December 4, 2009

Memorandum

To: TPB Technical Committee

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Subject: Status of Analysis of Transportation-related GHG Reduction Measures

Introduction

DTP staff is working to finalize a report detailing the analysis of potential transportation-related measures to reduce greenhouse gas emissions. The report will include measures in three categories: (1) fuel efficiency, (2) alternative fuels and alternative vehicle technologies, and (3) travel efficiency. The report will include an analysis of transportation emissions reduction measures (TERMs) from the TERM Tracking Sheet (i.e. additional implementations); "Potential TERMs;" the recommended TERM measures for the transportation sector from the COG Climate Change Report (listed in Attachment A); and new proposals. This document contains a summary of the results for the measures that have been analyzed to date. The final report will be patterned after this document and contain a detailed description of the assumptions and analysis for each of the new measures from the COG Climate Change Report.

Baseline

Table 1 shows the development of the baseline inventories for carbon dioxide as well as the COG goals and the resulting required reductions. Chart 1 illustrates the baseline inventories.

Table 1: Baseline CO_2 Emissions Calculations for 8-hour Ozone Non-Attainment Area (annual tons)				
	2005	2010	2020	2030
Total Network Emissions (BAU)	24,094,546	26,053,949	29,914,925	32,281,166
Reductions due to CAFE 35.5 by 2016			(5,862,615)	(8,837,569)
Net emissions after CAFE 35.5 by 2016			24,052,309	23,750,664
Previously Committed TERMs		(258,697)	(138,065)	(120,268)
Final Baseline		26,312,646	24,190,374	23,870,932
COG Goal			19,275,637	14,456,728
Required Reductions			4,914,737	9,414,205

Assessment of Potential Control Strategies

Chart 2 illustrates the impact on the region's carbon dioxide emissions resulting from two scenarios where CAFE standards for light-duty cars and trucks are extended beyond 2020. Chart 3 illustrates the impact of scenarios that extend CAFE to include heavy duty vehicles.

Table 2 shows a summary of the potential GHG reductions measures analyzed to date. The measures are divided into the three aforementioned categories and include analysis of regionally committed TERMs from the TERM Tracking Sheet, "Potential Terms," and transportation-related recommendations from the COG Climate Change Report and new measures.

Chart 1: Annual Baseline CO₂ Emissions Inventories based on the 2009 CLRP & 2010-2015 TIP
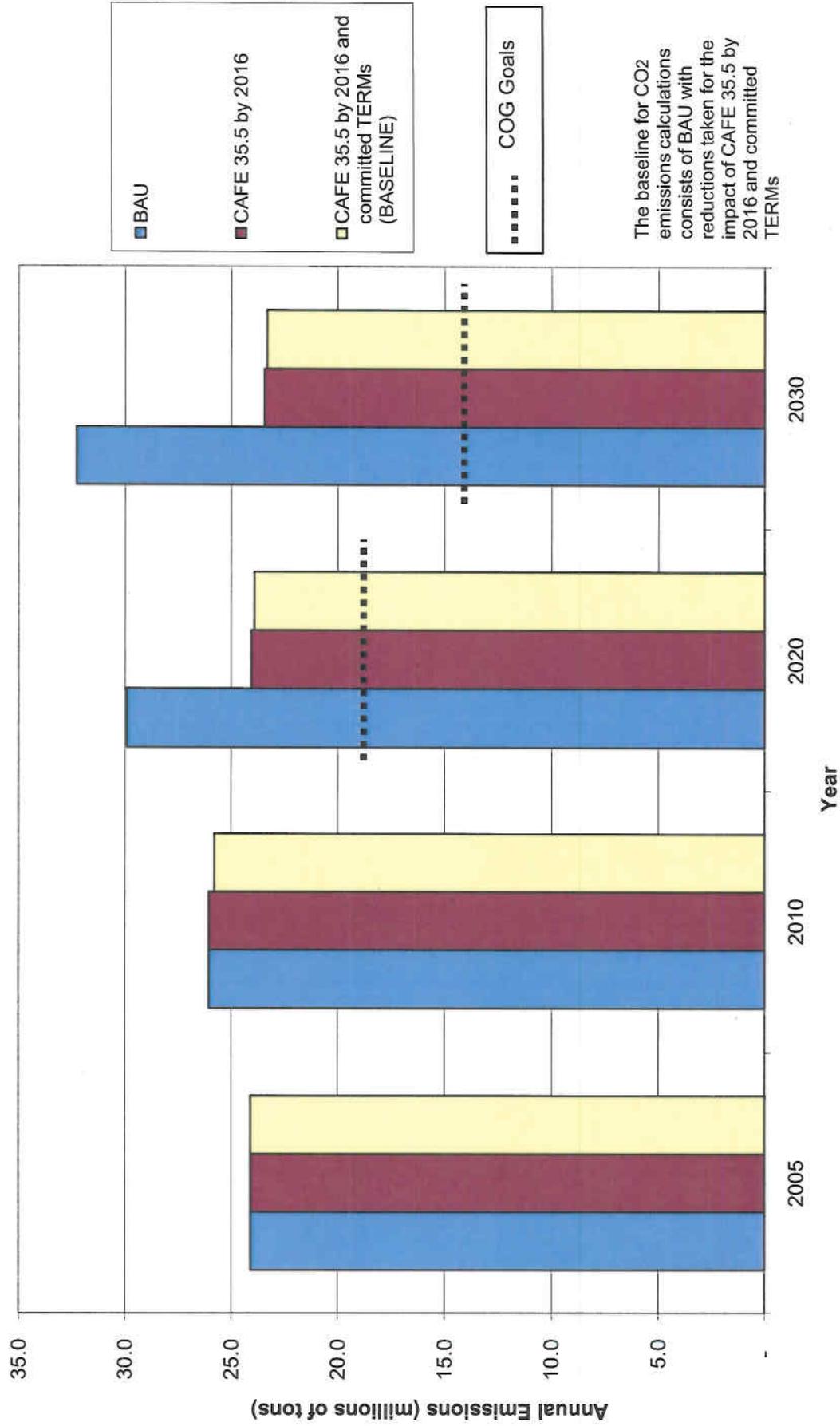
Legend:
- BAU
- CAFE 35.5 by 2016
- CAFE 35.5 by 2016 and committed TERMs (BASELINE)
- ······ COG Goals

The baseline for CO2 emissions calculations consists of BAU with reductions taken for the impact of CAFE 35.5 by 2016 and committed TERMs

Annual Emissions (millions of tons)

Vertical axis: 35.0, 30.0, 25.0, 20.0, 15.0, 10.0, 5.0, -

Year

Horizontal axis labels: 2005, 2010, 2020, 2030

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Chart 2: CO2 Emissions Inventories
Scenario: Impact of LDV/LDT Fuel Economy Improvement
A.1.ii – Extend CAFE Requirements Past 2020

Legend:
- BAU
- Baseline
- CAFE 45 by 2030
- CAFE 55 by 2030
- COG Goals

The baseline for CO2 emissions calculations consists of BAU with reductions taken for the impact of CAFE 35.5 by 2016 and committed TERMs

X-axis: Year (2005, 2010, 2020, 2030)

Y-axis: Annual Emissions (millions of tons) — 35.0, 30.0, 25.0, 20.0, 15.0, 10.0, 5.0, -
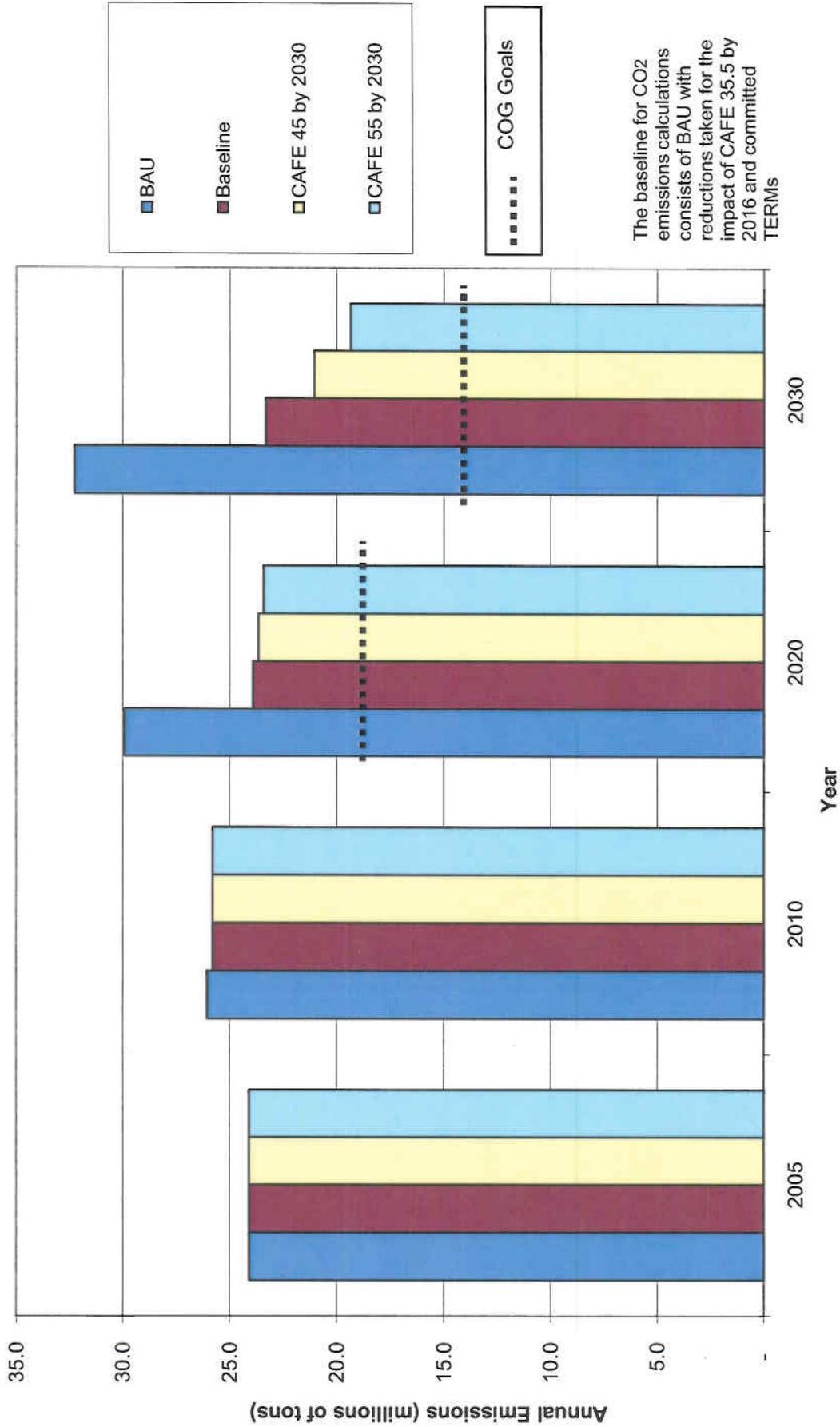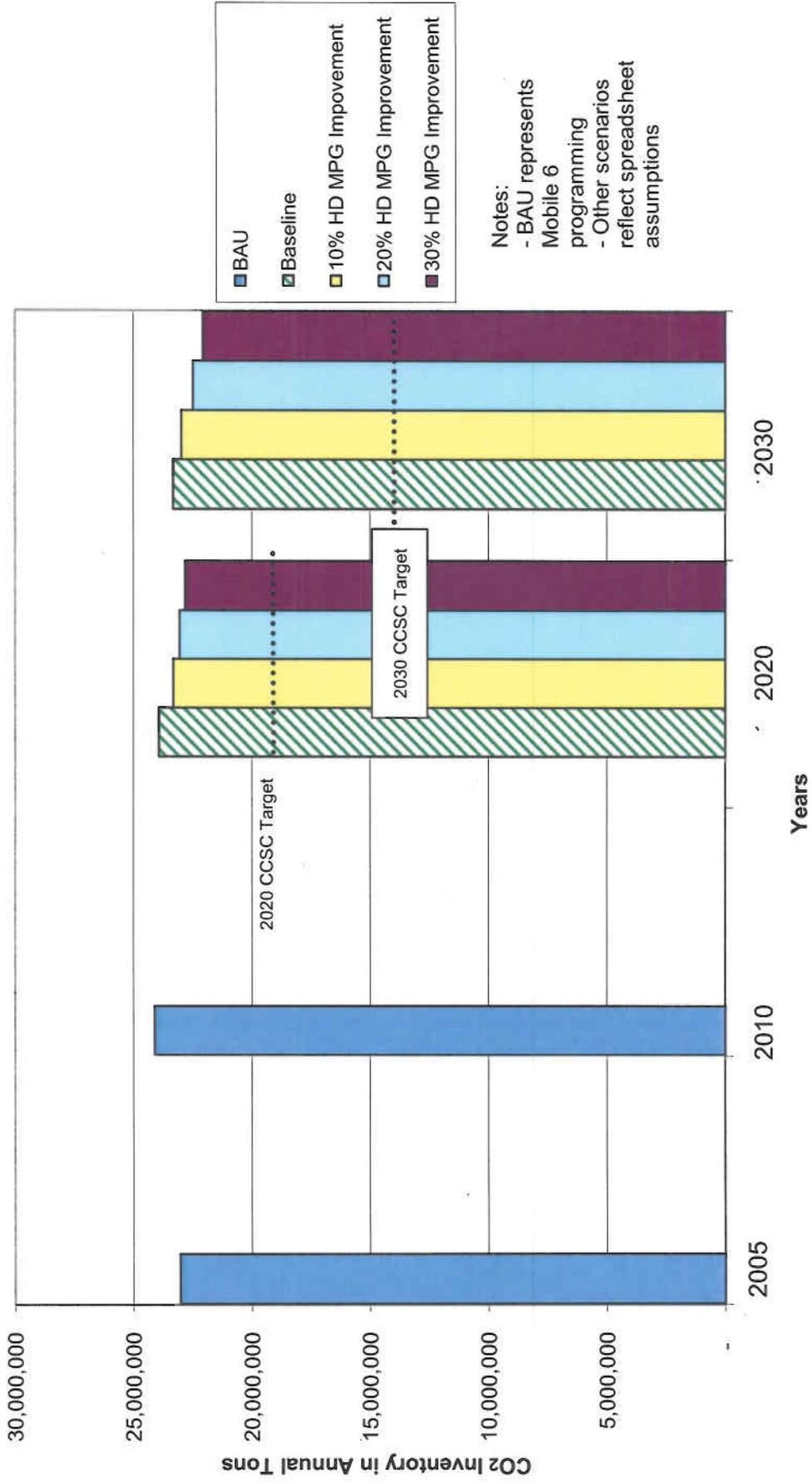
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Chart 3: CO2 Emissions Inventories
Scenario: Impact of HD Fuel Economy Improvement
A.1.ii – Expand CAFE Requirements to Include Heavy Duty Vehicles

Legend:
- BAU
- Baseline
- 10% HD MPG Impovement
- 20% HD MPG Improvement
- 30% HD MPG Improvement

Notes:
- BAU represents Mobile 6 programming
- Other scenarios reflect spreadsheet assumptions

Y-axis: CO2 Inventory in Annual Tons
- 30,000,000
- 25,000,000
- 20,000,000
- 15,000,000
- 10,000,000
- 5,000,000

X-axis: Years
- 2005
- 2010
- 2020
- 2030

2020 CCSC Target

2030 CCSC Target

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Table 2: Potential GHG Reduction Measures
Emissions Reductions from Baseline and Cost-effectiveness

Measure	CO2 Reductions in 2010 (annual tons)	CO2 Reductions in 2020 (annual tons)	CO2 Reductions in 2030 (annual tons)	Cost-effectiveness in 2020* ($'s/ton CO2)
Fuel Efficiency				
A.1.ii Evaluate options for extending CAFE requirements past 2020				
Extend existing 35.5 mpg by 2016 to achieve CAFE 45 by 2030	-	120,842	2,455,355	n/a
Extend existing 35.5 mpg by 2016 to achieve CAFE 55 by 2030	-	361,846	4,156,467	n/a
A.1.ii Evaluate options for extending CAFE to cover heavy trucks				
Improve HDV fuel efficiency by 10%	-	598,963	667,515	n/a
Improve HDV fuel efficiency by 20%	-	866,955	1,149,928	n/a
Improve HDV fuel efficiency by 30%	-	1,105,170	1,568,020	n/a
Alternative Fuels and Alternative Vehicle Technologies				
A.3 Promote Use of Clean Fuels				
"Reference Case" based on current energy legislation (source: AEO 2009)	280,000	1,280,000	1,900,000	n/a
"High Price Case" based on scenario with $200/barrel oil (source: AEO 2009)	780,000	3,170,000	5,890,000	n/a
Travel Efficiency				
Part 1 - Examples Regionally Committed TERMs from the TERM Tracking Sheet				
Access Improvements to Transit/ HOV				
Car sharing at Metro stations	546			
500 parking space at transit stations	1,795			
Bicycle / Pedestrian projects				
# 74 500 Bicycle Racks in DC	164			
Neighborhood sidewalk improvements in MD	136			
Transit Service improvements				
Circulator Bus in DC	5,454			
PRTC express bus service	231			
Rideshare Assistance Programs and Commuter Connections				
MV-123 Employer Outreach	6,477			
MD Commuter Tax Credit	33,517			
Guaranteed Ride Home	28,937			
Park & Ride Lots (Transit and HOV)				
Northern Virginia District Wide P& R lots	6,537			
Telecommute Programs				
MV-92 Expanded Telework Program	37,203			
Traffic Improvements/TSM				
Signal Optimization***	112,228			
Engine Technology/Alternative Fuel Programs				
Hybrid Electric Buses in Montgomery County	1,297			
100 Hybrid Electric light duty vehicles	153			
Part 2 - Potential TERMs (from SIP/Conformity Assessment)				
M-07A Voluntary Employer Parking Cash-Out Subsidy	33,095			$ 6
M-47c Employer Outreach for Private Sector Employers (expanded)	2,628			$ 323
M-93 Improve Pedestrian Facilities Near Rail Stations	2,836			$ 1,683
M-110 10 Transit Stores in Maryland	8,328			$ 18
M-113 6 Kiosks in Maryland	38			$ 385,141
M-123 Employer Outreach for Public Sector Employers	21,690			$ 38

Measure				$
M-133 Metrorail Feeder Bus Service	775			$ 439
M-134 Implement Neighborhood Circulator Buses (10)	5,959			$ 189
M-135 Construction of 1000 Parking Spaces at Metrorail Stations	2,650			$ 503
M-143 Real Time Bus Schedule Information	2,447			$ 933
M-146 Purchase 185 WMATA buses (ridership growth)	37,480			$ 122
M-148 WMATA Bus Information Displays with Maps (2000 cases)	4,390			$ 28
M-150 Enhanced Commuter Services- (HOV Facilities)	6,627			$ 402
M-151 Enhanced Commuter Services-US 1 (Reverse Commute)	3,805			$ 662
M-152 Enhanced Commuter Services- (Rail Relief)	9,365			$ 859
M-155 Expand Carsharing Program	576			$ 304
M-156 Free bus-to-rail/ rail-to-bus transfers (Similar to NYC pricing structure)	10,130			$ 3,634
M-158 Free Bus Service Off-Peak (10:00 AM to 2:00 PM Mid-Day and Weekends)	8,509			$ 2,564
M-144 Parking Impact Fees***	241,993			$ 1,636
Part 3 -Transportation-related measures from COG Climate Change Report				
B.1.ii Financial incentives to reduce VMT				
Pay-As-You-Drive Insurance	51,105	264,999	258,112	$ 45
TPB Value Pricing Study	tbd	tbd		$ tbd
B.3.i Enhanced transit				
K St. Busway (Center Median)	-	2,522	2,522	tbd
K St. Busway (Curb Side)	-	14,642	14,642	tbd
TIGER Grant Application - Smart Hubs		1881	1772	
TIGER Grant Application - Bus prioritization		5115	5119	
B.4.i Expand Commuter Connections Program				
Carpool Incentive	3,684	2,857	2,488	$ 45
Vanpool Incentive (Scenario 1 - $15/van/day)	-	14,553	25,354	$ 301
Vanpool Incentive (Scenario 2 - $25/van/day)	-	31,756	55,342	$ 187
B.4.iii Bicycle and Pedestrian Plan				
Completion of 2030 TPB Bike/Ped Plan by 2020	-	121,050	105,446	tbd
Completion of 2030 TPB Bike/Ped Plan by 2030	-	60,525	105,446	tbd
B.4.iv Improve pedestrian access to transit				
M-93	tbd	tbd		tbd
B.4.v Address need for bicycle facilities				
Construct four new bike stations	279	217	189	tbd
Construct nine new bike stations	557	433	377	tbd
B.4.vi Promote SmartBike				
TIGER Grant Application - Regional bike sharing program	-	2,573	5,946	tbd
C.1 Best practices for traffic engineering improvements				
Enhanced Traffic Signal Optimization Program**	112,228	93,227	85,446	$ 43
C.2 Implement MATOC Program				
MATOC analysis from CMAQ application	5,270	6,071	6,540	$ 322
C.3 Enforce existing idling regulations				
Idling Reduction (low estimate)	2,909	5,363	8,109	$ 93
Idling Reduction (high estimate)				

* Cost-effectiveness is in 2009 dollars, CE for Potential TERMs is calculated for 2010

** This is a new measure that would double the number of signals optimized in the current program

*** This estimation is under revision

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Analysis Approach for Recommended Measures in the "National Capital Region Climate Report"

Recommendations for Reducing GHG from Transportation and Land Use
Local and Regional Strategies for Government and Business

	Type of Analysis[1]		
	TERM	Scenario	Policy
A. Increase Fuel Efficiency and Use of Clean Fuel Vehicles			
1. Promote Clean Fuel Vehicles (cars, trucks, buses)			
i. Promote/accelerate adoption of efficient clean-fuel vehicles, including hybrids (cars, trucks, and buses).			X
ii. Evaluate options for promoting CA LEV-II, extending CAFE requirements past 2020 and to cover heavy trucks, and facilitating adoption of high-mileage vehicles through incentives and tax policies	X		
iii. Assess the benefits from a "Cash-for-Clunkers" program and rebates or tax incentives for the purchase of hybrid vehicles	X		
2. Adopt regional green fleet policy			
i. Establish a regional green fleet policy with measurable goals and timetables. Target public and private fleets, transit, taxicabs, rental cars, and refuse haulers. Evaluate the benefits of specific "green fleet" conversion percentages	X		
3. Promote use of clean fuels		X	
B. Reduce Vehicle Miles Traveled (VMT)			
1. Adopt VMT reduction goals			
i. Collaborate with the TPB to develop VMT reduction goals for 2012 and 2020 and associated options for meeting the goals			X
ii. Evaluate the potential greenhouse gas emission reduction benefits and costs of using financial incentives (e.g., pay as you travel insurance, tolling, or congestion pricing) to reduce VMT		X	
iii. Identify the percentage of auto trips under 3, 2, 1, and ½ miles; develop a strategy to shift half of these trips to bike, pedestrian, or transit modes; and evaluate the benefits of such a shift			X
2. Expand transit use (incentives, exclusive transit lanes)			
i. Examine options to promote the increased use of existing transit capacity		X	X
ii. Evaluate funding requirements for transit incentives and an expanded metrocheck program			X
3. Invest/Expand transit infrastructure			
i. With the Washington Metropolitan Area Transit Authority, MARC, VRE, and the local transit operators, evaluate the greenhouse gas reduction benefits of specific incremental expansion of transit capacity and commuter rail service		X	
ii. Evaluate the greenhouse gas reduction benefits of expanding existing and establishing new exclusive bus transit routes, lanes, on-ramps, corridors, and intercity high-speed rail		X	
4. Expand commuter options (car sharing, bicycle/pedestrian, financial incentives)			
i. Building on the accomplishments of Commuter Connections, develop specific targets for shifting modes from single-occupancy vehicles to transit, walking, and bicycling for commuting and noncommuting trips.	X		
ii. Expand existing and fund new programs to enhance access to transit and alternative modes, commuter connections, guaranteed ride home, telework programs, bike/pedestrian access, and park/ride lots	X		
iii. Fully fund the construction of bicycle/pedestrian paths in the region, as outlined in the regional bicycle/pedestrian plan.	X		
iv. Provide incentives to developments that speed improvements in bicycle/pedestrian access, including improvements in sidewalks, curb ramps, crosswalks, and lighting	X		

v. Address the need for on-road bicycle accommodations and facilities	X		
vi. Promote regional implementation of SmartBike program similar to the Zipcar concept	X		
5. Promote transit-oriented development/Concentrate future growth in Regional Activity Centers			
i. Evaluate the benefits from achieving a range of possible goals (up to 95 percent) for directing new residential and commercial growth to designated regional activity centers, including growth around transit as well mixed-use, higher-density development		X	
ii. Encourage local governments to evaluate opportunities to provide incentives (including zoning changes) to encourage mixed-use development, including workforce housing at transit stations and hubs to reduce sprawl and VMT		X	
iii. Encourage localities to revisit current land-use plans, in light of current shifts in the real estate market, coupled with high energy costs		X	
iv. Establish TOD as the region's preferred growth strategy			X
6. Examine parking policies to reduce VMT			
i. Examine parking policies and their relation to VMT, and implement new parking policies to reduce VMT			X
ii. Strengthen financial and other incentives (e.g., tax rebates, higher parking costs, and transit benefits) to encourage residents to drive less			X
iii. Advocate for federal income tax benefits for transit use that equal or exceed the benefits for employer provided/subsidized parking			X
C. Travel Efficiency			
1. Adopt best practices for traffic engineering improvements and road management to reduce VMT and congestion. Identify locations of significant recurrent congestion, and prioritize investments to reduce	X		
2. Implement the Metropolitan Area Transportation Operations Coordination Program to improve coordination among transportation agencies for data sharing and incident management	X		
3. Enforce existing idling regulations	X		
4. Aviation			
D. Land Use			
1. Tree canopy preservation - prepare plan to meet "increase regional canopy"			
2. Evaluate LEED-ND standards for new development			
3. Carefully plan the location and design of new, infill, and redevelopment projects			
i. Promote regional policies that support walkable communities and affordable housing near transit, and that protect green infrastructure.		X	
4. Integrate GHG analyses into comprehensive planning, new capital projects			
i. Quantify projected greenhouse gas emissions from major new transportation and other new capital projects			X
ii. Identify best practices enabling local governments to include greenhouse gas reduction and energy efficiency/conservation as elements in their local comprehensive planning			X
iii. In cooperation with COG's Planning Directors Technical Advisory Committee and local government environmental and energy planners, convene a working group to devise a consistent, standard methodology for evaluating the greenhouse gas emissions from proposed individual development projects		X	
iv. Encourage new commercial construction to include a "travel management plan."		X	
E. Regional Metropolitan Planning Process			
1. Develop regional metropolitan planning process for GHGs			
i. Collaborate with the TPB to evaluate how a regional process modeled after the current regional metropolitan planning process for transportation and air quality planning might be adapted to address greenhouse gas emissions			X

2. *Make greenhouse gas reduction a stated goal of regional transportation planning activities, including the newly launched multi-stakeholder Greater Washington 2050 initiative, poised to generate additional growth scenarios, and quality growth scenarios.*			X
3. *Consult with other regions around the country to broadly evaluate options for regional approaches to greenhouse gas reductions that include cap and trade and other approaches that might be relevant to our region (e.g., California SB 375), or that might be under consideration in upcoming national climate, energy or transportation legislation*			X

[1] TERM - Sketch planning analysis methods employed in previous SIP and air quality conformity analysis

Scenario - TPB's Scenario Task Force work activities

Policy - TPB policy/goal, rather than a technical assessment