan creates opportunities to build on these successes with additional reductions.

## **H. Regional Haze**

The NOx and particulate matter reductions in the Draft Plan will help Maryland continue to make progress on improving visibility under the Federal regional haze program.

# **VI. Eligible Mitigation Action to Achieve Goal**

The Settlement Agreement includes guidelines for how this funding can be used. These eligible mitigation actions are described in Appendix D-2 of the Partial Consent Decree and attached as Appendix A in this Draft Plan. Funding expenditures can only be used to fund projects deemed eligible in Appendix D-2 of the Partial Consent Decree.

The following preliminary project list is subject to modification based on project eligibility, new information received, projects submitted for consideration, and estimated emission reductions.

## **A. Electric Vehicle Infrastructure - Approximately \$11,300,000**

The Settlement Agreement limits the use of funds for Zero Emission Vehicle (ZEV) infrastructure investment to 15% of the total state allocated funds. This Draft Plan proposes to use the full 15%, approximately \$11.3 million, for the deployment of ZEV infrastructure to facilitate the state's adoption of battery electric and plug-in hybrid vehicles.

As permitted under Section 177 of the Clean Air Act, Maryland has adopted the California Low Emissions Vehicle Program. As part of that program, Maryland has a ZEV mandate that requires auto manufacturers to place a growing number of zero emission vehicles in the State.

As a ZEV state, Maryland is fully committed to a growing ZEV market and helping the auto manufacturers meet the targets of the ZEV Program. Therefore, Maryland intends to utilize the allowed maximum of 15% of Volkswagen Trust funds for zero emission vehicle infrastructure.

Maryland has already invested heavily in electric vehicle supply equipment across the state to facilitate charging these advanced technology vehicles, including providing rebates to purchasers of qualifying electric vehicles. Rebates are also available for electric vehicle supply equipment for residential and commercial use. The funding from this Trust would help Maryland continue to build its statewide network of charging stations so that Maryland residents, as well as those traveling to and through the State, can travel with confidence knowing there is sufficient charging infrastructure to facilitate statewide travel.

In the past few years, MEA has collectively awarded over \$3.3 million to help install 77 DC Fast Chargers at 46 locations, leveraging over \$4.5 million in private investment. In the same manner, matching private funds could be leveraged to install 2,000 charging stations using the full \$11.3 million. This proposed project is based on the fact that in order to meet the State's 2020 electric vehicle goals, an additional 2,000 charging stations will be needed at workplaces and other public sites located along the corridors (at a cost of approximately \$24 million).

Under this Draft Plan, Maryland's proposes to use these electric vehicle infrastructure funds for workplace charging, State office buildings (including Department of Transportation facilities), and the recently federally designated alternative fuel corridors. Selecting strategic installation sites will build on the state's current efforts by ensuring adequate access to charging infrastructure for electric vehicle owners and operators. Having adequate access will facilitate the adoption of ZEVs in the State fleet and will also incentivize employee and public ZEV purchases.

It is important to note, that under a separate part of the Volkswagen settlement (Appendix C), Volkswagen must invest \$2 billion nationwide in electric vehicle charging infrastructure. Volkswagen has been working with ZEV MOU states such as California and Maryland on possible projects that would fulfill this requirement. Maryland will wait until Volkswagen announces these planned projects (some of which may be in Maryland) before using the electric vehicle infrastructure funds outlined in this section. This will allow Maryland to leverage and maximize its investment throughout the state. It will also allow Maryland to maximize investment in the latest technology since newer charging systems will soon be available. These newer charging systems (i.e. Level 3 fast chargers) decrease charging times.

## **B. Private Sector and Federal Government - Approximately \$28,500,000**

This Draft Plan proposes dedicating approximately \$28.5 million for the private sector and federal government agencies to use for eligible mitigation projects throughout the state. These funds can be used for any eligible mitigation action, such as cargo handling equipment, switcher locomotives, heavy-duty diesel trucks replacements, and will be available through a separate request for proposal and evaluation process.

### **1. Dray Truck Replacement Program**

Under the 2015 Maryland Green Port Agreement, the State supports public/private partnerships that expand businesses at the Port while reducing Port related emissions. One important partnership stemming from this agreement is the dray truck replacement program which the Maryland Port Administration (MDOT MPA) has been successfully implementing over the last several years. Under this proposal, **\$2,000,000** would be used to continue this

program for the next 5 years. Project proposals will be evaluated based on criteria outlined in Section IV.

Dray trucks are short haul trucks that operate in and around the general Port/Baltimore area. Many of the dray trucks being used by private businesses are pre-model year 2000 and are therefore, amongst the dirtiest trucks in operation. This program will allow private businesses to replace them with newer post-2010 model year trucks to reduce emissions. The replacement of dray trucks is an eligible Appendix D-2 project under the Class 8 Local Freight Trucks and Port Drayage Trucks category as well as the DERA option. These vehicles are eligible for between 40 to 75% in eligible funds depending on vehicle type. Project proposals will be evaluated based on criteria outlined in Section IV.

## **2. Maryland Idle Reduction Program**

Maryland proposes using **\$500,000** in funding as a match for the Diesel Emission Reduction Act (DERA) idle reduction plan option as allowed under Appendix D-2. MDE, in partnership with MEA, has previously operated an idle reduction grant program to provide auxiliary power units (APU), fuel operated heaters (FOH), battery operated air conditioning systems (BAC) and other EPA SmartWay certified technologies to vehicles that operate in and around Maryland. The program operated for several years and was very successful, but was discontinued due to funding availability. For example, APUs allow for heating and cooling of sleeper cabins as well as powering appliances in the cabin without the need to idle the truck. By reducing idling, this programs results in significant reductions of all emissions such as NOx, PM, and CO2 as well as saving the operator significant money in fuel costs. Project proposals will be evaluated based on criteria outlined in Section IV.

## **3. Freedom Fleet Voucher (FFVP)**

This Draft Plan proposes to set aside **\$5,000,000** for replacing diesel vehicles with new alternative fuel vehicles. These funds will be managed similarly to that of the Freedom Fleet Voucher Program (FFVP) which is operated and administered by MEA. Project proposals will be evaluated based on criteria outlined in Section IV.

#### **4. Other Eligible Projects**

Maryland proposes to use the remaining **\$21,025,438** for other eligible projects in the private sector and federal government. Project proposals will be evaluated based on criteria outlined in Section IV.

#### **C. Local Governments, Communities, and Environmental Justice – Approximately \$12,000,000**

This Draft Plan proposes allocating approximately **\$12,000,000** for local governments and communities to implement their own eligible alternative fuel vehicle replacement projects. These projects will be administered via a program(s) similar to that of the MEA operated Freedom Fleet Voucher Program.

Projects will be evaluated based on criteria outlined in Section IV. Projects that target emission reductions in highly affected communities or that provide long-lasting environmental benefits (beyond the ten year term of the funding) will be weighted in an effort to distribute these funds to the communities most in need of air quality improvement.

This program reserves funding dollars for each of the following duty applications:

##### **1. Transit Bus Replacement**

**\$4,000,000** for local transit agencies to request funding to replace aging transit buses. A number of cities and counties have expressed interest in using available funds to continue their efforts to replace diesel transit buses with all-electric buses, which produce zero NOx tailpipe emissions. In addition to electric, other alternative fuel technologies would also be eligible. Funds will be available to cover the incremental cost of purchasing an alternative fueled bus. Project proposals will be evaluated based on criteria outlined in Section IV.

##### **2. School Bus Replacement**

**\$4,000,000** for school bus replacement. The funding available will be targeted toward replacement of diesel buses with alternative fuel buses, such as electric, CNG, and propane, all of which provide NOx emissions reductions. In particular,



the newest best-in-class propane school buses are certified to a low-NOx standard and reduce NOx emissions 81% over new diesel buses. This funding will be available to cover the incremental cost of purchasing an alternative fuel bus. In addition to counties being eligible, school bus contractors that have contracts with a county pupil transportation entity would also be eligible. Project proposals will be evaluated based on criteria outlined in Section IV.

### **3. Other Eligible Projects**

**\$4,000,000** for other eligible projects and be available to local government and community projects. Project proposals will be evaluated based on criteria outlined in Section IV.

## **D. State Agency Projects - Approximately \$22,888,000**

### **1. Maryland Transit Administration (MDOT MTA)**

Approximately **\$3,420,000**

MDOT MTA has several eligible mitigation projects outlined that will help improve MDOT MTA's operations and reduce NOx emissions.

#### **a. Rail Maintenance Equipment Dump Truck & Hi-Rail Dump Truck Replacements**

**Total Costs: \$1,100,000**

**Annual NOx Reductions: .094 (tons/year)**

**Lifetime NOx Reductions: 1.41 (tons)**

**Cost per ton: \$11,702,127**

MDOT MTA's Light Rail and Metro Subway Division is requesting **\$1,100,000** for replacement of equipment used to maintain the Light Rail and Metro facilities with new diesel equipment. The current equipment is in severely deteriorated condition and in need of replacement. This Plan provides funds for two single axle dump trucks, one single axle Hi Rail dump truck, and one tandem axle Hi Rail rotary dump truck. Replacing these vehicles will result in an 88% reduction in NOx emissions as well as a 94% reduction in harmful PM<sub>2.5</sub> emissions. MDOT MTA is focused on equipment in dire need of repair, and will achieve deep

emissions reductions - above 90% - in an area that is in nonattainment and provides benefits in Maryland's most affected communities.

Both single axle dump truck options replace existing diesel dump trucks as specified in Section 1 of Appendix D-2. The proposed trucks are all over 33,000 GVWR and are replacing vehicles manufactured before 2006. The old vehicles will be scrapped as required by the program. These replacements are eligible for 100% in funds. For more information on MDOT MTA's planned vehicle replacements for this project, please see Table 1 in Appendix C.

**b. 40-Foot Buses**

**Total Costs: \$2,320,000**

**Annual NOx Reductions: 1.4 (tons/year)**

**Lifetime NOx Reductions: 16.8 (tons)**

**Cost per ton: \$1,657,142**

MDOT MTA is requesting **\$2,320,000** for replacement of four 40-foot buses with new diesel buses. The current diesel buses are certified to older standards and emit approximately 83% more NOx emissions than the cleaner diesel buses available today. Due to budget constraints, the State has had to extend the typical replacement timeframe beyond the desired 12 years of useful life. The State maintains a fleet of approximately 700 buses, many of which were purchased prior to implementation of the stringent 2010 NOx standards and many even prior to the 2004 NOx standards. Replacing these buses with newer diesel buses is cost effective for the State and will result in immediate benefits to the City of Baltimore. In addition to an 83% reduction in NOx emissions, the new buses will result in a 95% reduction in harmful PM<sub>2.5</sub> emissions. MDOT MTA intends to replace buses which operate out of the Eastern Division, which serves several communities located in southeast Baltimore, including those near the Port of Baltimore. This funding will allow MDOT MTA to replace buses earlier than they would have been able to otherwise and will assist in working toward the goal of a 12-year replacement cycle. Safe, reliable, and efficient transit options are critical to fulfilling MDOT's mission of connecting their customers to life's opportunities.

The buses cost approximately \$580,000 per unit. The new buses would replace existing diesel buses as specified in Section 2 of Appendix D-2. The current buses

are Class-8 buses from 2004 and will be scrapped in accordance with the program requirements. These replacements are eligible for 100% funding.

## **2. Maryland Port Administration (MDOT MPA)**

Approximately **\$3,487,000**

### **Port Ground Service Equipment**

**Total Costs: \$3,487,000**

**Annual NOx Reductions: 7.85 (tons/year)**

**Lifetime NOx Reductions: 174.4 (tons)**

**Cost per ton: \$444,204**

In December 2015 MDOT MPA and MDE jointly signed the Maryland Green Port Agreement. This Agreement contemplates that the agencies will work cooperatively to expand business at the Port while reducing emissions generated by Port operations. MDOT MPA, in partnership with Maryland Environmental Services (MES), is seeking funds to replace several MPA-owned yard vehicles and maintenance and cargo handling equipment (CHE), as well as two MES-owned ferries, operated at the Port of Baltimore. A total of 22 vehicles and CHE, including two ferries, have been identified for replacement for a total cost of **\$3,487,000**. For more information on MDOT MPA's planned vehicle replacements for this project, please see Table 2 in Appendix C. These replacements are eligible for 100% funding.

## **3. Maryland Aviation Administration (MDOT MAA)**

Approximately **\$12,480,000**

### **40-foot and 60-Foot Transit Buses**

**Total Costs: \$12,480,000**

**Annual NOx Reductions: 4.84 (tons/year)**

**Lifetime NOx Reductions: 58.1 (tons)**

**Cost per ton: \$2,578,512**

MDOT MAA has identified an important area in its Ground Transportation Program for investment. MDOT MAA currently owns 74 40-foot transit buses (both CNG and Diesel powered). A few of these buses are from 2004. These buses are used to transport airport travelers to and from the BWI Marshall

Airport Rental Car and Parking Facilities. MDOT MAA is in the process of replacing them as they have reached the end of their useful life. MDOT MAA proposes to use Trust Funds to replace 10 of the 49 buses that are diesel powered with new electric buses. MDOT MAA proposes to purchase 5, 40-foot buses and 5, 60-foot buses. Sixty-foot buses offer nearly 50% more capacity. MDOT MAA projects travelers growth over 1% per year, which could result in at least 12% more riders over the life of the bus. Shuttle buses are an eligible project under Section 2 of Appendix D-2. Government owned buses are eligible for 100% funding. This Plan proposes to cover 100% of the replacement cost and inductive charging infrastructure through Trust Funds.

The 40-foot buses cost approximately \$800,000 per unit.

The 60-foot buses cost approximately \$1,300,000 per unit.

Charging infrastructure including plug in units, on-route charging, and other tools and equipment are estimated to cost a total of \$1,980,000.

#### **4. Maryland State Highway Administration (MDOT SHA)**

Approximately **\$3,501,800**

##### **Replacement of 26 Dump Trucks**

**Total Costs: \$3,501,800**

**Annual NOx Reductions: 2.1 (tons/year)**

**Lifetime NOx Reductions: 31.5(tons)**

**Cost per annual ton:\$1,667,524**

The MDOT State Highway Administration (SHA) has identified twenty-six Class 7 and 8 diesel trucks that were manufactured before 2006 that are eligible for replacement. These trucks generally have high engine hours and are in poor condition due to the use requirements of the units. The replacement of these trucks will result in an 88% NOx reduction due to the regulatory requirements for heavy duty compression ignition engines. An additional benefit to replacing these trucks would be compliance with GHG phase 2. The units are utilized for short haul, maintenance of the Maryland Highway System, and emergency response both weather and transportation related. All the units listed do have idling requirements due to the nature of work SHA performs, the replacement units will be CARB Clean Air Idle certified.

SHA is looking to replace:

- 2-Cone Layer (MOT) Trucks,

- 2-5<sup>th</sup> Wheel Truck Tractors,
- 5-Crew Cab Dump Trucks,
- 4-Regular Cab Dump Trucks,
- 3-Tri Axle Dump Trucks, and
- 5-Regular Cab Dump Trucks with Big Bore Engines.

All the trucks will be replaced with a unit of the same kind. The units being replaced will be scrapped per program requirements. It should be noted that 65% of the units replaced reside within the top ten counties with the highest NOx emission measurements. For more information on MDOT SHA’s planned vehicle replacements for this project, please see Table 3 in Appendix C.

#### **E. Administrative Costs - Approximately \$1,000,000**

Maryland proposes allocating approximately **\$1,000,000** over the ten-year life of the Trust for the administrative costs of reviewing, implementing, and reporting on eligible mitigation projects.

## **VII. Anticipated Emission Benefits**

The projects eligible for funding under the consent decree are wide-ranging in scope as well as emissions benefits. There are many factors to consider when determining the emissions benefit of particular projects, including the type of vehicles being replaced, age of vehicles, specific route or usage of vehicles, and information on the new vehicles being purchased and what type of fuel they use.

Actual NOx reductions will be determined on a project by project basis and be used in determining what projects to fund through this Trust. Funding will be prioritized on large-scale projects designed to achieve the greatest long-term emissions reductions throughout the State.

There were an estimated 14,688<sup>1</sup> 2.0L diesel vehicles delivered to Maryland in violation of emission standards. An estimated 1,669<sup>2</sup> 3.0L diesel vehicles in violation were also delivered. Maryland estimates that these vehicles emitted between 575 and 1,730 tons

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<sup>1</sup> Vehicle estimate derived from registration data as well as vehicle reports submitted by Volkswagen

<sup>2</sup> Vehicle estimate derived from registration data as well as vehicle reports submitted by Volkswagen

of NOx than they were certified to produce between 2009 and 2016. MDE will strive to ensure that the emission reductions achieved through this Mitigation Plan will be equal to or greater than the amount emitted by these vehicles over the course of the last eight years.

## **VIII. Public Input**

Maryland has opened a public comment period starting August 1, 2018 and ending August 31, 2018. Maryland will not submit this proposed Plan to the Trustee until after the public comment period.

In accordance with the requirements of the Consent Decree, Maryland will also have public comment periods for every future change to the Plan before re-submitting it to the Trustee for approval. These actions are only required for major changes to the Plan in how Maryland will spend its funds, for example changes in the eligible funding categories or total funds available for each category. Resubmittal for public comment and Trustee approval would not be required for routine updates to the Plan, such as identifying projects being funded that meet eligible project categories that are identified in the existing Plan.

Additional information on the public comment process may be found on the Maryland Department of the Environment's web site at:

<http://mde.maryland.gov/programs/Air/MobileSources/Pages/MarylandVolkswagenMitigationPlan.aspx>

**IX. Appendix A**

**Eligible Mitigation Actions from  
APPENDIX D-2 of Volkswagen Partial  
Consent Decree**

**APPENDIX D-2**  
**ELIGIBLE MITIGATION ACTIONS AND MITIGATION ACTION EXPENDITURES**

1. Class 8 Local Freight Trucks and Port Drayage Trucks (Eligible Large Trucks)

a. Eligible Large Trucks include 1992-2009 engine model year Class 8 Local Freight or Drayage. For Beneficiaries that have State regulations that already require upgrades to 1992-2009 engine model year trucks at the time of the proposed Eligible Mitigation Action, Eligible Large Trucks shall also include 2010-2012 engine model year Class 8 Local Freight or Drayage.

b. Eligible Large Trucks must be Scrapped.

c. Eligible Large Trucks may be Repowered with any new diesel or Alternate Fueled engine or All-Electric engine, or may be replaced with any new diesel or Alternate Fueled or All-Electric vehicle, with the engine model year in which the Eligible Large Trucks Mitigation Action occurs or one engine model year prior.

d. For Non-Government Owned Eligible Class 8 Local Freight Trucks, Beneficiaries may only draw funds from the Trust in the amount of:

1. Up to 40% of the cost of a Repower with a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) engine, including the costs of installation of such engine.
2. Up to 25% of the cost of a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) vehicle.
3. Up to 75% of the cost of a Repower with a new All-Electric engine, including the costs of installation of such engine, and charging infrastructure associated with the new All-Electric engine.
4. Up to 75% of the cost of a new All-Electric vehicle, including charging infrastructure associated with the new All-Electric vehicle.

e. For Non-Government Owned Eligible Drayage Trucks, Beneficiaries may only draw funds from the Trust in the amount of:

1. Up to 40% of the cost of a Repower with a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) engine, including the costs of installation of such engine.
2. Up to 50% of the cost of a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) vehicle.
3. Up to 75% of the cost of a Repower with a new All-Electric engine, including the costs of installation of such engine, and charging infrastructure associated with the new All-Electric engine.
4. Up to 75% of the cost of a new all-electric vehicle, including charging infrastructure associated with the new All-Electric vehicle.



f. For Government Owned Eligible Class 8 Large Trucks, Beneficiaries may draw funds from the Trust in the amount of:

1. Up to 100% of the cost of a Repower with a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) engine, including the costs of installation of such engine.
2. Up to 100% of the cost of a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) vehicle.
3. Up to 100% of the cost of a Repower with a new All-Electric engine, including the costs of installation of such engine, and charging infrastructure associated with the new All-Electric engine.
4. Up to 100% of the cost of a new All-Electric vehicle, including charging infrastructure associated with the new All-Electric vehicle.

## 2. Class 4-8 School Bus, Shuttle Bus, or Transit Bus (Eligible Buses)

a. Eligible Buses include 2009 engine model year or older class 4-8 school buses, shuttle buses, or transit buses. For Beneficiaries that have State regulations that already require upgrades to 1992-2009 engine model year buses at the time of the proposed Eligible Mitigation Action, Eligible Buses shall also include 2010-2012 engine model year class 4-8 school buses, shuttle buses, or transit buses.

b. Eligible Buses must be Scrapped.

c. Eligible Buses may be Repowered with any new diesel or Alternate Fueled or All-Electric engine, or may be replaced with any new diesel or Alternate Fueled or All-Electric vehicle, with the engine model year in which the Eligible Bus Mitigation Action occurs or one engine model year prior.

d. For Non-Government Owned Buses, Beneficiaries may draw funds from the Trust in the amount of:

1. Up to 40% of the cost of a Repower with a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) engine, including the costs of installation of such engine.
2. Up to 25% of the cost of a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) vehicle.
3. Up to 75% of the cost of a Repower with a new All-Electric engine, including the costs of installation of such engine, and charging infrastructure associated with the new All-Electric engine.
4. Up to 75% of the cost of a new All-Electric vehicle, including charging infrastructure associated with the new All-Electric vehicle.

e. For Government Owned Eligible Buses, and Privately Owned School Buses Under Contract with a Public School District, Beneficiaries may draw funds from the Trust in the amount of:

1. Up to 100% of the cost of a Repower with a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) engine, including the costs of installation of such engine.
2. Up to 100% of the cost of a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) vehicle.
3. Up to 100% of the cost of a Repower with a new All-Electric engine, including the costs of installation of such engine, and charging infrastructure associated with the new All-Electric engine.
4. Up to 100% of the cost of a new All-Electric vehicle, including charging infrastructure associated with the new All-Electric vehicle.

### 3. Freight Switchers

a. Eligible Freight Switchers include pre-Tier 4 switcher locomotives that operate 1000 or more hours per year.

b. Eligible Freight Switchers must be Scrapped.

c. Eligible Freight Switchers may be Repowered with any new diesel or Alternate Fueled or All-Electric engine(s) (including Generator Sets), or may be replaced with any new diesel or Alternate Fueled or All-Electric (including Generator Sets) Freight Switcher, that is certified to meet the applicable EPA emissions standards (or other more stringent equivalent State standard) as published in the CFR for the engine model year in which the Eligible Freight Switcher Mitigation Action occurs.

d. For Non-Government Owned Freight Switchers, Beneficiaries may draw funds from the Trust in the amount of :

1. Up to 40% of the cost of a Repower with a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) engine(s) or Generator Sets, including the costs of installation of such engine(s).
2. Up to 25% of the cost of a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) Freight Switcher.
3. Up to 75% of the cost of a Repower with a new All-Electric engine(s), including the costs of installation of such engine(s), and charging infrastructure associated with the new All-Electric engine(s).
4. Up to 75% of the cost of a new All-Electric Freight Switcher, including charging infrastructure associated with the new All-Electric Freight Switcher.

e. For Government Owned Eligible Freight Switchers, Beneficiaries may draw funds from the Trust in the amount of:

1. Up to 100% of the cost of a Repower with a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) engine(s) or Generator Sets, including the costs of installation of such engine(s).
2. Up to 100% of the cost of a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) Freight Switcher.
3. Up to 100% of the cost of a Repower with a new All-Electric engine(s), including the costs of installation of such engine(s), and charging infrastructure associated with the new All-Electric engine(s).
4. Up to 100% of the cost of a new All-Electric Freight Switcher, including charging infrastructure associated with the new All-Electric Freight Switcher.

#### 4. Ferries/Tugs

a. Eligible Ferries and/or Tugs include unregulated, Tier 1, or Tier 2 marine engines.

b. Eligible Ferry and/or Tug engines that are replaced must be Scrapped.

c. Eligible Ferries and/or Tugs may be Repowered with any new Tier 3 or Tier 4 diesel or Alternate Fueled engines, or with All-Electric engines, or may be upgraded with an EPA Certified Remanufacture System or an EPA Verified Engine Upgrade.

d. For Non-Government Owned Eligible Ferries and/or Tugs, Beneficiaries may only draw funds from the Trust in the amount of:

1. Up to 40% of the cost of a Repower with a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) engine(s), including the costs of installation of such engine(s).
2. Up to 75% of the cost of a Repower with a new All-Electric engine(s), including the costs of installation of such engine(s), and charging infrastructure associated with the new All-Electric engine(s).

e. For Government Owned Eligible Ferries and/or Tugs, Beneficiaries may draw funds from the Trust in the amount of:

1. Up to 100% of the cost of a Repower with a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) engine(s), including the costs of installation of such engine(s).
2. Up to 100% of the cost of a Repower with a new All-Electric engine(s), including the costs of installation of such engine(s), and charging infrastructure associated with the new All-Electric engine(s).

## 5. Ocean Going Vessels (OGV) Shorepower

a. Eligible Marine Shorepower includes systems that enable a compatible vessel's main and auxiliary engines to remain off while the vessel is at berth. Components of such systems eligible for reimbursement are limited to cables, cable management systems, shore power coupler systems, distribution control systems, and power distribution. Marine shore power systems must comply with international shore power design standards (ISO/IEC/IEEE 80005-1:2012 High Voltage Shore Connection Systems or the IEC/PAS 80005-3:2014 Low Voltage Shore Connection Systems) and should be supplied with power sourced from the local utility grid. Eligible Marine Shorepower includes equipment for vessels that operate within the Great Lakes.

b. For Non-Government Owned Marine Shorepower, Beneficiaries may only draw funds from the Trust in the amount of up to 25% for the costs associated with the shore-side system, including cables, cable management systems, shore power coupler systems, distribution control systems, installation, and power distribution components.

c. For Government Owned Marine Shorepower, Beneficiaries may draw funds from the Trust in the amount of up to 100% for the costs associated with the shore-side system, including cables, cable management systems, shore power coupler systems, distribution control systems, installation, and power distribution components.

## 6. Class 4-7 Local Freight Trucks (Medium Trucks)

a. Eligible Medium Trucks include 1992-2009 engine model year class 4-7 Local Freight trucks, and for Beneficiaries that have State regulations that already require upgrades to 1992-2009 engine model year trucks at the time of the proposed Eligible Mitigation Action, Eligible Trucks shall also include 2010-2012 engine model year class 4-7 Local Freight trucks.

b. Eligible Medium Trucks must be Scrapped.

c. Eligible Medium Trucks may be Repowered with any new diesel or Alternate Fueled or All-Electric engine, or may be replaced with any new diesel or Alternate Fueled or All-Electric vehicle, with the engine model year in which the Eligible Medium Trucks Mitigation Action occurs or one engine model year prior.

d. For Non-Government Owned Eligible Medium Trucks, Beneficiaries may draw funds from the Trust in the amount of:

1. Up to 40% of the cost of a Repower with a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) engine, including the costs of installation of such engine.

2. Up to 25% of the cost of a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) vehicle.
3. Up to 75% of the cost of a Repower with a new All-Electric engine, including the costs of installation of such engine, and charging infrastructure associated with the new All-Electric engine.
4. Up to 75% of the cost of a new All-Electric vehicle, including charging infrastructure associated with the new All-Electric vehicle.

e. For Government Owned Eligible Medium Trucks, Beneficiaries may draw funds from the Trust in the amount of:

1. Up to 100% of the cost of a Repower with a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) engine, including the costs of installation of such engine.
2. Up to 100% of the cost of a new diesel or Alternate Fueled (e.g. CNG, propane, Hybrid) vehicle.
3. Up to 100% of the cost of a Repower with a new All-Electric engine, including the costs of installation of such engine, and charging infrastructure associated with the new All-Electric engine.
4. Up to 100% of the cost of a new All-Electric vehicle, including charging infrastructure associated with the new All-Electric vehicle.

## 7. Airport Ground Support Equipment

a. Eligible Airport Ground Support Equipment includes:

1. Tier 0, Tier 1, or Tier 2 diesel powered airport ground support equipment; and
2. Uncertified, or certified to 3 g/bhp-hr or higher emissions, spark ignition engine powered airport ground support equipment.

b. Eligible Airport Ground Support Equipment must be Scrapped.

c. Eligible Airport Ground Support Equipment may be Repowered with an All-Electric engine, or may be replaced with the same Airport Ground Support Equipment in an All-Electric form.

d. For Non-Government Owned Eligible Airport Ground Support Equipment, Beneficiaries may only draw funds from the Trust in the amount of:

1. Up to 75% of the cost of a Repower with a new All-Electric engine, including costs of installation of such engine, and charging infrastructure associated with such new All-Electric engine.

2. Up to 75% of the cost of a new All-Electric Airport Ground Support Equipment, including charging infrastructure associated with such new All-Electric Airport Ground Support Equipment.

e. For Government Owned Eligible Airport Ground Support Equipment, Beneficiaries may draw funds from the Trust in the amount of:

1. Up to 100% of the cost of a Repower with a new All-Electric engine, including costs of installation of such engine, and charging infrastructure associated with such new All-Electric engine.

2. Up to 100% of the cost of a new All-Electric Airport Ground Support Equipment, including charging infrastructure associated with such new All-Electric Airport Ground Support Equipment.

## 8. Forklifts and Port Cargo Handling Equipment

a. Eligible Forklifts includes forklifts with greater than 8000 pounds lift capacity.

b. Eligible Forklifts and Port Cargo Handling Equipment must be Scrapped.

c. Eligible Forklifts and Port Cargo Handling Equipment may be Repowered with an All-Electric engine, or may be replaced with the same equipment in an All-Electric form.

d. For Non-Government Owned Eligible Forklifts and Port Cargo Handling Equipment, Beneficiaries may draw funds from the Trust in the amount of:

1. Up to 75% of the cost of a Repower with a new All-Electric engine, including costs of installation of such engine, and charging infrastructure associated with such new All-Electric engine.

2. Up to 75% of the cost of a new All-Electric Forklift or Port Cargo Handling Equipment, including charging infrastructure associated with such new All-Electric Forklift or Port Cargo Handling Equipment.

e. For Government Owned Eligible Forklifts and Port Cargo Handling Equipment, Beneficiaries may draw funds from the Trust in the amount of:

1. Up to 100% of the cost of a Repower with a new All-Electric engine, including costs of installation of such engine, and charging infrastructure associated with such new All-Electric engine.

2. Up to 100% of the cost of a new All-Electric Forklift or Port Cargo Handling Equipment, including charging infrastructure associated with such new All-Electric Forklift or Port Cargo Handling Equipment.

9. Light Duty Zero Emission Vehicle Supply Equipment. Each Beneficiary may use up to fifteen percent (15%) of its allocation of Trust Funds on the costs necessary for, and directly connected to, the acquisition, installation, operation and maintenance of new light duty zero emission vehicle supply equipment for projects as specified below. Provided, however, that Trust Funds shall not be made available or used to purchase or rent real estate, other capital costs (e.g., construction of buildings, parking facilities, etc.) or general maintenance (i.e., maintenance other than of the Supply Equipment).

a. Light duty electric vehicle supply equipment includes Level 1, Level 2 or fast charging equipment (or analogous successor technologies) that is located in a public place, workplace, or multi-unit dwelling and is not consumer light duty electric vehicle supply equipment (i.e., not located at a private residential dwelling that is not a multi-unit dwelling).

b. Light duty hydrogen fuel cell vehicle supply equipment includes hydrogen dispensing equipment capable of dispensing hydrogen at a pressure of 70 megapascals (MPa) (or analogous successor technologies) that is located in a public place.

c. Subject to the 15% limitation above, each Beneficiary may draw funds from the Trust in the amount of:

1. Up to 100% of the cost to purchase, install and maintain eligible light duty electric vehicle supply equipment that will be available to the public at a Government Owned Property.
2. Up to 80% of the cost to purchase, install and maintain eligible light duty electric vehicle supply equipment that will be available to the public at a Non-Government Owned Property.
3. Up to 60% of the cost to purchase, install and maintain eligible light duty electric vehicle supply equipment that is available at a workplace but not to the general public.
4. Up to 60% of the cost to purchase, install and maintain eligible light duty electric vehicle supply equipment that is available at a multi-unit dwelling but not to the general public.
5. Up to 33% of the cost to purchase, install and maintain eligible light duty hydrogen fuel cell vehicle supply equipment capable of dispensing at least 250 kg/day that will be available to the public.
6. Up to 25% of the cost to purchase, install and maintain eligible light duty hydrogen fuel cell vehicle supply equipment capable of dispensing at least 100 kg/day that will be available to the public.

10. Diesel Emission Reduction Act (DERA) Option. Beneficiaries may use Trust Funds for their non-federal voluntary match, pursuant to Title VII, Subtitle G, Section 793 of the DERA Program in the Energy Policy Act of 2005 (codified at 42 U.S.C. § 16133), or Section 792 (codified at 42

U.S.C. § 16132) in the case of Tribes, thereby allowing Beneficiaries to use such Trust Funds for actions not specifically enumerated in this Appendix D-2, but otherwise eligible under DERA pursuant to all DERA guidance documents available through the EPA. Trust Funds shall not be used to meet the nonfederal mandatory cost share requirements, as defined in applicable DERA program guidance, of any DERA grant.



## **X. Appendix B**

# **NOx Emissions Data for Maryland**

Figure 1: 2014 Annual On-Road Diesel NOx Emissions in Maryland Counties (2014 NEI v1)

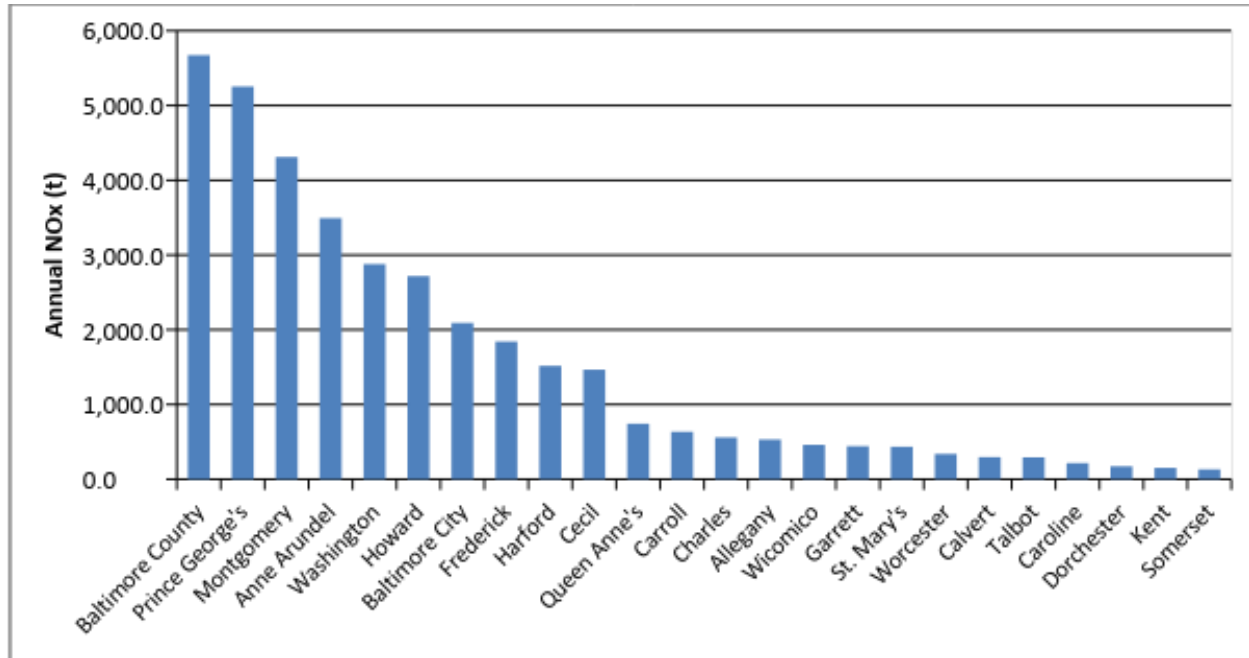
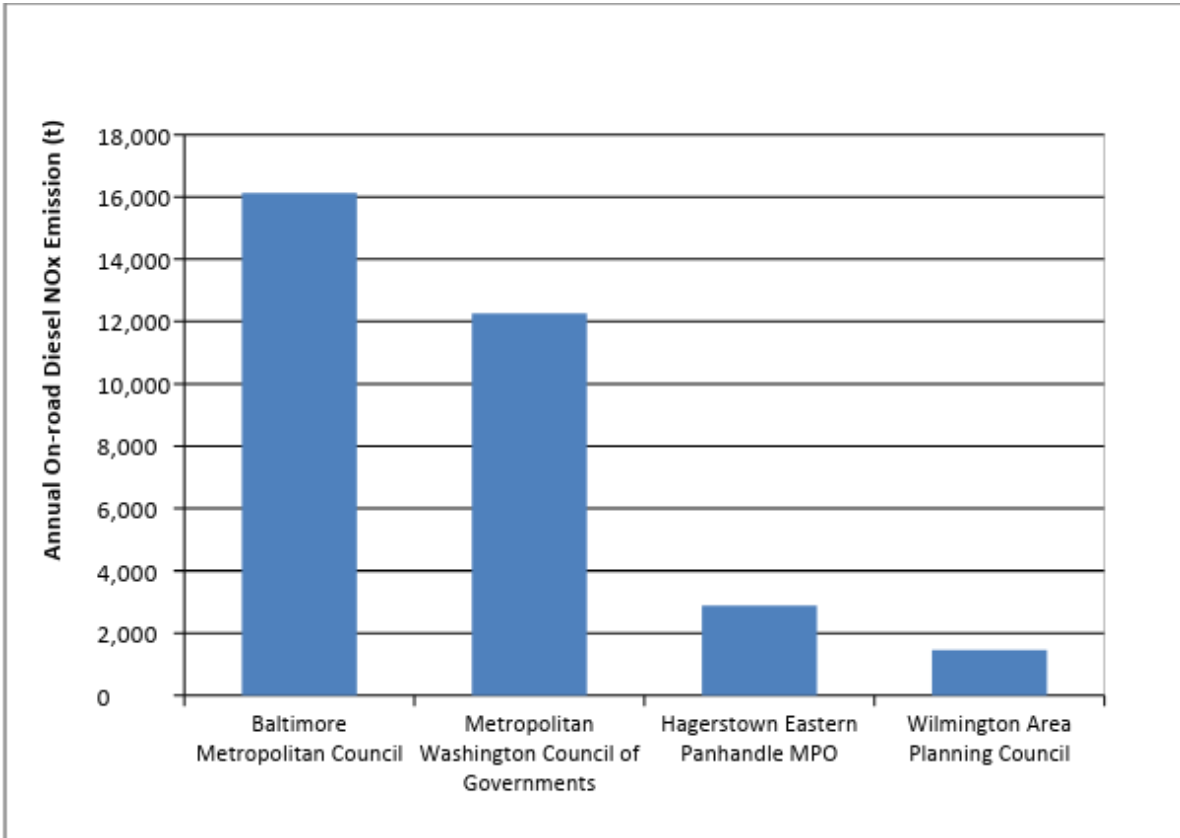


Figure 2: 2014 Maryland Annual On-road Diesel NOx Emissions by Metropolitan Planning Organization (2014 NEI V1)



## **XI. Appendix C**

# **Additional Project Information**

**Table 1: MDOT MTA Rail Maintenance Dump Trucks**

<b>MDOT MTA Rail Maintenance Dump Trucks</b>	<b>Cost per Vehicle</b>	<b>Replacements</b>	<b>Total</b>
Single-Axle	\$ 200,000.00	2	\$ 400,000.00
Single-Axle Hi Rail	\$ 300,000.00	1	\$ 300,000.00
Tandem-Axle Hi Rail Rotary	\$ 400,000.00	1	\$ 400,000.00
<b>Totals</b>		<b>4</b>	<b>\$ 1,100,000.00</b>

**Table 2: MDOT MPA Port Ground Service Equipment**

<b>MDOT MPA Port Ground Service Equipment</b>	<b>Estimated Replacement Cost</b>	<b>Replacement Vehicle</b>
Diesel Cranes	\$60,000	Repower with new diesel
Ferries/Tugs	\$330,000	Repower with new diesel
Ferries/Tugs	\$220,000	Repower with new diesel
Diesel Terminal Tractors	\$400,000	Replacement with new electric*
Diesel Terminal Tractors		
Heavy-Duty Trucks	\$75,000	Replacement with new diesel
Heavy-Duty Trucks	\$155,000	Replacement with new diesel
Heavy-Duty Trucks	\$155,000	Replacement with new diesel
Heavy-Duty Trucks	\$155,000	Replacement with new diesel
Heavy-Duty Trucks	\$155,000	Replacement with new diesel
Heavy-Duty Trucks	\$55,000	Replacement with new diesel
Heavy-Duty Trucks	\$92,000	Replacement with new diesel
Heavy-Duty Trucks	\$155,000	Replacement with new diesel
Heavy-Duty Trucks	\$155,000	Replacement with new diesel
Diesel Aerial Lifts	\$60,000	Replacement with new diesel
Diesel Forklifts	\$75,000	Replacement with new electric*
Diesel Forklifts		
Heavy-Duty Trucks	\$165,000	Replacement with new diesel
Heavy-Duty Trucks	\$55,000	Replacement with new diesel
Heavy-Duty Trucks	\$130,000	Replacement with new diesel
Heavy-Duty Trucks	\$350,000	Replacement with new diesel
Heavy-Duty Trucks	\$235,000	Replacement with new diesel
Diesel Terminal Tractors	\$75,000	Replacement with new diesel
Diesel Rubber Tire Loaders	\$180,000	Replacement with new diesel
<b>Totals</b>	<b>\$3,487,000</b>	

\*The MDOT MPA plan to replace two diesel terminal tractors and two diesel forklifts with one electric terminal tractor and one electric forklift

**Table 3: MDOT SHA Dump Truck Replacements**

<b>MDOT SHA Dump Truck Replacements</b>	<b>Cost per Truck</b>	<b># Replaced</b>	<b>Total Cost</b>
Cone Layer Trucks	\$ 150,000.00	2	\$ 300,000.00
Regular Cab Dump Trucks	\$ 160,000.00	4	\$ 640,000.00
Regular Cab Dump Trucks with Big Bore Engines	\$ 160,000.00	5	\$ 800,000.00
Crew Cab Dump Truck	\$ 167,000.00	5	\$ 835,000.00
Tri Axle Dump Trucks	\$ 218,000.00	3	\$ 654,000.00
5 <sup>th</sup> Wheel Truck Tractors	\$ 136,400.00	2	\$ 272,800.00
<b>Totals</b>		<b>21</b>	<b>\$ 3,501,800.00</b>