Primary Sector	Strategy	New or Existing?	CO_2e Reduction Potential[1] (L, M, H)	Timeframe for Implement. (S, M, L)	Costs (L, M, H)	Policy Acceptance (L, M, H)	Current Authority (Y, P, N)	Tech Avail (C, E, F)	Co-Benefits										Related Sectors	Notes
									S	R	C	Q	E	M	A	W	B	C A		
T= Transportation B=Built Environment E=Energy L=Land Use		New = New regional strategy Existing = Exists in region; expandable	Low (L) <0.5% reduction Medium (M) – 0.5% - 1.5% reduction High (H) – 1.5%+	Short-Term (S): by 2020 Medium-Term (M): between 2020 and 2040 Long-Term (L): after 2040	Low (L): <$50M Medium (M): between $50M and $500M High (H): $500M+	Low (L): May be controversial Medium (M): Acceptable by some stakeholders High (H): Wide support	Yes (Y): within current authority Partial (P): Action needed is some jurisdictions No (N): New auth. needed	Current (C): Widely available Experimental (E): In pilot phase Future (F): Not yet launched	Safety	Reliability	Congestion Reduction	Air Quality (Criteria Pollutant	Economic Vitality, Jobs, Equity	Mobility	Accessibility	Current and Future Weather Resilient	Chesapeake Bay/stormwater	Community Amenity	T= Transportation B=Built environment E=Energy L=Land Use	
T	T-1: Improve fuel economy of light-duty vehicle fleet and increase alternative fuel vehicles (AFVs)	Existing + New	H About 3% transportation GHG reduction (calculated from estimated 1% of total GHGs)from low-emission vehicles beyond federal corporate average fuel economy (CAFE) standard; 14% transportation GHG reduction from California Low Emission Vehicle (LEV-II) regulations by 2020 (MWCOG CCR)	S-M	L-M Infrastructure improvements necessary for widespread Plug-in electric vehicles (PEV) use (MWCOG EVIMW) Cost savings from driving a PEV can be up to $950/year	H	P Existing programs in several jurisdictions (see notes)	C				X					X		E	Strategies to support/promote electric vehicles include investing in a system of public-access vehicle recharging stations, offering tax credits to provide businesses that install recharging stations, offering benefits (HOV access, priority parking) to owners of electric vehicles, and pursuing PEV car fleets for car sharing programs (TPB RTTP). Existing programs: AFV and hybrid emission testing exemption, authorization for PEV charging rates (Dominion, AFDC-VA), PEV and electric vehicle supply equipment (EVSE) tax credit and rebate program, PEV HOV lane exemption, AFV voucher program, PEPCO and BGE PEV rates, PEV promotion, zero emission vehicle (ZEV) MOU, LEV requirements (AFDC-MD) AFV and Infrastructure Tax Credit, AFV and fuel-efficient reduced reg. fee and title tax, DC fuel efficient purchase requirements (AFDC-DC)
T	T-2: Increase alternative fuels in public sector fleets	Existing	L 0.3% reduction off on-road GHG levels 2010-2030 (MWCOG WWIT)	S	L 185 new compressed natural gas (CNG) buses approx. $10-15M including infrastructure (MWCOG CCR)	H	P AFV Conversion Fund, AFV tax reduction for local gov't, AFV school bus regulations - AFDC-VA), AFV use requirement (AFDC-MD)	C				X					X		E	Public school buses, transit buses, and light-duty fleets together comprise thousands of vehicles, but still only represent a small share of the total vehicle stock. This strategy, however, is readily actionable by public agencies [Estimated reduction of GHG emissions relates to the purchase of 185 new CNG buses for 36 crowded routes (WWIT) – assume $50k/bus and installation of at least 2-3 new CNG stations (MWCOG CCR).

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Primary Sector	Strategy	New or Existing?	CO_2e Reduction Potential[1] (L, M, H)	Timeframe for Implement. (S, M, L)	Costs (L, M, H)	Policy Acceptance (L, M, H)	Current Authority (Y, P, N)	Tech Avail (C, E, F)	Co-Benefits										Related Sectors	Notes
									S	R	C	Q	E	M	A	W	B	C A		
T	T-3: Clean freight technologies	Existing + New	L-M Depending on the technology, can reduce freight vehicle fuel consumption by 2% (e.g., low rolling resistance tires) to 60% (e.g., Class 8 battery electric (BEV) truck) (ICF); 0.4-1.2% transportation GHG reduction from truck idling reduction (26-100% of sleeper cabs with on-board idle reduction technology) by 2030 (USDOT)	S-M	L Technologies could be an incremental cost of $300 (e.g., tractor gap fairing) - $150,000 (e.g., fully electric Class 8 BEV truck) per vehicle; clean truck corridor infrastructure at $1.3-$6 million per mile (ICF). Cost savings from reduced fuel use	H	P AFV voucher program, idle reduction technology grant, idle reduction requirement (AFDC-MD) AFV driving restriction exemptions, AFV acquisition requirements for fleets, idle reduction requirement (AFDC-DC)	C	X	X		X	X				X		E	
T	T-4: Lower emissions of off-road vehicles and engines	Existing + New	L 11% to 76% GHG reduction factor from switching to hybrid and/or alternative fuel construction equipment (FHWA ICE)	M	L	H	P	C				X								E	Off-road equipment are estimated to make up a very small portion of total GHG emissions in the region. The level of GHG reduction is contingent on fuel switch that occurs. For example, the switch from diesel construction vehicles to pure biodiesel (B100) construction vehicles yields a greater potential for GHG reduction that the switch from diesel construction vehicles to 20% biodiesel (B20) construction vehicles. This strategy could also encompass equipment in the Energy-Built Environment sector (e.g., generators)

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T	T-5: Low carbon fuel standard (LCFS)	New	H 5-6% reduction under low oil price scenario and 7-9% reduction under high oil price scenario for 10% emissions reduction requirement; gas and diesel use would decrease by 12-29% annually when fully implemented (NESCAUM - PowerPoint) MDOT estimates a reduction of 1.21 mmt CO2e by 2020 for MD (MD CAP 2)	M	L-M Low public sector costs. Estimated incremental costs for consumers in the 11 participating states is estimated at $4B to $19.5B over the 10 year period (NESCAUM). Net costs could be lower (i.e. savings for consumers)	M Though MD has not passed legislation; there may be some concerns in DC and VA to implement a similar standard	N Other than MD's participation in the 11-state MOU, there has been no state legislation moving towards the implementation of an LCFS	C				X	X					X		E	Eleven Northeast and Mid-Atlantic states, including Maryland, signed a MOU in December of 2009 to evaluate and develop a LCFS for the region. The states agreed to develop a model framework and rule that could be adopted by state-specific governing bodies. See the MOU for details: http://www.nescaum.org/documents/lcfs-mou-govs-final.pdf/. In December 2010, the environmental and energy heads of the eleven states announced that a draft program framework for a regional LCFS would be available in 2011, pending the completion of an economic analysis of the program. The final analysis was released in August 2011. For relevant documents, see the Northeast States for Coordinated Air Use Management (NESCAUM) website: http://www.nescaum.org/topics/clean-fuels-standard. Economic benefits from incentive to produce alternative fuels locally.
T	T-6: Roadway bottleneck relief/targeted capacity enhancements	Existing	L Estimated small CO2 reduction nationally (generally less than 0.5% reduction in on-road emissions) by 2030 but net increase due to induced travel by 2050 (MC)	M	M-H Tens to hundreds of millions of dollars (TPB RTTP)	H Projects that alleviate bottlenecks are often highly visible and positively viewed due to congestion benefits (TPB RTTP)	Y	C	X	X	X	X	X	X		X	-			National Moving Cooler study estimated net increase in GHG emissions over the long-term (2050) due to induced travel (encouraging additional driving due to reduction in delay. However, the Washington, DC region is one of the most congested in the nation, with about 85.1 million gallons of wasted fuel in traffic congestion in 2012 (TTI); this is equivalent to about 0.76 MMT CO2, or 3.3% of on-road regional GHG emissions. With increasing population growth, congestion is expected to grow, and may suggest increased value of these strategies. - May actually result in increased runoff from additional vehicle use.
T	T-7: Corridor/regional operational improvements	Existing	L-M Estimated little CO2 reduction in near-term but over 1% reduction in on-road GHGs by 2050 nationally (MC); 0.01% GHG reduction by 2020 (MD CAP)	S,M	L $2.36 million from 2010-2020 (MD CAP)	H Positively viewed due to significant co-benefits	Y		X	X	X	X	X	X		X				As with bottleneck relief, the significant congestion in the Washington, DC region suggests that these strategies can be more effective regionally than they are at the national level. Moving Cooler showed notable benefits for ramp metering, incident management, active traffic management and integrated corridor management in 2050. Note that these strategies could also encourage induced travel.

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T	T-8: Promote ecodriving	New	M-H 1.1-5.9% on-road GHG reduction nationally (USDOT), 1.35% per capita reduction by 2025 (MTC)	S	L Low costs for outreach campaign; results in driver cost savings	H	Y	C	X			X								Eco-driving practices can increase fuel efficiency in light-duty vehicles by 10% (MWCOG WWIT). Since light-duty vehicles make up a significant share of transportation GHG emissions, there is a very large potential base of application. Overall effectiveness depends on level of adoption. Some of the benefits of ecodriving are likely to occur as newer vehicles include immediate real-time fuel economy and ecodriving information.
T	T-9: Off-peak freight deliveries	New	L	S	L	M Generally acceptable but may have business or community concerns about truck noise.	N	C	X	X	X	X	X	X						Freight movement makes up an important but still relatively limited component of GHG emissions in the region. Off-hours deliveries can impose additional costs on receivers, requiring them to staff their stores in off-hours or build a secure delivery area that can be accessed by carriers, and involves financial incentives to offset those costs. But low-cost solutions include use of delivery lockers or keyed entry. New York City pilot found carriers had faster delivery and program reduced congestion.
T	T-10: Lower speed limits / increased speed enforcement	Existing	L-M 1.7-2.7% on-road GHG reduction nationally (USDOT), estimated 6% per capita GHG emissions reduction by 2035 (MTC). However, expect more limited potential in DC area	S	L Costs of increased enforcement, $260 million (MTC). Net costs savings due to vehicle operating costs savings (USDOT)	L	N	C	X			X		-						MTC study modeled lowering all freeway speed limits to 55 mph, and found notable GHG emissions benefits. National studies show that fuel economy loss per vehicle is about 13.6% from 60-70 mph, and 24.5% from 50 to 70 mph (DOE AEO). However, most DC area freeways already have a 55 mph speed limit, so effect would largely be due to increased enforcement.
T	T-11: Advance adoption of connected vehicle technologies Increase fuel efficiency through connected vehicles (CVs) and/or autonomous vehicles (AVs) using vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) technologies	New	M-H Depends largely on adoption rate; estimated 25% fuel savings if 90% of vehicles were AVs (Eno)	M-L	L-M Public sector costs associated with costs of installing, operating, and maintaining V2I infrastructure.	H	N	C	X	X		X		X	X	X				Reductions in fuel consumption, idling, and VMT is a goal of some CV applications, including eco-signal operations, eco-traveler information, eco-lanes, eco-integrated corridor management, and low emissions zones. These applications overlap somewhat with T-7 and T-8 applications and will enable system users to make more efficient travel choices (e.g., route, mode, or time of trip) and optimize the vehicle's operation and maintenance for maximum fuel efficiency, as well as enable improved system operations. Penetration rates are key to benefits: Several studies developed simulations of traffic modeling to test the network effects of CV applications. National requirements for vehicles will advance adoption.

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									S	R	C	Q	E	M	A	W	B	C A		
T	T-12: Enhance the bicycle/pedestrian environment	Existing	L 0.3% reduction off on-road levels 2010-2030 (MWCOG WWIT); extensive programs increase bike share 2-5 percentage points (Pucher)	S-M Strategies can generally be implemented quickly	L-M Individual strategies are low cost but many investment needs	H Generally viewed as community amenities if implemented effectively	Y	C	X	+	+	X	X	X	X		X	X	L Also, supports increased transit ridership.	Short trips (under 3 miles) make up about 16-18% of work trips and 44-45% of non-work trips regionally (TPB). Winter weather and high heat/humidity summer conditions, physical disabilities, age, and other conditions, however, limit potential for shifts from driving to bicycling for some populations. Short trip length somewhat limits GHG reduction. Bike-ped improvements work most effectively with supporting land use, and support transit use. + Congestion relief is limited to the extent that many bike/walk trips do not substitute for peak-period driving trips. Bike/walk trips provide reliable travel time but do not significantly affect vehicle travel time reliability
T	T-13: Enhance transit services	New	L-M 0.45% GHG reduction by 2020 (MD CAP) 0.43% reduction off BAU levels for long and short-term strategies (MWCOG WWIT)	S-L	L-H $1.55B -$1.74B from 2010-2020 (MD CAP)	M-H Generally high acceptance but cost is a key factor	Y			X	X	X	X	X	X		X	X	L Also supports improved bike and pedestrian access	Makes most sense when implemented in suitable markets, i.e., where there is appropriate density and mix in the corridor served, and walk/bike accessibility is maximized, and benefits are maximized with road pricing. If applied in conjunction with intensified activity centers, would see larger benefit. In a region as congested as the Washington, DC region, transit provides significant congestion relief during peak periods. Transit enhancements on the margins often have limited direct GHG emissions benefits due to off-setting emissions from transit vehicles. However, transit has some "multiplier effects" by encouraging broader land use changes.
T	T-14: Transit incentives	Existing + New	L <0.1% reductions by 2050 nationally (MC) but would be higher in urbanized area; 0.1%-0.25% reduction in emissions by 2020 (MD CAP)	S	M $60M - $140M from 2010-2020 (MD CAP)	M-H Generally high acceptance but cost is a key factor	Y	Y			X	X		X	X		X			Reducing transit prices off-peak and/or peak to encourage more transit ridership will encourage additional transit ridership, but effectiveness is specific to trips that are well served by transit.
T	T-15: Park-and-ride and HOV investments	Existing + New	L <0.1% reductions in on-road emissions by 2050 from HOV Lane Investment nationally (MC)	M	M	H	P	Y		X	X	X		X		X				Somewhat limited potential in DC region, given than most existing highways currently have HOV lanes. Additional park and ride may support use, but park and ride may work at cross purposes to building around transit, i.e., may encourage longer commutes from outlying areas.

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									S	R	C	Q	E	M	A	W	B	C A		
T	T-16: Parking management	Existing + New	L-M 0.2% transp. GHG reduction nationally (USDOT), would be expected higher in urbanized area	S-M	L Could result in increase in parking revenues and cost savings through avoided construction	M Parking pricing generally accepted in urbanized areas but still not generally favored	P	C		X	X	X	-				X			Parking is key determinant of travel choice. Potential partners: COG members, state/local government This is a supportive strategy for better land use: less land used for parking, higher cost to drive. - Charging for parking may be viewed negatively from an economic development and business perspective.
T	T-17: Travel demand management	Existing + New	L-M 0.15% reduction off on-road levels 2010-2030 (MWCOG WWIT), 0.4%-2.8% reduction off LDV levels 2040 (EPA TEAM) 0.2-1.1% for light-duty vehicle reductions for employer outreach; additional 1.3-2.3% from teleworking, additional rideshare outreach (USDOT)	S, M Strategies can generally be implemented quickly	L-M There may be some public sector incentive costs, but net costs to the individual can be negative (USDOT)	M-H Outreach / incentives very acceptable; employer mandates or targets less so.	P	C			X	X	+	X	X	X	X			These strategies largely target commute trips, which make up a minority of all vehicle trips regionally. This would expand upon existing Commuter Connections program. Could also include residential, school, and other program components. + Employer programs and incentives are viewed positively by the business community but mandates for employer trip reduction or ordinances may be viewed unfavorably. Types of strategies in program matter greatly; if only support strategies, trip reduction maxes at 5% (then fades over time). If use financial incentives & disincentives, can have 20-40% impact on VT for targeted trips. These programs can operate revenue-neutral or generate revenue to support other incentives (TCRP). 0.3% per capita reduction by 2035 from a Commuter Benefit Ordinance (MTC) 0.4% per capita reduction by 2035 from a vanpool incentive and shuttle program (MTC)
T	T-18: Road pricing/ congestion pricing		M-H 1.1-3.1% reduction in on-road GHG emissions nationally for VMT fees (USDOT) 0.13-0.68 % reduction by 2020 (MD CAP) 1.69% reduction off of BAU levels for short- and long-term strategies (MWCOG WWIT) Depends on coverage of pricing	M	L-M $132M -$708M from 2010-2020 (MD CAP) Generates revenues that can be used for other transportation improvements	L	N	E	X	X	X	X	-	+			X			Assumes VMT fee of 2 to 5 cents per mile (USDOT) Level of GHG reduction and cost depends on the type of congestion pricing implemented. Success depends on the availability of alternative routes and travel options (transit, bicycling, etc.) - Potential economic issue by discouraging business investments in the region. + VMT fees could limit mobility, but if implemented as congestion pricing and funds used to support transit may help to enhance mobility

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T	T-19: Cordon pricing		L 0.1 - 0.2% reduction in on-road GHG emissions nationally (average fee of 65 cents/mile) (USDOT), but would be higher in urbanized region	M	L-M Generates revenues that can be used for other transportation improvements	L	N	E	X	X	X	X	-	+			X			Has been applied in only limited areas (London most known example). Places cordoned area at a disadvantage for driving so need to provide better transit, walkability, attractive & unique destinations. - Potential economic issue by discouraging business investments in downtown. + Pricing could limit mobility, but if funds used to support transit may help to enhance mobility
T	T-20: Pay as You Drive Insurance	New	M-H 1.45% reduction off-on road levels 2010-2030 (MWCOG WWIT); 1.4-4.7% reduction in light-duty vehicle GHG emissions (USDOT) 0.26% reduction in GHG emissions by 2020 (MD CAP)	M	L No new infrastructure required	L	P	E	X		X	X	+				X			.26% reduction rate assumes 20% penetration rate of Pay as You Drive Insurance by 2020. It is assumed that public sector costs are minimal (MD CAP) Pay as you drive insurance currently offered by insurance companies in MD and VA, but increased adoption is key to strategy success. + Supports equity by more fairly pricing insurance based on use.
T	T-21: Increasing Fuel Taxes / Carbon Tax		H Potential significant impact depending on level of tax; 2 to over 20% reduction in on-road GHG emissions nationally (USDOT)	S But would need to phase over time for significant increases in tax	L No new infrastructure required. Generates revenues that can be used to pay for other transportation improvements	L	Y	C	X		X	X	-	-			X			Has multiple beneficial impacts on GHG emissions: encourages reduced VMT, encourages more fuel efficient vehicles, and could also encourage compact development. Fuel tax needs to be raised to higher levels to maintain effect as vehicle fuel economy standards increase. - Potential economic issue by discouraging business investments in the region. - Potentially adversely affects mobility, unless revenues are put into transit, biking, walking, and other options.

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