5.0 CONTROL MEASURES

This section is divided into five sections: Point Source Measures, Area Source Measures, Nonroad Source Measures, Mobile Measures, and Supplemental Control Measures.

Reductions from the control measures presented in this Chapter are summarized in Table A.

TABLE A
SUMMARY OF CONTROL STRATEGIES
PM2.5, NOx, and SO_2 Benefits of Control Measures
(2009 uncontrolled-2009 controlled)

Ref No.	*Control Measure*	Reductions $PM_{2.5}$ Direct tons/year	Reductions NOx tons/year	Reductions SO_2 tons/year
MEASURES INCLUDED IN THE BASELINE CONTROLS SCENARIO				
POINT SOURCE MEASURES				
5.1.1	State Regional Transport Requirement	0	0	0
5.1.2	Visibility Standards	0	0	0
AREA SOURCE MEASURES				
5.2.1	Seasonal Open Burning Restrictions	0	0	0
ON-ROAD MEASURES				
5.4.1	High-Tech Inspection/Maintenance (original cutpoints)	0	0	0
5.4.2	Evaporative Standards	0	0	0
5.4.3	National Low Emission Vehicle Program	0	0	0
5.4.6	Transportation Control Measures and Vehicle Technology, Fuel, or Maintenance Measures	0	0	0
NON-ROAD MEASURES				
5.3.1	EPA Non-Road Gasoline Engines Rule	0	0	0
5.3.2	EPA Non-Road Diesel Engines Rule	0	0	0
5.3.3	Emissions Standards for Spark Ignition Marine Engines	0	0	0
5.3.4	Emissions Standards for Large Spark Ignition Engines	0	0	0
MEASURES INCLUDED IN THE FUTURE CONTROLLED SCENARIO				
POINT SOURCE MEASURES				
5.1.1	State and Regional Transport Requirement (RACT, NOx SIP Call, CAIR, HAA)	-	43,091	17,967
SUBTOTAL			**43,091**	**17,967**
AREA SOURCE MEASURES				
SUBTOTAL		-	-	-
NON-ROAD MEASURES				
5.3.1	EPA Non-Road Gasoline Engines Rule			
5.3.2	EPA Non-Road Diesel Engines Rule			
5.3.3	Emissions Standards for Spark Ignition Marine Engines	393	5,320	2,152
5.3.4	Emissions Standards for Large Spark Ignition Engines			
5.3.5	Standards for Locomotive			
SUBTOTAL		**393**	**5,320**	**2,152**
ON-ROAD MEASURES				
5.4.1	High-Tech Inspection/Maintenance (updated cutpoints)			
5.4.3	National Low Emission Vehicle Program	204	28,770	3,496
5.4.4	Tier 2 Motor Vehicle Emission Standards			
5.4.5	Heavy-Duty Diesel Engine Rule			
5.4.6	Transportation Control Measures and Vehicle Technology, Fuel, or Maintenance Measures	2.6	149.1	0
SUBTOTAL		**207**	**28,919**	**3,496**
TOTAL REDUCTIONS		**599**	**77,330**	**23,615**

Notes: No additional emission reductions are expected for measures fully implemented before 2002.

5.1 POINT SOURCE MEASURES

5.1.1 RACT and Regional Transport Requirements (federal and state regulation)

This section documents credit for emissions reductions attributable to federal and state requirements on point sources. These credits include

- NO_x Reasonably Available Control Technology (RACT), as required for 8-hour ozone nonattainment areas;
- "NO_x Budget" rules that required a second phase of stationary source NO_x reductions as part of a coordinated regulatory initiative by the Ozone Transport Region (OTR) states to further reduce NO_x emissions in the Northeast;
- "NO_x SIP Call" to reduce ozone transport in the eastern United States;
- EPA's Clean Air Interstate Rule (CAIR); and
- Maryland's Healthy Air Act (HAA).

Control Strategy

RACT

States implemented NO_x RACT to meet the requirements for 8-hour ozone nonattainment areas. For each $PM_{2.5}$ nonattainment area, 40 CFR 51.1010 notes that a SIP revision demonstrating that all reasonably available control measures, including RACT for stationary sources, necessary to demonstrate attainment as expeditiously as practicable, have been adopted. The section of the implementation rule goes on to state that potential measures that are reasonably available, considering technical and economic feasibility, must be adopted as Reasonably Available Control Measures (RACM) if, considered collectively, they would advance the attainment date by one year or more. As discussed in Section 7.2.1, the states determined that there are no additional control measures that could be adopted by January 1, 2008. Further, existing measures, and those planned for implementation by 2009, are expected to enable the region to continue to demonstrate compliance with the $PM_{2.5}$ NAAQS (1997) through the 2009 attainment date. As such, no further actions on RACT is warranted.

NO_x OTC Phase II Budget Rules

In the late 1990's Maryland and the District adopted "NO_x Budget" rules to require a second phase of stationary source NO_x reductions as part of a coordinated regulatory initiative by the OTR states to further reduce NO_x emissions in the Northeast. The rules required large stationary sources to reduce summertime NO_x emissions by approximately 65 percent from 1990 levels. The regulation also included provisions allowing sources to comply by trading "allowances." This regulation required affected sources to reduce their emissions to meet these requirements by May 2001.

NO_x SIP Call

In late 1998, the EPA adopted a rule called the "NO_x SIP Call" to reduce ozone transport in the eastern United States. This regional NO_x reduction program required 22 states, including Maryland and Virginia, and the District of Columbia, to further reduce large point source NO_x emissions to EPA-identified state emission budget levels by 2007. State regulation adoption timelines notwithstanding, the majority of the 22 SIP call states had these regulations in place by

2003/2004.

Clean Air Interstate Rule (CAIR)

On May 12, 2005, the EPA promulgated the Clean Air Interstate Rule, which requires reductions in emissions of NO_x and SO_2 from large fossil fuel fired electric generating units. The rule is set up in several phases with the first phase of NO_x reductions to come by 2009. The first phase of SO_2 reductions are expected by 2010. The rule sets up both an annual emissions budget and an ozone season emissions budget. The rule requires that units with nameplate capacity greater than 25 megawatts (MW) emit no more NO_x or SO_2 than their allocations determined by the state either through emission controls or banking and trading.

Virginia CAIR and New Source Review Permitting

Virginia has adopted state regulations codifying the requirements of the CAIR. Virginia's rules create an emissions cap based on the allowances allocated to the facility. These nonattainment area requirements are enforceable as regulations of the State Air Pollution Control Board as provided in the Virginia Air Pollution Control Law [Chapter 13 (§ 10.1- 1300 et seq.) of Title 10.1 of the Code of Virginia] and enforceable to meet emissions reductions necessary for attainment under this plan; however, they have not been submitted to be part of the Virginia SIP in order to implement the federal CAIR program or meet the requirements of § 110(a)(2)(D)(i) of the federal Clean Air Act.

The Possum Point Power Station initiated a new source review action resulting in a netting exercise that reduced emissions. The netting exercise relied on a fuel switch from coal to natural gas for several units, thereby providing emissions reductions in SO_2.

Maryland Healthy Air Act (HAA)

In April of 2006, the Maryland General Assembly enacted the Maryland Healthy Air Act. The Maryland General Assembly record related to the HAA and the final version of the Act itself can be found at http://mlis.state.md.us/2006rs/billfile/SB0154.htm. The Maryland Department of the Environment (MDE) Regulations (Code of Maryland Regulations) can be found at http://www.mde.state.md.us/assets/document/CPR_12-26-06_Emergency_and_Permanent_HAA_Regs_for_AELR.pdf. The HAA is one of the toughest power plant emission laws on the East Coast. The HAA requires reductions in nitrogen oxide (NO_x), sulfur dioxide (SO_2), and mercury emissions from large coal burning power plants. The HAA also requires that Maryland become involved in the Regional Greenhouse Gas Initiative (RGGI), which is aimed at reducing greenhouse gas emissions. The MDE has been charged with implementing the HAA through regulations. As enacted, these regulations constitute the most sweeping air pollution emission reduction measure proposed in Maryland history. To meet the requirements of Maryland's regulations a company's "system" (covered units owned by the same company) must meet a system-wide cap by 2009. Compliance cannot be achieved through the purchase of allowances under the HAA.

District of Columbia CAIR

The District of Columbia is currently drafting its CAIR. Its CAIR regulations do not allow trading of NO_x allowances for achieving the reductions for the facilities within its jurisdiction.

Summary

The point source NO_x, SO_2, and $PM_{2.5}$ Direct controls are a phased approach to controlling emissions from power plants and other large fuel combustion sources. The following programs result in emission reductions from point sources that demonstrate progress toward attaining the PM standard:

- NO_x SIP Call Rule
- EPA's CAIR
- Maryland's HAA
- New Source Review Permitting

In Maryland, the expected emission reductions for 2009 were calculated using the emissions estimates consistent with annual allocations under the HAA implementing regulation. The program does not allow trading of emission allowances. In Virginia, the expected emission reductions for 2009 from electric generating utilities were calculated using knowledge of historical emission rates, adjusted by the expected control efficiencies achieved from various control devices that have been installed or by estimating the amount of allowances the facility would receive under the Virginia CAIR rule. In the District of Columbia, the expected emission reductions for 2009 were calculated using the listed allowances within the CAIR.

See Appendix C for further point source documentation.

Implementation

District Department of the Environment
Maryland Department of the Environment, Air and Radiation Management Administration
Virginia - Department of Environmental Quality

Projected Reductions

Emission reductions resulting from the point source controls are presented by state in the table below.

	Emission Reductions (tons/year)			
	District of Columbia	**Maryland**	**Virginia**	**Total**
2009 NO_x Reductions	700.8	36,447	5,943	43,091
2009 SO_2 Reductions	0	0	17,967	17,967
2009 $PM_{2.5}$ Direct Reductions	0	0	0	0

Emission Benefit Calculations

The emission reductions associated with the federal and state requirements on point sources were supplied by the staff of the Maryland Department of the Environment, Air and Radiation Management Administration, the District Department of the Environment, and the Virginia Department of Environmental Quality Air Division.

References

1990 Clean Air Act Amendments, 42 U.S.C. §§7513

Code of Maryland Regulations (COMAR) 26.11.27

Federal Register, Vol. 70, No. 91, May 12, 2005, p. 25162.

5.1.2 Visibility Standards (federal and state regulation)

This section documents credit for emissions reductions attributable to federal and regional requirements on point sources. These credits include visibility standards for existing and modified stationary sources.

Control Strategy

Virginia

The visibility regulations for existing facilities were adopted in Virginia under 9 VAC 5 Chapter 40 "Existing Stationary Sources" Part II "Emission Standards" Article 1 "Visible Emissions and Fugitive Dust/Emissions (Rule 4-1)." See
http://www.deq.virginia.gov/air/regulations/air40.html
The paragraphs under the article are

- 9 VAC 5-40-80 "Standard for Visible Emissions"
- 9 VAC 5-40-90 "Standard for Fugitive Dust/Emissions"

The visibility regulations for new and modified units were adopted under 9 VAC 5 Chapter 50 "New and Modified Stationary Sources" Part II "Emission Standards" Article 1 "Visible Emissions and Fugitive Dust/Emissions (Rule 5-1)." See
http://www.deq.virginia.gov/air/regulations/air50.html The paragraphs under the article are

- 9 VAC 5-50-80 "Standard for Visible Emissions"
- 9 VAC 5-50-90 "Standard for Fugitive Dust/Emissions"

District of Columbia

The opacity regulations in the District of Columbia were adopted in 1984 with District of Columbia Air Pollution Control Act. The official cite is 20 DCMR 606, and the effective date is March 15, 1985.

Maryland

The visibility regulations in Maryland were adopted in 1968 and have been amended several times since that time. See Chapter 9 for additional details.

Implementation
District Department of the Environment
Maryland Department of the Environment - Air and Radiation Management Administration
Virginia - Department of Environmental Quality

Projected Reductions and Emission Benefit

The benefits of this program are reflected in the 2002 baseline inventory and the 2009 projections thereof. Additional reductions from this measure are not expected.

5.2 AREA SOURCE MEASURES

5.2.1 Seasonal Open Burning Restrictions (state rule)

This measure involves amending and/or adopting state regulations to ban the open burning of such items as trees, shrubs, and brush from land clearing; trimmings from landscaping; and household or business trash during the peak ozone season. The measure is authorized by state regulations but is enforced by the local governments.

Source Type Affected

The measure affects all citizens and businesses that burn solid waste.

Control Strategy

Under the 15% VOC Reduction Plan, Maryland and Virginia adopted state regulations to prohibit open burning during peak ozone season in the Washington, D.C. ozone nonattainment area. The emissions benefits will remain constant through 2009.

Implementation

District of Columbia - Department of Environment.
Maryland Department of the Environment, Air and Radiation Management Administration; local government enforcement.
Virginia - Department of Environmental Quality; local government enforcement.

Projected Reductions and Emission Benefit

The benefits of this program are reflected in the 2002 baseline inventory and the 2009 projections thereof. Additional reductions from this measure are not expected.

References

"Open Burning in Residential Areas, Emissions Inventory Development Report," E.H. Pechan & Associates, Inc., January 31, 2003. Prepared for the Mid-Atlantic/Northeast Visibility Union.

"Northern Virginia Open Burning Rule Effectiveness Evaluation," E.H. Pechan & Associates, Inc., December 8, 2003. Prepared for the County of Fairfax.

5.3 NONROAD MEASURES

The following nonroad emission reduction measures, discussed in greater detail later in this section, are calculated using the NONROAD2005 model:

- EPA Nonroad Gasoline Engines Rule, 5.3.1
- EPA Nonroad Diesel Engines Rule, 5.3.2
- Emissions Standards for Spark-Ignition Marine Engines, 5.3.3
- Emissions Standards for Large Spark-Ignition Engines, 5.3.4
- Emission Standards for Locomotives, 5.3.5, are calculated using the Area Source spreadsheet, but emission benefits are included in the nonroad sector totals.

Projected Reductions and Emission Benefit Calculations

NONROAD2005, the current nonroad emissions model approved for use by the EPA, is not designed to calculate the benefits of each of the above control measures individually. As a result, this and future SIP revisions will not enumerate the benefits of individual nonroad control measures. The table below summarizes the combined benefits from the above control measures by jurisdiction.

	Emission Reductions (tons/year)			
	District of Columbia	**Maryland**	**Virginia**	**Total**
2009 NO_x Reductions	708	2,165	2,447	5,320
2009 SO_2 Reductions	351	814	987	2,152
2009 $PM_{2.5}$ Direct Reductions	52	151	190	393

5.3.1 Phase I and Phase II Emissions Standards for Gasoline-Powered Nonroad Utility Engines (federal rule)

This measure takes credit for emissions reductions attributable to emissions standards promulgated by the EPA for small nonroad, spark-ignition (SI) (i.e., gasoline-powered) utility engines, as authorized under 42 U.S.C. §7547. The measure affects gasoline-powered (or other SI) lawn and garden equipment, construction equipment, chain saws, and other such utility equipment as chippers and stump grinders, wood splitters, etc., rated at or below 19 kilowatts (kW) [an equivalent of 25 or fewer horsepower (hp)]. Phase 2 of the rule applied further controls on handheld and nonhandheld outdoor equipment.

Control Strategy

Federal emissions standards promulgated under §7547 (a) apply to SI nonroad utility engines. The EPA's Phase 1 Spark Ignition Nonroad Final Rule on such emissions standards was published in 60 *Federal Register* 34581 (July 3, 1995) and was effective beginning August 2, 1995. Compliance was required by the 1997 model year. The Phase 2 final rule for handheld nonroad equipment was published in 65 *Federal Register* 24267 (April 25, 2000). The Phase 2 final rule for nonhandheld equipment was published in 64 *Federal Register* 15207 (March 30, 1999).

Implementation

This program is implemented by the EPA, under 42 U.S.C. §7547 (a).

References

EPA Guidance Memorandum, "Future Nonroad Emission Reduction Credits for Court-Ordered Nonroad Standards," from Emission Planning and Strategies Division, Memorandum from Phil Lorang, Director, Emission Planning and Strategies Division, November 28, 1994.

U.S. Environmental Protection Agency, "Emission Standards for New Nonroad Spark-Ignition Engines at or Below 19 Kilowatts," Final Rule, 60 *Federal Register* 34581 (July 3, 1995).

U.S. Environmental Protection Agency, “Phase 2 Emission Standards for New Nonroad Spark-Ignition Nonhandheld Engines At or Below 19 Kilowatts,” Final Rule, 64 *Federal Register* 15207 (March 30, 1999); correction published 64 *Federal Register* 36423 (July 6, 1999).

U.S. Environmental Protection Agency, “Phase 2 Emission Standards for New Nonroad Spark-Ignition Handheld Engines at or Below 19 Kilowatts,” Final Rule, 65 Federal Register 24267 (April 25, 2000).

1990 Clean Air Act Amendments, 42 U.S.C. §7547 (a).

5.3.2 Emissions Standards for Diesel-Powered Nonroad Utility Engines of 50 or More Horsepower (federal rule)

This measure takes credit for emissions reductions attributable to emissions standards promulgated by the EPA for nonnroad, compression-ignition (i.e., diesel-powered) utility engines, as authorized under 42 U.S.C. § 7547. The measure affects diesel-powered (or other compression-ignition) construction equipment, industrial equipment, etc., rated at or above 37 kW (37 kW is approximately equal to 50 hp).

Control Strategy

Federal emissions standards applicable to compression-ignition nonroad utility engines are promulgated under §7547 (a).

EPA's first rule on such emissions standards was published in 59 *Federal Register* 31306 (June 17, 1994) and was effective on July 18, 1994.

Tier 2 and Tier 3 Emission Standards were promulgated in 1998. This program includes the first set of standards for nonroad diesel engines less than 37 kW (phasing in between 1999 and 2000), including marine engines in this size range. It also phases in more stringent Tier 2 emission standards from 2001 to 2006 for all engine sizes and adds yet more stringent Tier 3 standards for engines between 37 and 560 kW (50 and 750 hp) from 2006 to 2008.

EPA adopted a comprehensive national program to greatly reduce emissions from future nonroad diesel engines by integrating engine and fuel controls as a system to gain the greatest air quality benefits. This rule was published June 29, 2004. The requirement to reduce sulfur levels in nonroad diesel fuel by more than 99 percent will allow, for the first time, advanced emission control systems to be used on the engines used in construction, agricultural, industrial, and airport service equipment.

Implementation

This program is implemented by the EPA under 42 U.S.C. § 7547 (a).

References

1990 Clean Air Act Amendments, 42 U.S.C. §7547 (a).

U.S. Environmental Protection Agency, "Control of Emissions of Air Pollution from Nonroad Diesel Engines; Final Rule," 63 *Federal Register* 56967, October 23, 1998.

U.S. Environmental Protection Agency, "Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel; Final Rule," 69 *Federal Register*, Vol. 69, No. 124, June 29, 2004.

EPA Guidance Memorandum, "Future Nonroad Emission Reduction Credits for Court-Ordered Nonroad Standard," from Emission Planning and Strategies Division, Memorandum from Phil Lorang, Director, Emission Planning and Strategies Division, November 28, 1994.

U.S. Environmental Protection Agency," Determination of Significance for Nonroad Sources and Emission Standards for New Nonroad Compression-Ignition Engines at or Above 37 Kilowatts," Final Rule, 59 *Federal Register* 31306 (June 17, 1994).

5.3.3 Emissions Standards for Spark-Ignition (SI) Marine Engines (federal rule)

This EPA measure controls exhaust NO_x emissions from new spark-ignition (SI) gasoline marine engines, including outboard engines, personal watercraft engines, and jet boat engines.

Control Strategy

EPA is imposing emission standards for two-stroke technology, outboard and personal watercraft engines. This will involve increasingly stringent control over the course of a 9-year phase-in period beginning in model year 1998. By the end of the phase-in, each manufacturer must meet a NO_x emission standard.

Implementation

This program is implemented by the EPA under 42 U.S.C. § 7547 (a).

References

1990 Clean Air Act Amendments, 42 U.S.C. §7547 (a).

U.S. Environmental Protection Agency, "Control of Air Pollution; Final Rule for New Gasoline Spark-Ignition Marine Engines; Exemptions for New Nonroad Compression-Ignition Engines at or Above 37 Kilowatts and New Nonroad Spark-Ignition Engines at or Below 19 Kilowatts," 61 *Federal Register* 52087, October 4, 1996.

Regulatory Impact Analysis "Control of Air Pollution Emission Standards for New Nonroad Spark-Ignition Marine Engines," U.S. EPA, June 1996

5.3.4 Emissions Standards for Large Spark-Ignition (SI) Engines (federal rule)

This EPA measure controls emissions from several groups of previously unregulated nonroad engines, including large industrial SI engines.

Control Strategy

The EPA requirements vary depending upon the type of engine or vehicle, taking into account environmental impacts, usage rates, the need for high performance models, costs, and other factors. The emission standards apply to all new engines sold in the United States and any imported engines manufactured after these standards began.

Controls on the category of large industrial SI engines were first required in 2004. Controls on the other engine categories began in years after 2005. Large industrial SI engines are those rated over 19 kW used in a variety of commercial applications; most use liquefied petroleum gas, with others operating on gasoline or natural gas.

EPA adopted two tiers of emission standards for large SI engines. The first tier of standards, which started in 2004, are based on a simple laboratory measurement using steady-state procedures. The Tier 1 standards are the same as those adopted earlier by the California Air Resources Board for engines used in California. Tier 2 standards became effective in 2007.

Implementation

This program is implemented by the EPA under 42 U.S.C. § 7547 (a).

References

1990 Clean Air Act Amendments, 42 U.S.C. §7547 (a).

U.S. Environmental Protection Agency, "Control of Emissions from Nonroad Large Spark-Ignition Engines, and Recreational Engines (Marine and Land-Based)," Final Rule, 67 *Federal Register* 68241 (November 8, 2002).

U.S. Environmental Protection Agency, Final Regulatory Support Document: Control of Emissions from Unregulated Nonroad Engines," EPA420-R-02-022, September 2002.

5.3.5 Standards for Locomotives (federal rule)

This measure sets NO_x standards for locomotive engines remanufactured and manufactured after 2001.

Source Type Affected

This program includes all locomotives originally manufactured from 2002 through 2004. It also applies to the remanufacture of all engines built since 1973. Regulation of the remanufacturing process is critical because locomotives are generally remanufactured five to ten times during their total service lives, which are typically 40 years or more.

Control Strategy

Three separate sets of emissions standards have been adopted, with the applicability of the standards dependent on the date a locomotive is first manufactured. The first set of standards (Tier 0) applies to locomotives and locomotive engines originally manufactured from 1973 through 2001, any time they are manufactured or remanufactured. The second set of standards (Tier 1) apply to locomotives and locomotive engines originally manufactured from 2002 through 2004. These locomotives are required to meet the Tier 1 standards at the time of manufacture and at each subsequent remanufacture. The final set of standards (Tier 2) apply to locomotives and locomotive engines originally manufactured in 2005 and later. Electric locomotives, historic steam-powered locomotives and locomotives manufactured before 1973 do not significantly contribute to the emissions problem and, therefore, are not included in the regulation.

Implementation

This program is implemented by the EPA under the *Final Emissions Standards for Locomotives* (EPA420-F-97-048) published in December 1997.

Projected Reductions

Emission reduction values are generated using the Area Source spreasheet but are presented in the overall nonroad sector totals.

Emission Benefit Calculations

Emission benefits are based on EPA guidance on emission factors for locomotives. In 2009, the reductions are 32.35 percent for NO_x and 15 percent for $PM_{2.5}$.

References

Regulatory Update, EPA's Nonroad Engine Emissions Control Programs, EPA, Air and Radiation, EPA420-F-99-001, January 1999.

Final Emissions Standards for Locomotives, EPA420-F-97-048, December 1997.

Emission Factors for Locomotives, EPA420-F-97-051, December 1997, Table 9.

5.4 ON-ROAD MEASURES

The following onroad emission reduction measures, discussed in greater detail later in this section, are calculated using the MOBILE6 model:

- Enhanced Inspection and Maintenance (I/M), 5.4.1
- Federal Tier 1 Vehicle Standards, 5.4.2
- National Low Emission Vehicle Standards, 5.4.3
- Federal Tier 2 Vehicle Standards, 5.4.4
- Heavy Duty Diesel Engine Rule, 5.4.5

Projected Reductions and Emission Benefit Calculations

MOBILE5b, the mobile emissions model used in previous SIPs, was designed to calculate the benefits of each of the above control measures individually. In the update to MOBILE6, changes were made to the model, creating synergistic effects between the five mobile control measures listed above. These effects make it difficult to calculate incremental benefits from implementation of individual control measures. As a result, this and future SIP revisions will not enumerate the benefits of individual mobile control measures, with the exception of the transportation control measures (TCMs) and vehicle technology, fuel, and maintenance-based measures, which are quantified outside of the MOBILE6 model. The table below summarizes the combined benefits from the above control measures by jurisdiction. See Appendix E1 for documentation of the MOBILE 6 modeling process.

	Emission Reductions (tons/year)			
	District of Columbia	**Maryland**	**Virginia**	**Total**
2009 NO_x Reductions	2,277	13,853	12,640	28,770
2009 SO_2 Reductions	265	1,706	1,525	3,496
2009 $PM_{2.5}$ Reductions	15	100	89	204

5.4.1 Enhanced Vehicle Emissions Inspection and Maintenance (Enhanced I/M) (federal regulation)

This measure involves requiring a regional vehicle emissions I/M program with requirements stricter than "basic" programs, as required under 42 U.S.C. §7511a(c)(3) and 7521. Before 1994, "basic" automobile emissions testing checked only tailpipe emissions while idling and sometimes at 2,500 rpm. The new procedures include a dynamometer (treadmill) test that checks the car's emissions under driving conditions. In addition, evaporative emissions and the on-board diagnostic computer are checked.

Source Type Affected

This measure affects light-duty gasoline and diesel vehicles and trucks.

Control Strategy

Maryland, the District of Columbia, and Virginia committed to EPA Performance Standard Enhanced I/M programs in the 15% VOC Emissions Reduction Plan. Each affected vehicle in the region is given a high-tech emissions test every two years, and there is extensive use of on-board diagnostics. In Maryland and the District of Columbia, emissions tests are performed at test-only stations. Virginia tests vehicles in stations that may also perform repairs using a decentralized program.

Implementation

District of Columbia - Department of Public Works, Department of Consumer and Regulatory Affairs
Maryland - Motor Vehicles Administration
Virginia - Department of Environmental Quality

Appendix E1 contains detailed information regarding implementation of I/M programs in the District, Maryland, and Virginia.

References

U.S. Environmental Protection Agency, "Inspection/ Maintenance Program Requirements," Final Rule, 57 *Federal Register* 52950 (November 5, 1992).

U.S. Environmental Protection Agency, "I/M Costs, Benefits, and Impacts Analysis," Draft, February 1992.

5.4.2 Federal Tier I New Vehicle Emission and New Federal Evaporative Emissions Standards (federal regulation)

Under 42 U.S.C. §7521, EPA issued a new and cleaner set of federal motor vehicle emission standards (Tier I standards), which were phased in beginning with model year 1994.

The benefits of this program are reflected in the 2002 baseline inventory and the 2008 and 2009 projections thereof.

Source Type Affected

These federally implemented programs affected light-duty vehicles and light-duty trucks (LDT).

Control Strategy

The Federal Motor Vehicle Control Program requires more stringent exhaust emission standards as well as a uniform level of evaporative emission controls, demonstrated through the new federal evaporative test procedures. Under 42 U.S.C. §7521(g), all post-1995 model year cars must achieve the Tier I (or Phase I) exhaust standards, which are as follows (emissions are in grams/mile and are related to durability timeframes of 5 yrs/50,000 miles and 10 yrs/100,000 miles):

Vehicle Type	*5 yrs/50,000 miles*			*10 yrs/100,000 miles*		
	VOCs	CO	NO_x	VOCs	CO	NO_x
Light-duty vehicles; light-duty trucks (loaded weight 3,750 lbs)	0.25	3.4	0.4[a]	0.31	4.2	0.6[a]
Light-duty trucks (loaded weight of 3,751 to 5,750 lbs)	0.32	4.4	0.7[b]	0.40	5.5	0.97

[a]For diesel-fueled light-duty vehicles and for LDTs at 3,750 lbs, before model year 2004, the applicable NO_x standards shall be 1.0 at 5 yrs/50,000 miles and 1.25 at 10 yrs/100,000 miles.
[b]This NO_x standard does not apply to diesel-fueled trucks of 3,751 to 5,750 lbs.

Implementation
This program is implemented by the EPA under 42 U.S.C. §7521.

References

U.S. Environmental Protection Agency, Office of Mobile Sources, *User's Guide to MOBILE5*, Chapter 2, March 1993.

5.4.3 National Low Emission Vehicle Program (federal regulation)

Under the National Low-Emission Vehicle (LEV) program, auto manufacturers have agreed to comply with tailpipe standards that are more stringent than EPA can mandate prior to model year (MY) 2004. Once manufacturers committed to the program, the standards became enforceable in the same manner in which other federal motor vehicle emissions control requirements are enforceable. The program went into effect throughout the Ozone Transport Region (OTR), including Maryland, Virginia, and the District of Columbia, in MY 1999 and was in place nationwide in MY 2001.

The benefits of this program are reflected in the 2002 baseline inventory and the 2008 and 2009 projections thereof. Additional reductions from this measure are not expected.

Source Type Affected

These federally implemented programs affect light-duty vehicles and trucks.

Control Strategy

The National Low Emission Vehicle Program requires more stringent exhaust emission standards than the Federal Motor Vehicle Control Program Tier I (or Phase I) exhaust standards.

Implementation

This program is implemented by the EPA, under 40 CFR Part 86 Subpart R. Nine states within the OTR, including the MWAQC states, have opted-in to the program as have all the auto manufacturers. EPA found the program to be in effect on March 2, 1998.

References

U.S. Environmental Protection Agency, Office of Mobile Sources, *User's Guide to MOBILE5*, Chapter 2, March 1993.

5.4.4 Tier 2 Motor Vehicle Emission Regulations (federal regulation)

The EPA promulgated a rule on February 10, 2000, requiring more stringent tailpipe emissions standards for all passenger vehicles, including sport utility vehicles (SUVs), minivans, vans, and pick-up trucks. These regulations also require lower levels of sulfur in gasoline, which will ensure the effectiveness of low emission-control technologies in vehicles and reduce harmful air pollution.

Source Type Affected

These federally implemented programs affect light-duty vehicles and trucks.

Control Strategy

The new tailpipe and sulfur standards require passenger vehicles to be 77 to 95 percent cleaner than those built before the rule was promulgated and will reduce the sulfur content of gasoline by up to 90 percent. The new tailpipe standards are set at an average standard of 0.07 grams/mile for NO_x for all classes of passenger vehicles beginning in 2004. This includes all light-duty trucks, as well as the largest SUVs. Vehicles weighing less than 6000 pounds are being phased-in to this standard between 2004 and 2007.

Beginning in 2004, the refiners and importers of gasoline have the flexibility to manufacture gasoline with a range of sulfur levels as long as all of their production is capped at 300 parts per million (ppm) and their annual corporate average sulfur levels are 120 ppm. In 2005, the refinery average was set at 30 ppm, with a corporate average of 90 ppm and a cap of 300 ppm. Finally, in 2006, refiners met a 30 ppm average sulfur level with a maximum cap of 80 ppm.

As newer, cleaner cars enter the national fleet, the new tailpipe standards will significantly reduce emissions of nitrogen oxides from vehicles by about 74 percent by 2030.

Implementation
EPA implements this program under 40 CFR Parts 80, 85, and 86.

References

U.S. Environmental Protection Agency, "Control of Air Pollution from New Motor Vehicles: Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements," Final Rule, 65 *Federal Register 6697,* February 10, 2000.

5.4.5 Heavy-Duty Diesel Engine Rule (federal regulation)

Under the Heavy-Duty Diesel Engine Rule, truck manufacturers must comply with more stringent tailpipe standards by 2004 and 2007. The standards are enforceable in the same manner that other federal motor vehicle emissions control requirements are enforceable.

Source Type Affected

These federally implemented programs affect heavy-duty diesel engines used in trucks.

Control Strategy

The Heavy-Duty Diesel Engine Rule requires more stringent exhaust emission standards. The rule also mandates use of ultra-low sulfur diesel fuel. Sulfur in diesel fuel must be lowered to enable modern pollution-control technology to be effective on these trucks and buses. EPA requires a 97 percent reduction in the sulfur content of highway diesel fuel from its former level of 500 ppm (low sulfur diesel, or LSD) to 15 ppm (ultra-low sulfur diesel, or ULSD). Refiners began producing the cleaner-burning diesel fuel, ULSD, for use in highway vehicles beginning June 1, 2006.

Implementation

This program is implemented by the EPA, under 40 CFR Parts 9 and 86 Control of Emissions of Air Pollution From Highway Heavy-Duty Engines; Final Rule.

References

U.S. Environmental Protection Agency, Office of Mobile Sources, *User's Guide to MOBILE5*, Chapter 2, March 1993.

40 CFR Parts 9 and 86 Control of Emissions of Air Pollution from Highway Heavy-Duty Engines; Final Rule (62 FR 54694), October 21, 1997.

5.4.6 Transportation Control Measures (TCMs) and Vehicle Technology, Fuel, and Maintenance-based Measures (state and local program)

Section 108(f) of the Clean Air Act Amendments provides examples of TCMs that can be implemented to reduce emissions from mobile sources. Most TCMs are designed to improve the flow of traffic or reduce vehicle miles traveled (VMT) or vehicle trips.

In conjunction with state departments of transportation and local transit authorities, state air agencies have identified a number of projects designed to reduce vehicle travel and mitigate traffic congestion in the Metropolitan Washington nonattainment area. These measures include purchase of alternative-fueled vehicles, improvements to bicycle and pedestrian facilities, improvements to transit services, and access to transit facilities. All responsible agencies have committed to implementing these projects by January 1, 2005.

Additional information on TCMs is contained in Appendix F.

Source Type Affected
Transportation-related activities in the Metropolitan Washington nonattainment area

Implementation
District of Columbia – Department of Transportation
Maryland - Department of Transportation
Virginia - Department of Transportation
Washington Metropolitan Area Transit Authority
Northern Virginia Local Governments

Projected Reductions

Transportation Control Measures

	Emission Reductions (tons/year)			
	District of Columbia	**Maryland**	**Virginia**	**Total[a]**
2009 $PM_{2.5}$ Reductions	-	-	-	1.55
2009 NO_x Reductions	-	-	-	67.14

Vehicle Technology, Maintenance, or Fuel-Based Measures

	Emission Reductions (tons/year)			
	District of Columbia	**Maryland**	**Virginia**	**Total[a]**
2009 $PM_{2.5}$ Reductions	-	-	-	1.03
2009 NO_x Reductions	-	-	-	81.93

[a] Totals also include TCMs and Vehicle Technology, Maintenance, and Fuel-based Measures for the Washington Metropolitan Area Transit Administration (WMATA). Emission reduction estimates were supplied by the District of Columbia Department of Transportation, the Maryland Department of Transportation, the Virginia Department of Transportation. See Appendix F for details.

5.5 SUPPLEMENTAL CONTROL MEASURES

EPA's voluntary measures policy, "Guidance on Incorporating Voluntary Mobile Source Emission Reduction Programs in State Implementation Plans," establishes criteria under which emission reductions from voluntary programs are creditable in a SIP. This policy permits states to develop and implement innovative programs that partner with local jurisdictions, businesses, and private citizens to implement emission-reducing behaviors at the local level.

Inclusion of the following programs in the control measures portion of this attainment plan is not intended to create an enforceable commitment by the states to implement the programs or to achieve any specific emission reductions projected as a result of implementation of the programs, and the states do not make any such commitment. In addition, the states do not rely on any emission reductions projected as a result of implementation of these programs to demonstrate attainment. While the emission reductions from these programs could be substantial and could lead to significant regional air quality benefits, actual air quality benefits are uncertain.
Consequently, projected emission reductions from these programs are not included in the emission inventory, the attainment modeling, the reasonable further progress calculation, or any other area of the SIP where specific projected emission reductions are identified.

This SIP proposes a set of supplemental controls that includes emission reductions measures included in the bundle for the 8-hour ozone SIP and several additional programs proposed herein. All of the supplemental measures have been implemented after the 2002 base year. These supplemental measures may be expanded in future SIPs as additional voluntary measures are developed and implemented. Though the benefits of these programs are not reflected in the region's 2009 controlled inventory, the programs are an important part of the region's attainment strategy. Commitment letters from participating jurisdictions are included in Appendix G.

This section contains descriptions of the supplemental control measures and other programs that are included in this SIP submission. Individual measures and programs are described on succeeding pages. Some examples of successful local programs include

- Committing to purchasing low-emission vehicles reducing emissions from on-road sources.
- Voluntary shutdowns of county waste-to-energy facilities to reduce stationary source emissions during air pollution episodes.
- Reducing emissions from peaking units that generate electricity to reduce NO_x emissions during periods of poor air quality.
- Banning operation of lawn and garden equipment to reduce nonroad emissions.
- Reducing mobile emissions through liberal leave policies and support for teleworking on Code Red Days.
- Developing tree planting programs as a long-term strategy to improve air quality.

Source Type Affected

These supplemental controls reflect commitments by owners, operators, purchasers, or users of the following types of emissions-related items/equipment in the Metropolitan Washington area: commercial power generation, municipal buildings, commuting, fleets, and urban forest trees.

Implementation

Arlington County, Virginia
City of Alexandria, Virginia
City of Falls Church, Virginia
City of Greenbelt, Maryland
Fairfax City, Virginia
Fairfax County, Virginia
Loudoun County, Virginia
Maryland Department of Transportation
Maryland National Capital Parks and Planning Commission
Montgomery County, Maryland
Prince George's County, Maryland
Prince William County, Virginia
Washington Surburban Sanitary Commission, Maryland

Supplemental Control Measures

The local governments and state agencies in the Washington region have taken a coordinated, proactive approach to reducing emissions. These actions reduce SO_2 and NO_x emissions from a variety of source sectors. Programs include

Point Source Measures

- Renewable Energy Programs
  - Regional Wind Power Purchase Program
  - Clean Energy Rewards Program
  - Renewable Portfolio Standards
- Energy Efficiency Programs
  - Light-Emitting Diode (LED) Traffic Signal Retrofit Program
  - Building Energy Efficiency Programs
- Green Building Programs
- High Electricity Demand Day Initiative (HEDD)

Mobile Source Measures

- Diesel Particulate Reductions*
- Low-Emission Vehicle Purchases*
- Telecommuting Initiative*

* Explicitly reserved for use as TERMs in transportation conformity.

Other Programs

- Clean Air Partners
- Tree Canopy Programs

Additional Programs Being Implemented or under Development**

- Early Adoption of Low-Sulfur Fuel for Off-Road Applications
- Restrictions on Installation of Wood Burning Fireplaces
- Dust Suppression for Construction
- Idling Controls
- CAIR Plus
- Distributed Generation Rule
- Industrial, Commercial, and Institutional Boiler Rule
- Energy Performance Contracting
- Airport Initiatives
- Heavy Duty I/M, Smoke Testing
- Low-Sulfur Home Heating Oil

** No further information on these initiatives is provided herein.

Point Source Strategies

5.5.1 Regional Wind Power Purchase Program

Under this measure, local and state government entities in the nonattainment area have committed to purchase a specific number of kilowatt-hours (kWh) of power during the summer ozone season from wind turbines. The government agencies will purchase the wind energy directly from an electricity supplier or purchase renewable energy certificates (RECs)[1] that ensure that such wind energy is placed on the electric grid. This zero-emission wind power will displace emissions from fossil-fueled power plants that would normally supply power to the Metropolitan Washington region. The air agencies in Maryland, the District of Columbia, and Virginia may retire NO_x allowances in an amount commensurate with the amount of emissions displaced.

Source Type Affected

The measure affects certain local and state government entities within the Metropolitan Washington nonattainment area. The region is implementing this measure to reduce electric power generation from coal, oil, and/or gas-fired sources, thereby reducing NO_x emissions from these sources.

Control Strategy

This measure is envisioned as a region-wide measure encompassing purchases of wind power or wind energy RECs by state and local government entities within the Metropolitan Washington nonattainment area.

This program was initiated on a pilot basis in the 1-hour ozone SIP and was expanded in the 8-hour ozone SIP. To meet commitments, local governments signed multi-year commitments with wind power suppliers to ensure that a fixed quantity of wind energy would be placed on the electric grid in upwind or continguous states. These purchases have displaced fossil fuel generated power, thus reducing the NO_x emitted from those plants.

Implementation

Arlington County, Virginia
Fairfax County, Virginia
Prince William County, Virginia
Montgomery County, Maryland
Members of the Montgomery County buying group (see list below)
Prince George's County
Washington Suburban Sanitary Commission (WSSC)
District of Columbia

[1] Renewable energy certificates represent the unique and exclusive proof that 1 megawatt-hour of energy was generated from a renewable energy source and placed on the electric grid.

In Fiscal Years (FY) 2005 and 2006, a buying group led by Montgomery County, Maryland, purchased 40,845,139 kWh of wind energy RECs per fiscal year. The purchase represented 5% of the total annual electricity consumption of each purchasing group participant. Montgomery County executed a contract amendment on September 18, 2006, to purchase additional kWhs of clean, renewable energy in compliance with SIP requirements (RECs for energy were generated at the Mountaineer Wind Energy Center in West Virginia) for FY07 and FY08 (July 1, 2006 to June 30, 2008). In the new contract, the county and many other members of the buying group opted to increase their wind energy purchase to 10% of their total annual electricity consumption, for a total of 51,809,091 kWh of clean energy purchased by the group in FY07 and 57,481,122 kWh in FY08. The purchase will cover the period from July 1, 2006 to June 30, 2008.

The following other counties, cities, and state agencies will participate in the Montgomery County buying group:

Montgomery County Public Schools (MCPS)
Montgomery County Government
Maryland National Capital Park and Planning Commissions (M-NCPPC)
Montgomery College
Housing Opportunities Commission (HOC)
City of Rockville
Gaithersburg
Takoma Park
College Park
Rockville Housing Enterprise
Town of Kensington
Chevy Chase Village
Somerset
Glenn Echo
Chevy Chase Sect. 5
Town of Laytonsville

In addition, the Virginia Energy Purchasing Governmental Association (VEPGA) issued a Reasonable Further Progress (RFP) in March 2007 to select a supplier of wind energy RECs. Current commitments amount to at least 11,470,000 kWh/year. The RFP covers the period April 2007 to March 2010. The following counties, cities, and state agencies will participate in this buying group: Fairfax County, Arlington County, City of Alexandria Schools, and Prince William County.

The District of Columbia plans to purchase 16,500 kWh/year from wind energy or wind energy RECs. There is the possibility that this purchase can be used by utilities to meet Renewable Portfolio Standard (RPS) requirements, so it is not analyzed further here.

5.5.2 Clean Energy Rewards Program

Under this measure, Montgomery County Government will provide rewards (incentives) to residents, small businesses, and community organizations purchasing clean energy products certified by the Department of Environmental Protection (DEP). The authority for this program is granted in the Montgomery County Code Section 18A-11, as amended, and Executive Regulation No. 2-06AM. Based on the program's funding of $361,000 for FY07, Montgomery County has estimated that its Clean Energy Rewards Program will provide incentives for 31,900 MWh of clean energy.

Source Type Affected

The measure affects Montgomery County residents, small businesses, congregations, and nonprofits and is supported by Montgomery County Government, within the Metropolitan Washington nonattainment area. Montgomery County is implementing this measure to reduce consumption of electric power generated from coal, oil, and/or natural gas-fired sources by consumers, thereby reducing NO_x emissions from these sources.

Control Strategy

Clean Energy Rewards is a unique program developed by Montgomery County to encourage consumers to switch to clean energy. Consumers must purchase at least 50 percent of their annual energy consumption from a clean energy product certified by DEP to be eligible for rewards.

Under the program, eligible clean energy products must be generated within the PJM Regional Transmission Organization (RTO)[2] from solar, wind, and/or Tier 1 biomass as defined by the Maryland Code, Public Utility Company Article, 7-703 (Maryland's RPS). However, current products for FY07 are limited to energy generated from wind and solar sources, and Montgomery County believes that the majority of certified clean energy products will be wind-based in 2007.

Participating suppliers must provide documentation to DEP's director verifying that all products marketed through Clean Energy Rewards meet the program's criteria. These steps ensure the clean energy is generated within the PJM region and is not used to meet the requirements of the Maryland RPS or is otherwise double counted. Only purchases of wind energy or solar will be reported for purposes of the SIP.

[2] PJM Interconnection is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia.

Implementation

Montgomery County Government. DEP solicited support from several energy suppliers and REC marketers for this program. Potential suppliers are required to submit product information labels or other generation data about each product to be marketed through the program and to sign a Memorandum of Understanding with the county agreeing to deliver the rewards to consumers either as a credit on their bill or as a product discount. Montgomery County residents will receive 1 cent/kWh up to 20,000 kWh/year. Nonresidential end-users (small business, congregations, and nonprofits) will receive 1.5 cents/kWh up to 100,000 kWh/year. Consumers can shop and sign up for clean energy through the DEP Web site. By choosing a program-certified product, consumers will automatically receive rewards.

DEP is the main marketing arm of the Clean Energy Rewards Program. However, program suppliers have also marketed their certified products and the program to Montgomery County consumers with DEP guidance to insure consistency. DEP developed a Web site and educational materials to inform consumers about the program and the benefits of clean energy. The county ran several advertising campaigns in print, on TV and radio, and through community organizations and other Montgomery County support structures. DEP estimates that these marketing measures reached thousands of Montgomery County electric consumers.

The Clean Energy Rewards program began enrolling consumers and delivering rewards January 1, 2007. Within the first fiscal year (ending June 2007), the program rewarded nearly 4,000 megawatt-hours (MWh) of clean energy purchased by Montgomery County residents, businesses, and nonprofit organizations. Program results for the first quarter of FY08 (July 2007 - June 2008) are over 7,500 MWh. DEP projects clean energy purchased through the program will increase and is likely to reach maximum participation of 31,900 MWh.

5.5.3 Renewable Portfolio Standards

This measure will focus on NO_x emission reductions resulting from the displacement of power generation from coal, oil, and/or gas-fired sources by zero-emission renewable energy sources.

Source Type Affected

The measure affects the District of Columbia within the Metropolitan Washington nonattainment area. According to the DC Renewable Energy Portfolio Standard (RPS) Act of 2004, a major purpose of the Act is to "ensure that the benefits of electricity from renewable energy sources, including long-term reduced emissions…accrue to the public at large."

Control Strategy

Under the DC RPS Act, retail electricity suppliers are required to meet their regulatory requirements by supplying renewable energy that is located (A) in the PJM Interconnection region or in a state that is adjacent to the PJM Interconnection region or (B) outside the area described in (A) but in a control area that is adjacent to the PJM Interconnection region, if the electricity is delivered into the PJM Interconnection region.

The increased supply of renewable energy will displace fossil fuel generated power in the PJM Interconnection area, thus reducing the NO_x emitted from these plants.

Implementation

District of Columbia. Under the DC RPS Act, retail electricity suppliers serving customers in the District of Columbia are required to provide 2.5% of their supply from Tier 1 renewable energy sources in 2009. In addition, retail electric suppliers are required to provide 0.019% from solar energy or solar REC purchases. This renewable energy percentage increases each year to a level of 11% in 2022 and later. Tier 1 renewable sources are defined to include (1) zero-emission renewable energy sources, including solar energy, wind energy, geothermal energy, and ocean energy, and (2) low-emission renewable energy, including qualifying biomass, qualified methane from anaerobic decomposition, and fuel cells.

5.5.4 Green Building Programs

Under this program, local governments in the nonattainment area have committed to reducing energy demand associated with operation of existing and new buildings by implementing Green Building Programs. Depending on the energy efficiency and renewable energy components of these programs, they will decrease demand for electricity and displace power generation from coal, oil, and/or gas-fired sources that would normally supply power to the Metropolitan Washington region, thereby reducing NO_x emissions from those sources.

Source Type Affected

The measure affects state and local governments within the Metropolitan Washington nonattainment area.

Control Strategy

This measure is envisioned as a region-wide measure encompassing Green Building Programs by state and local governments within the Metropolitan Washington nonattainment area. These programs are in the early stages of development and affect several local jurisdictions in the nonattainment area. Local governments have begun to implement a variety of Green Building Programs that may reduce demand for electricity. The reduction in energy demand will displace fossil fuel generated power, thus reducing the NO_x emitted from those plants.

Green Building Programs can include a number of initiatives such as certification under the Leadership in Environmental and Energy Design (LEED) Program, labeling under the ENERGY STAR® program, Green Globes rating, and green building codes. To provide air quality benefits, any program must include as a key component a requirement that retrofitted or new buildings achieve a reduction in energy demand compared to an established baseline.

Implementation

This section identifies the current status of Green Building Programs listed for the SIP, examines what uses or adaptations of major green building rating systems could be made to quantify emissions effects in a SIP context, and summarizes major green buildings efforts to date within the nonattainment area.

Current Status of Green Building Programs for the SIP

The following table lists the initial survey responses for Green Building Programs in the nonattainment area that the jurisdictions indicated they would like to include as voluntary measures, for SIP purposes. None of the jurisdictions intend to quantify the listed Green Buildings Program elements for 2009 emission reductions for the $PM_{2.5}$ SIP.

Summary of Initial Survey Responses of Voluntary Measures Regarding Green Building Programs (2002-2009)

Jurisdiction	Program Element
Fairfax County	LEED projects for municipal buildings
Arlington County	LEED scorecard for projects; developer incentives
Montgomery County	Green Building ordinance
District of Columbia	Planning for LEED requirements for all govt buildings
City of Alexandria	LEED silver goal for all govt buildings
City of Alexandria	Require plan for voluntary LEED for private sector
City of Greenbelt	LEED silver for public works building

Additional green building activities of the local governments in the nonattainment area are further described in the section below on "Green Building Activities in the Nonattainment Area."

Green Building Activities in the Nonattainment Area

This section identifies green buildings activities in the jurisdictions and LEED-certified buildings in the nonattainment area and discusses federal green buildings.

Jurisdiction Activities. Many of the jurisdictions are undertaking green buildings activities. These have not been included in this SIP submission. The National Renewable Energy Laboratory (NREL) compiled this information from the Internet and personal communications.

Metropolitan Washington Council of Governments (MWCOG). In June 2006, MWCOG Board Chair Jay Fisette announced a goal of promoting Green Building policies and practices in the Washington region. This effort supports the MWCOG Board's focus on growth and development and provides environmental and energy friendly methods for supporting sustainable development in the region, consistent with MWCOG's Strategic Energy Plan. On September 29, MWCOG's "Regional Leadership Conference on Green Building" was held with over 300 attendees from the public and private sectors. The conference focused on a review of local and national Green Building best management practices, policies, regulations, and legislation. In addition, several MWCOG members have adopted or will soon adopt legislation encouraging or requiring Green Building practices for government and/or private sector construction. The MWCOG Board adopted resolution R55-06 at the November 8, 2006, MWCOG Board Meeting, which supports the development of regional Green Building policies and best practice guidelines, establishes a special ad hoc elected official advisory committee, and adopts the existing Intergovernmental Green Building Group (IGBG) as an MWCOG technical committee.

The 2006 Regional Energy Strategic Plan, “Powered by Energy Efficiency – Fueled by Energy Conservation," outlines an energy vision and mission for the National Capital Region and expands existing regional energy and environmental goals. The Energy Strategic Plan also identifies potential initiatives to address the region’s diversity of energy sources, help manage energy demand, mitigate the effects of energy disruption, and enhance overall environmental quality. Development of the Plan was identified by the MWCOG Board of Directors as a 2006 priority. In addition, the Plan is consistent with and complements the proposed Green Building Program. The Plan was submitted to member governments in June 2006 for a 90-day comment period. The MWCOG Board approved the revised version of the Energy Strategic Plan by adopting resolution R56-06 at the MWCOG Board Meeting on November 8, 2006.

Washington, D.C. In December 2006, the District of Columbia Council enacted green building legislation applicable to private development. The legislation, which is expected to be approved by the U.S. Congress, would make Washington the first major city to require private developers to adhere to the standards of the U.S. Green Building Council (USGBC). Even before the legislation, that jurisdiction was already on track to open the nation's first LEED-certified stadium.

The bill requires all commercial development of 50,000 square feet or more to meet the building council's standards starting in 2012. The requirement applies to both new construction and significant renovations of old buildings.

All city-owned commercial projects funded in 2008 or later would have to attain certification, and District of Columbia-funded housing projects would be required to follow similar environmental standards. The bill also orders the mayor to adopt separate standards for schools, which the USGBC is now developing.

Montgomery County. On November 28, 2006, the Montgomery County Council unanimously enacted “Green Building” requirements for future public and private construction in Montgomery County -- the strongest “Green Building” requirements in the region.

The legislation requires that county-built or funded nonresidential buildings achieve a LEED Silver rating and requires private nonresidential or multi-family residential buildings to achieve a LEED-certified rating.

Buildings covered by the law include any newly constructed or extensively modified nonresidential or multi-family residential building with at least 10,000 square feet of gross floor area. The law would take effect for private buildings one year after the county implementing regulations are finalized, but not later than September 1, 2008. Follow-up regulations will address many of the details on the rating system [LEED New Construction (NC), Exisitng Building (EB)], and such regulations are expected to be developed by July 2007.

The current legislation does not have a defined mandatory energy-efficiency component beyond the prerequisites of the LEED rating system. The Montgomery County energy code is International Energy Conservation Code (IECC) 2003 (IECC 2006 is expected to be adopted in the spring of 2007), which is more aggressive than most of the neighboring jurisdictions.

Arlington County. Arlington County's Green Building Program is a leading municipal program in the region and has been developed in the context of the county's commitment to smart growth and community sustainability. County policy encourages all large commercial and multi-family residential projects to incorporate LEED components of 25 or more credits on a voluntary basis. Arlington's Green Building Incentive Program allows developers to apply for bonus density in exchange for official LEED certification. Projects may apply for a bonus density of 0.15 to 0.35 additional floor-to-area ratio (FAR). Developers who choose to participate in the density bonus and commit to LEED certification post a bond that is released when the building is certified. Site plan projects that do not receive official LEED certification from the USGBC are asked to contribute $0.03/square foot to the county's Green Building Fund. This money is used to fund green building education and workshops.

A few buildings have gone through the county's Green Building Incentive Program, including the new Navy League building, the National Rural Electric Cooperative Association building, and a private multi-family building currently under construction. Examples of the county's own green buildings include Langston Brown School and the Walter Reed Community Center.

Fairfax County. Fairfax County is expanding activities in support of environmentally sustainable development, which include incorporating more sustainable building practices. The county has focused its green building efforts in two areas: the greening of public buildings and policy for private development. Of 20 municipal buildings recently built in the county, 18 have LEED elements, with many moving toward certification. The county is in the process of reviewing the Comprehensive Plan, its key guidance document, and is developing broad language supporting green building.

City of Alexandria. The City of Alexandria initiated a green building policy four years ago and adopted a LEED standard for all public buildings in 2003-2004. Project staff review the LEED checklist to determine actions within their existing budgets and then make the decision whether to fully certify. They currently target a 3.5 percent premium for projects in order to meet the LEED Silver standard. One percent is reserved for green construction costs. Alexandria also enacted legislation in July 2006 to allow a design-build process for projects. Green building will be integrated into that process.

LEED Certified and Registered Buildings. At least 46 building projects in the nonattainment area jurisdictions are registered for LEED, and one LEED-certified building is currently listed on the USGBC Web site:

> Langston-Brown High School Continuation and Community Center
> LEED® Project # 0172
> LEED Version 2 Certification Level: SILVER
> September 3, 2003
> Arlington Public Schools, Arlington County
> Arlington, VA
> http://www.usgbc.org/ShowFile.aspx?DocumentID=425
> This project was awarded 1 credit for 15% reduction in the energy cost budget.

ENERGY STAR® *Buildings Label.* There are over 300 ENERGY STAR® labeled buildings in Maryland, Virginia, and Washington, D.C., but none are owned by the MWCOG government organizations. Many of the jurisdictions have signed up as ENERGY STAR® Partners committed to improving their energy efficiency. These local government partners currently include

Alexandria Public Schools
Arlington County
Commonwealth of Virginia
Fairfax County Government
Fairfax County Public Schools (Special Recognition in 2004)
Loudon County Public Schools
Prince William County
City of Washington, DC (and DC Energy Office)
Washington DC Public Schools
Charles County Public Schools
City of Takoma Park
Montgomery County

Federal Green Buildings. Legislation and federal mandates provide an example of setting guidelines for sustainable buildings generally and energy efficiency specifically. The Energy Policy Act of 2005 and Executive Order 13423 of January 2007 require all new federal buildings to achieve a 30 percent improvement in energy cost to American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2004. This ASHRAE Standard is the same baseline applied in LEED-NC version 2.2. The Executive Order also requires federal agencies to follow the guidelines of the Memorandum of Understanding for Federal Leadership in High Performance and Sustainable Buildings. Federal agencies are also required to meet progressive energy use intensity reduction targets for their entire building stock. These goals are stated in terms of reduced energy consumption. There are a number federal buildings located in the MWCOG region with case study information available.

Effiency Programs

5.5.6 Building Energy Efficiency Programs

Under this program, the local governments in the nonattainment area have undertaken measures to improve the energy performance of government facilities.

Source Type Affected
These programs improve the energy efficiency of buildings and building equipment owned and operated by the local governments in the Metropolitan Washington area.

Control Strategy
This measure is envisioned as a region-wide measure encompassing energy performance contracts and other structured energy savings programs by state and local governments within the Metropolitan Washington nonattainment area. This program is at varying stages of development, and commitments received involve several local jurisdictions in the nonattainment area. State and local governments have signed contracts with energy service companies (ESCOs) to retrofit existing facilities to reduce the demand for electricity and have undertaken other energy efficiency measures in their facilities. The reduction in electricity demand will displace fossil fueled power generation, thus reducing the NO_x emitted from those plants.

Implementation
Arlington County, Virginia. The Arlington County government has instituted a variety of measures since 2002 to improve energy efficiency of operations. In addition, Arlington has allocated funds for additional efficiency investments that will increase the energy savings between now and 2010.

Fairfax County, Virginia. The Fairfax County government has implemented several large energy efficiency projects in 2005 and 2006. These projects involve variable speed drives; lighting and heating, ventilation, and air conditioning (HVAC) upgrades; and other efficiency investments.

Montgomery County, Maryland. Montgomery County departments undertake their own energy efficiency investments, as detailed in each of their Resource Conservation Plans. (See http://www.montgomerycountymd.gov/content/dep/Energy/2007rcp.pdf). These investments cover a wide range of measures during the period 2003 to 2008.

City of Alexandria, Virginia. The City requires purchase of Energy Star appliances in all newly constructed single famly and multi-family homes.

5.5.7 Light-Emitting Diode (LED) Traffic Signal Retrofit Program

Under this program, state and local governments in the nonattainment area have committed to replace existing traffic signals with more energy efficient light-emitting diode (LED) technology. This will decrease demand for electricity and subsequent power generation from coal, oil, and/or gas-fired sources that would normally supply power to the Metropolitan Washington region, thereby reducing NO_x emissions from those sources.

Source Type Affected

The measure affects state and local governments within the Metropolitan Washington nonattainment area.

Control Strategy

This measure is envisioned as a region-wide measure encompassing LED traffic signal retrofits by state and local governments within the Metropolitan Washington nonattainment area. This program is in the early stages of development, and commitments received at this point affect several state and local jurisdictions in the nonattainment area. Transportation agencies have begun to retrofit existing traffic signals to LED technology to reduce the demand for electricity. The reduction in energy demand will displace fossil fuel generated power, thus reducing the NO_x emitted from those plants.

Implementation

Maryland Department of Transportation (MDOT)
Virginia Department of Transportation (VDOT)
District Department of Transportation (DDOT)
Montgomery County, Maryland
Arlington County, Virginia
City of Alexandria, Virginia
City of Falls Church, Virginia

Under this program, jurisdictions are committing to replace older incandescent traffic signals with more energy-efficient LED signals. All of the identified replacements will be in place by May 1, 2009.

The following table summarizes the LED signal replacement commitments:

LED Traffic Signal Replacment	Number of LED Signal Units
Washington, DC	69,140
VDOT	6,894
MDOT	15[a]
Montgomery County, MD	250[a]
Arlington County, VA	92[a]
City of Alexandria, VA	25[a]
City of Falls Church, VA	92

[a] Data reported are number of intersections with LED signal units installed.

5.5.8 High Electrical Demand Day Emission Reduction Strategies

Heating and cooling requirements increase during the hottest and coldest days of the year, thus requiring electric generators and other industries directly using fossil fuels to increase production, which can increase emissions. High electrical demand day (HEDD) operation of these units generally have not been addressed under existing air quality control requirements, and these units are called into service on the very hot days of summer and on very cold days of winter when air pollution levels typically reach their peaks.

The Ozone Transport Commission (OTC) has been meeting with state environmental and utility regulators, EPA staff, electric generating unit (EGU) owners and operators, and the independent regional systems operators to assess emissions associated with HEDD during the ozone season and to address excess NO_x emissions on HEDDs. The OTC has found that NO_x emissions are much higher on a high electrical demand day than on a typical summer day and that there is the potential to reduce HEDD emissions by approximately 25 percent in the short term through the application of known control technologies. HEDD units consist of gasoline and diesel combustion turbines and coal and residual oil burning units.

On March 2, 2007, the OTC states and the District of Columbia agreed to a Memorandum of Understanding (MOU) committing to reductions from the HEDD source sector. The MOU includes specific targets for a group of six states to achieve reductions in NO_x emissions associated with HEDD units on high electrical demand days during the ozone season. These states agreed to achieve these reductions beginning with the 2009 ozone season or as soon as feasible thereafter, but no later than 2012. The remaining OTC states including Virginia and the District of Columbia agreed to continue to review the HEDD program and seek reductions where possible, but they do not have a formal emissions reduction target in the MOU.

Through the HEDD MOU commitments, significant NO_x reductions are anticipated in the Washington, DC-MD-VA $PM_{2.5}$ nonattainment area from the program Maryland expects to develop with EGUs. Maryland has agreed to a specific NO_x emission reduction target in the MOU of a state-wide reduction of NO_x emissions from HEDD units by 32 percent. The OTC MOU is included in Appendix G.

5.5.9 Mobile Source Strategies

The following mobile source strategies are included as supplemental controls:

- **Diesel Retrofit Program.** Under this program, local governments and transit agencies identify high-emitting, high-mileage diesel vehicles, such as older school buses and transit buses, for retrofit. These vehicles are retrofitted using any of a variety of technologies certified under EPA's Voluntary Diesel Retrofit Program. Commonly considered technologies include oxidation catalysts and particulate filters.

- **Alternative Fuel Vehicle/Low-Emission Vehicle Purchase Program.** Under this program, local governments and transit agencies purchase low-emission vehicles instead of conventional gasoline-powered vehicles.

Local governments have reserved any emission reduction credits that these programs may generate for potential future use in meeting transportation conformity or for weight of evidence.

5.5.10 Urban Heat Island Mitigation/Tree Planting/Canopy Conservation and Management

Strategic tree planting and tree canopy conservation and management are innovative voluntary measures that will achieve area-wide improvement of the tree canopy, providing air quality benefits including reductions in $PM_{2.5}$ in the Washington, DC metropolitan nonattainment area. Air quality benefits associated with trees and their shade result from lowering summertime air temperatures and from actual pollutant absorption and contact removal from the trees themselves.

One of the most dramatic improvements achievable from area-wide comprehensive tree canopy conservation and planting is reducing the negative effects of urban heat islands (the rise in temperatures due to an increased number of buildings and impermeable surface areas retaining heat). Strategic placement of trees around homes, buildings, streets, and parking lots increases shade and evapotranspiration, thereby lowering summertime air temperatures and surface temperatures of asphalt, concrete, and other impervious areas. Lowering air summertime temperatures helps reduce air pollution in several ways:

- Slows the temperature-dependent reaction that forms $PM_{2.5}$; and
- Reduces the amount of electricity generated for cooling, thereby reducing air pollutant emissions including $PM_{2.5}$ precursors, from power plants.

In addition, through up-take and contact removal, trees remove nitrogen oxides, sulfur oxides, and other $PM_{2.5}$ precursors from the air. Other air quality benefits from trees include removal of carbon monoxide and fine particulate matter less than 10 microns. Carbon dioxide is removed and stored by trees, dust is intercepted, and oxygen is released.

Source Type Affected

The measure affects state and local governments within the Washington, DC-MD-VA metropolitan nonattainment area.

Control Strategy

To achieve reductions in air pollution, government agencies, volunteer organizations, and private landowners must make long-term commitments to conserving existing canopy and planting significant numbers of trees in strategic locations. Under this measure, local governments in the metropolitan nonattainment area will commit to

1. Measure existing resources and track changes – Initiate and/or enhance efforts to measure, track, and enhance existing urban tree canopy and canopy expansion efforts.

2. Programs to enhance and increase benefits from trees – Implement urban forestry programs to enhance canopy coverage to reduce summertime air and surface temperatures. Programs include planting trees in strategic locations to cool targeted surfaces and provisions for long-term maintenance. Priority planting sites include

locations where buildings, streets, driveways, and parking lots will be shaded by the new plantings.

3. Public outreach – The region commits to undertake a public outreach program designed to promote tree and canopy conservation and planting. Local governments, counties, states, and MWCOG will work with volunteer tree planting organizations, school children, property owners, and stakeholder groups of businesses to support tree conservation and planting and to conduct educational outreach regarding the benefits of trees and canopy, species selection, tree planting and establishment, and long-term tree maintenance. Efforts will be made to document all conservation and planting efforts including voluntary programs.

4. Regional canopy management plan – Local governments will work to develop a long-range plan to enhance tree conservation and planting and to establish goals for increasing tree canopy coverage between 2010 and 2030 that could lead to lower levels of air pollution. Issues to address include coordination of efforts, tracking progress in centralized databases, continuation and increases of resources from state and federal sources, involvement of private landowners and businesses, and periodic evaluations and reports.
5. Species selection – During photosynthesis, trees release secondary metabolic products. Some of these include biogenic volatile organic compounds (VOCs), precursors to the formation of ozone. In most instances, the improvements in air quality gained from trees outweigh the concerns over additional biogenic VOC emissions. Additionally, large trees are considerably more beneficial for air quality than small trees. Therefore, when planting trees, species should be selected for their large size and long-term survival based on specific site conditions and adjusted, when possible, for low-VOC emitters.
6. Monitoring programs – Monitor these activities and report periodically.

Current Programs

Many programs that support, encourage, or require the tree and forest conservation and planting exist within the local jurisdictions, counties, and states in the Washington DC metropolitan nonattainment area. Special attention will be paid coordinating these programs to enhance tree protection, canopy conservation, and expansion to enhance regional air quality.

Implementation

Fairfax County – Tree canopy requirement for new development.
Fairfax County – Parking lot canopy ordinance.
Fairfax County – Government land planting program.
Fairfax County – County-wide nonprofit tree planting program.
Arlington County Urban Forest Master Plan.
Arlington County – 1,280 trees to be planted annually.
Arlington County Chesapeake Bay Preservation Ordinance/Landscape Conservation Plan.

City of Alexandria – Urban Forestry Plan under development.
City of Alexandria – 12,000 square feet of vegetative roof installed on city buildings.
City of Alexandria – Reflective roofs standard for government buildings.
City of Greenbelt – Tree planting program; shade tree improvement initiative.
Montgomery County – Street tree planting program; 1,200 trees per year.
Montgomery County – "Shade to Save" pilot program.
Montgomery County – A residential tree planting program is under development.
Montgomery County – Urban tree legislation is under development.
Montgomery County Stream Restoration Projects – Native trees and shrubs are planted to enhance and establish forests near stream project sites.
Montgomery County Rainscapes Program.
Montgomery County Forest Conservation Law.
Amendments to the Forest Conservation Law to adjust for changes in development patterns are being developed.
Montgomery County Forest Banking Program.
Montgomery County Legacy Open Space Program.
Montgomery County Rural Legacy Program.
Montgomery County Development Rights Program.
Prince George's County Releaf Grant Program.
Prince George's County Tree Replacement Program.
Prince George's County Gorgeous Prince George's Day.
MNCPPC Montgomery County Parks Department – Shade trees are actively maintained and planted in developed areas of parks.
MNCPPC Montgomery County Parks Department – Forested areas are established on open land within the park system.

5.5.11 Voluntary Action Campaign: Clean Air Partners

Clean Air Partners is a bi-regional public-private partnership in the Baltimore/Washington region created to develop and implement voluntary action programs to reduce emissions on the days when ozone levels are expected to be high.

The partnership was created in 1994 by the Metropolitan Washington Air Quality Committee (MWAQC), the Transportation Planning Board of the National Capitol Region (TPB), and the Baltimore Metropolitan Council (BMC). The partnership, originally known as ENDZONE Partners, has conducted an air quality public education campaign in the Washington and Baltimore metropolitan areas since 1995. The purposes of the campaign are to raise public awareness of air quality issues and to promote voluntary actions to improve air quality. The campaign is funded by public funds from Maryland, Virginia, and the District of Columbia and receives staff support from the state air management agencies. In 1997 the partnership formed a new formal public-private partnership, hired a managing director, and in 1999 changed its name to Clean Air Partners.

The partnership established the Ozone Action Days employer program in 1995 to encourage employers and their employees to take voluntary actions to reduce ozone pollution causing emissions. When the EPA designated both Baltimore and Washington, DC metropolitan regions as nonattainment for $PM_{2.5}$, Clean Air Partners' Board of Directors changed the name of the program from Ozone Action Days to Air Quality Action Days (AQAD).

The AQAD program is designed to educate employers and employees to take voluntary actions, specifically on Code Orange and Code Red Days. Clean Air Partners provides resources and information to a network of AQAD participants. Clean Air Partners assists employers in establishing on-site programs designed to reduce employee travel on bad air days and encourages voluntary actions by business, industry, government, and individuals to restrict activities that contribute to the formation and risks of bad air. Approximately 1200 individuals, businesses and organizations are registered as AQAD participants and have committed to take voluntary actions to reduce emissions on Code Orange and Code Red Days. The participants receive electronic air quality updates daily.

Clean Air Partners runs an extensive education campaign throughout the ozone season, May to September, to educate the public about the effects of ground-level ozone and $PM_{2.5}$. The messages tell people what they can do to protect their health and improve air quality. Air quality forecasts are distributed daily by fax and email to the media and AQAD participants. The air quality forecast is color coded for ease of communication, following EPA's regulation for the Air Quality Index (AQI).3

During the ozone season, in addition to communicating daily with television and radio meteorologists in the regions, Clean Air Partners places radio and television ads to advise about the health risks and to promote less polluting behaviors on unhealthy air days. The ad messages

3 Federal Register, Vol.64, No. 149, August 4, 1999, pp.42529-42549.

target individual emission reduction actions for behavior modification and the heath effects of poor air quality.

5.5.12 Code Red/Code Orange Telework Program

Clean Air Partners is adopting a new program to increase teleworking as an episodic strategy. Beginning in the summer of 2007, Clean Air Partners will promote teleworking throughout government and businesses when air quality is forecasted to be in the unhealthy for sensitive groups range, Code Orange or above. The decision to initiate Clean Air telework days will be guided by forecasts issued using the Air Quality Index (AQI). Three-day forecasts are issued by the Maryland Department of the Environment and the MWCOG for the Washington region.

Clean Air Partners will develop a toolkit that will assist organizations in promoting, establishing, and tracking a telework program and provide resources for keeping abreast of forecasted and current air quality levels in the region. Participants will be asked to track their participation using a Web-based system that tracks auto emission reductions resulting from teleworking (NO_x, VOC, CO, and CO_2).

The University of Maryland (UM) will evaluate the telework program through photochemical modeling by using different assumptions regarding the programs effectiveness at reducing Vehicle Miles Traveled (VMT). Preliminary UM modeling indicates that a strengthened telework program has the potential to reduce VMT and thereby leads to a measurable air pollution reduction on the worst days of summer.