Memorandum

To: Mark Moran, Erin Morrow, and Dusan Vuksan, Metropolitan Washington Council of Governments (COG)

From: Michael Grant, Skyler Brown, and Noah Levine, ICF

Date: February 23, 2024

Re: Recommended GHG Reduction Strategies for Assessment and Priority Implementation Considerations

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In 2022, the National Capital Region Transportation Planning Board (TPB) adopted Resolution R18-2022 on the Adoption of On-Road Transportation Greenhouse Gas (GHG) Reduction Goals and Strategies. In the resolution, the TPB decided to set very ambitious GHG reduction targets for the on-road transportation sector, adopted priority on-road transportation GHG reduction strategies, and identified other strategies for further exploration.

Specifically, the TPB adopted the following seven on-road transportation GHG reduction strategies as priorities:

1. Improve walk/bike access to all TPB-identified high-capacity transit stations.
2. Increase walk/bike modes of travel - Complete the TPB's National Capital Trail Network by 2030.
3. Convert private- and public-sector, light-, medium-, and heavy-duty vehicles, including public transit buses, to clean fuels by 2030.
4. Deploy a region-wide, electric vehicle (EV) charging network, including refueling stations for alternate fuels.
5. Add additional housing units near TPB-identified high-capacity transit stations and in COG's Regional Activity Centers.
6. Reduce travel times on all public transportation bus services.
7. Implement transportation system management & operations (TSMO) improvement measures at all eligible locations by 2030.

In addition, the TPB identified the following seven strategies for "further exploration in coordination at the local and state levels":

1. Take action to shift growth in jobs and housing from locations currently forecast to locations near TPB-identified high-capacity transit stations and in COG's Regional Activity Centers to improve the jobs-housing balance locally.
2. Make all public bus transportation in the region fare-free by 2030.
3. Make all public rail transportation in the region fare-free by 2030.

4. Price workplace parking for employees – only in Activity Centers by 2030 and everywhere by 2050
5. Convert a higher proportion of daily work trips to telework by 2030 and beyond.
6. Charge a new fee per vehicle mile of travel (VMT) by motorized, private, passenger vehicles in addition to the prevailing transportation fees and fuel taxes [mileage-based user fee].
7. Charge a "cordon fee" (Commuter tax) per motorized vehicle trip for all vehicles entering Activity Centers, by 2030.

To build on this work, COG staff have requested a study to examine implementation issues and considerations associated with the seven strategies identified for further exploration and to identify additional strategies that were not included in the Climate Change Mitigation Study of 2021 (CCMS) for consideration. The memo includes a recommended list of additional on-road transportation GHG strategies for further exploration (in addition to the seven identified in R18-2022). It also identifies a set of recommended implementation considerations to be analyzed.

Recommended Additional Transportation GHG Reduction Strategies for Further Analysis

To identify possible additional transportation GHG reduction strategies for analysis (beyond those in R18-2022), ICF conducted a review of strategies that were considered but not included in the CCMS. ICF also reviewed a range of documents that describe transportation GHG reduction strategies from jurisdictions within and outside the COG region. This review included the Transportation Carbon Reduction Strategy (CRS) documents developed by the District of Columbia, Maryland, and Virginia (Note that Virginia has not yet released its CRS so the review included presentations on the draft CRS). ICF also reviewed climate action plans developed by several local jurisdictions in the COG region—Alexandria, VA; Arlington County, VA; Fairfax County, VA; Montgomery County, MD; and Prince George's County, MD—with respect to their transportation sector strategies. Finally, ICF reviewed CRS documents from California, Minnesota, Oregon, Pennsylvania, and Washington, as well as national-level documents, including the *U.S. National Blueprint for Transportation Decarbonization*[1] and the National Cooperative Highway Research Program (NCHRP) resource on *Reducing Greenhouse Gas Emissions: A Guide for State DOTs*.[2]

Through this review, ICF identified several additional transportation GHG reduction strategies to consider. These are divided into two categories: primary additional recommendations and secondary additional recommendations. The latter category includes strategies related to existing strategies that have either been adopted or identified for further exploration as well as strategies that address transportation emissions other than on-road mobile sources. Note that in identifying potential additional strategies to consider, the TPB adopted strategies were

[1] The U.S. National Blueprint for Transportation Decarbonization: A Joint Strategy to Transform Transportation. Jan. 2023. https://www.energy.gov/sites/default/files/2023-01/the-us-national-blueprint-for-transportation-decarbonization.pdf

[2] NCHRP Web Resource 1, Reducing Greenhouse Gas Emissions: A Guide for State DOTs. March 8, 2022. https://crp.trb.org/nchrpwebresource1/

interpreted broadly. For instance, the strategy to "convert private- and public-sector, light-, medium-, and heavy-duty vehicles, including public transit buses, to clean fuels by 2030" was interpreted to include a wide array of strategies, including public sector fleet purchases, incentives for electric vehicle (EV) purchases, outreach and education on EVs, etc. Similarly, the strategy to "reduce travel times on all public transportation bus services" was interpreted to include a wide array of strategies, including transit signal priority, bus-only lanes, and enhancements to bus service frequencies (to reduce waiting times).

Each strategy is described briefly below, along with information on whether the strategy is identified within any of the state or local climate plans within the COG region.

Primary Additional Strategies Recommended for Further Consideration

- **Institute a carbon pricing program or increase in fuel taxes**
  Carbon pricing has often been identified by economists as a very promising strategy for reducing carbon emissions from transportation by increasing the cost of using carbon-intensive travel. Carbon pricing actions include implementing a cap-and-trade program—limiting the total transportation sector GHG emissions, issuing emissions permits, and allowing emitters to trade them—or instituting a carbon tax based on the carbon content of the fuel (e.g., essentially an increase in fuels taxes, which would vary based on type of fuel).[3] Carbon pricing would encourage both a shift toward using cleaner vehicles (e.g., electric vehicles, more fuel efficient vehicles) and reduced vehicle travel. The Montgomery County Climate Action Plan identifies "advocate for a vehicle carbon/gas tax or VMT tax" as one of the transportation actions in the plan.[4]

- **Implement pay-as-you-drive insurance requirements**
  Currently, most drivers pay a fixed premium for auto insurance that does not vary based on the mileage they travel month to month. Pay-as-you-drive insurance involves a mileage-based fee structure for these vehicle insurance costs, and so has many of the same effects as a VMT-fee but would not be a new fee on consumers. By converting a fixed payment into a variable payment based on miles traveled, this premium structure would incentivize driving less. Several insurers currently offer pay-as-you-drive insurance, and this strategy would expand this option or require this option to be offered. Pay-as-you-drive insurance is noted in the Maryland CRS as an "emerging carbon reduction innovation."

- **Implement employer-based parking cash-out program requirements**
  Parking cash-out programs, in which employers compensate their employees for forfeiting their subsidized parking benefit, can reduce emissions by shifting travel from automobiles to transit, active modes, or vanpools.[5] This strategy may have similar

[3] Resources for the Future, Carbon Pricing 202: Pricing Carbon in the Transportation Sector. Sep. 10, 2020. https://www.rff.org/publications/explainers/carbon-pricing-202-pricing-carbon-transportation-sector/
[4] Montgomery County, Montgomery County Climate Action Plan, June 2021. https://www.montgomerycountymd.gov/climate/Resources/Files/climate/climate-action-plan.pdf
[5] U.S. Department of Transportation Federal Highway Administration, An Assessment of the Expected Impacts of City-Level Parking Cash-Out and Commuter Benefits Ordinances.

effects as requiring priced parking at work but has some different implementation considerations. The District of Columbia has an existing Parking Cash Out law (Transportation Benefits Equity Amendment Act of 2020), which requires employers with 20 or more employees in DC that offer parking benefits to provide a "clean air transportation benefit" to employees who decline the parking benefit, pay a Clean Air Compliance fee, or implement a transportation management plan.[6]

- **Reduce VMT associated with school-based trips**
  During the CCMS, a suggestion was made to explore strategies to reduce school-based trips; however, this analysis was not integrated into the modeling due to limitations in data. Recognizing that some other strategies (e.g., workplace parking pricing, telework) target commute trips, it was suggested that school trips would be a potentially promising target for VMT reduction. Potential actions to reduce VMT associated with school trips include limiting parental drop-offs and restricting student parking to encourage school bus use, as well as facilitating school-based carpooling, walking, and biking to school (e.g., "walking school bus" programs, safe bicycle parking, incentives and promotions).

- **Incentivize electric-bicycle (e-bike) adoption**
  E-bike adoption incentives like purchase rebates and tax credits can reduce emissions by replacing shorter car trips with e-bike trips, thereby reducing VMT. The District of Columbia enacted an e-bike incentive with the Electric Bicycle Incentive Kickstarting the Environment Act of 2023.[7]

Secondary Additional Strategies for Further Consideration

These strategies also may be considered for further study but have some overlaps with strategies that have already been identified as priorities or for further study or address other aspects of transportation outside of on-road mobile sources.

- **Expand the rail system**
  In addition to enhancing bus services and instituting bus priority, public transportation could be made more viable to more travelers through expansion or enhancement of the regional rail system, including Metrorail, commuter rail, and/or light rail. Beyond what is currently in the TPB's currently adopted Long-Range Transportation Plan (LRTP), known as *Visualize 2045*, Metrorail expansion could include extensions to rail lines (such as those explored by the Long-Range Plan Task Force)[8] or a new rail line (such as the Blue

https://ops.fhwa.dot.gov/publications/fhwahop23023/ch1.htm#:~:text=Cash%2Dout%20programs%20can%20be,to%20not%20drive%20to%20work.

[6] District Department of Transportation, Everything You Need to Know about the DC Parking Cashout Law. March 17, 2022. https://godcgo.com/everything-you-need-to-know-about-the-dc-parking-cashout-law/

[7] Juiced Bikes, 2023 Guide to U.S. E-Bike Rebates & Tax Credits, July 20, 2023. https://www.juicedbikes.com/blogs/news/2023-guide-us-ebike-rebates-and-tax-credits

[8] ICF et al., "An Assessment of Regional Initiatives for the National Capital Region: Technical Report on Phase II of the TPB Long-Range Plan Task Force" (Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board, December 20, 2017), https://www.mwcog.org/documents/2017/12/20/long-range-plan-task-force-reports-projects-regional-transportation-priorities-plan-scenario-planning-tpb/.

Line Loop proposed by WMATA), new light-rail lines, and/or significant service frequency enhancements to commuter rail services such as the Maryland Area Rail Commuter (MARC) and Virginia Rail Express (VRE). Rail expansion/enhancements could reduce emissions by making the transit system more appealing to potential riders and support more transit-oriented development, thereby reducing VMT.[9] Transit capacity/service expansion, including the MARC Growth and Investment Plan, intercity transportation initiatives (Amtrak Northeast Corridor), and investments to improve transit to BWI Thurgood Marshall Airport are included in the Maryland Carbon Reduction Strategy, and the Montgomery County Climate Action Plan notes that providing more reliable, off-peak, and reverse services on MARC will enable the system to attract more trips.

- **Freight-related efficiency strategies**
  Strategies to reduce GHG emissions associated with goods movement encompass a wide array of actions, including truck stop electrification to reduce freight idling, modernizing rail infrastructure, and improvements to real-time truck parking information and availability. The Maryland CRS also identifies several emerging carbon reduction innovations, such as freight villages/urban freight consolidation centers, designated zero-emission truck corridors, and emerging last-mile logistics. Compared to other regions with major ports, like the Baltimore region, freight is not as large an industry sector in the Washington, DC region. However, these strategies could be explored further since none of the TPB strategies adopted as priorities or identified for further study directly focus on freight. These strategies would need to be defined further for analysis.

- **Replace fossil fuels with biofuels / implement a low-carbon fuel standard**
  Replacing fossil fuels with biofuels like ethanol and biodiesel can reduce emissions in that their growing removes carbon dioxide from the atmosphere and they burn more cleanly.[10] A Low Carbon Fuel Standard (LCFS) is a market-based program designed to reduce the carbon intensity of transportation fuels through a system of credits which can then be sold to regulated entities, such as importers, producers, and refiners of petroleum fuels, that are required to reduce the carbon intensity of the transportation fuels they sell in the state. Several states, including California, Oregon, Washington, and Pennsylvania, have adopted this strategy. The Fairfax County Climate Action Plan also calls for supporting low-carbon fuels. While this strategy may be effective, it was put in the secondary list since it overlaps with the adopted strategy to "convert private- and public-sector, light-, medium-, and heavy-duty vehicles, including public transit buses, to clean fuels by 2030."

- **Convert fixed transportation fees into mileage-based fees**
  This strategy is similar to the VMT-fees strategy but rather than adding new fees, this strategy would involve converting fixed fees into variable or VMT-based fees. Potential taxes or fees that could be converted into "per mile" charges include state vehicle sales

[9] Axios, Metro is mapping out its future with new stations and signs, September 26, 2023. https://www.axios.com/local/washington-dc/2023/09/26/dc-metro-expansion-georgetown
[10] U.S. Energy Information Administration, Biofuels Explained. https://www.eia.gov/energyexplained/biofuels/

taxes for newly purchased vehicles, annual vehicle registration fees, and personal property taxes (the "car tax").

- **Adjust parking requirements and urban design guidelines**
  This strategy is related to land use and urban form strategies that were identified by TPB as priority strategies or for further study (i.e., Improve walk/bike access to all TPB-identified high-capacity transit stations; Add additional housing units near TPB-identified high-capacity transit stations and in COG's Regional Activity Centers; Take action to shift growth in jobs and housing from locations currently forecast to locations near TPB-identified high-capacity transit stations and in COG's Regional Activity Centers to improve the jobs-housing balance locally). However, it focuses on more local-scale urban form issues such as by reducing minimum parking requirements, capping parking allowed, and incorporating design standards to reduce auto-oriented development and enhance the environment for walking, biking, and using transit, such as through changes in street networks, design features, and setbacks from roadways. These strategies could be applied both in activity centers and outside of activity centers.
- **Expand programs to incentivize carpooling and vanpooling**
  While MWCOG jurisdictions are already promoting carpooling and vanpooling through programs like Commuter Connections, which includes a guaranteed ride home program, ridematching, and vanpool support,[11] regional partners could consider additional support strategies through more incentives and/or restrictions (e.g., HOV-only roads or zones).
- **Expand the bikeshare system**
  Expanding the Capital Bikeshare system in terms of fleet size and geographic extent could reduce emissions by replacing short car trips with bike trips as well as solving the first/last mile problem for potential transit users, thereby reducing VMT.[12] This strategy is closely tied to the adopted priority strategy, "Increase walk/bike modes of travel - Complete the TPB's National Capital Trail Network by 2030."
- **Expand microtransit / first mile-last mile service in the region**
  Microtransit is typically an on-demand service that uses app-enabled trip requests and payment to complement fixed-route transit service. Expanding microtransit service can reduce emissions by solving the first/last mile problem for potential transit users, thereby reducing VMT. Existing microtransit programs in the region include DC Neighborhood Connect[13] and Montgomery County Flex.[14]

[11] MWCOG Commuter Connections. https://www.commuterconnections.org/
[12] Estimating Vehicle-miles traveled reduced from Dock-less E-bike-share: Evidence from Sacramento, California, April 2023. https://www.sciencedirect.com/science/article/abs/pii/S1361920923000688
[13] DC Neighborhood Connect. https://dfhv.dc.gov/page/dc-neighborhood-connect
[14] Montgomery County Department of Transportation, Flex. https://www.montgomerycountymd.gov/dot-transit/flex/

- **Expand carsharing**
  Carsharing can reduce emissions by facilitating vehicle shedding, which reduces VMT, and by shifting VMT to more efficient vehicles.[15] The Montgomery County Climate Action Plan specifically calls for an EV carshare program for low-income communities.

- **Constrain vehicle use in urban areas**
  Some U.S. cities and other worldwide have limited or banned private vehicle use from city centers or parts of city centers. A strategy to constrain the use of private vehicles in downtown commercial districts and activity centers could involve limiting the number of lanes available for motor vehicles, converting street space to dedicated use for walking, biking, outdoor dining, or public plazas, or creating "car free" zones. The Montgomery County Climate Action Plan includes a transportation action to "constrain cars in urban areas, limit major new road construction."

- **Promote the deployment of Connected and Autonomous Vehicles (CAVs)**
  CAV deployment may reduce GHG emissions by facilitating eco-driving and platooning, both of which improve vehicle efficiency, as well as reducing crashes, thus decreasing delay-associated emissions.[16] The Maryland Carbon Reduction Strategy includes implementation of CAV pilots and supporting CAV testing through partnerships as a transportation technology strategy to support GHG reduction. This strategy has some connections to the priority strategy adopted by the TPB to implement TSMO strategies.

- **Utilize low-carbon methods for constructing and maintaining transportation infrastructure**
  GHG emissions associated with the construction and maintenance of transportation infrastructure (across all modes, including transit infrastructure, roadways, off-road paths) can be minimized through reuse of materials and use of innovative low-carbon materials and techniques (reducing the amount of carbon emissions associated with the production and use of materials). The implementation of energy-efficient alternatives (e.g., LED lighting) for street lighting and traffic control devices also can reduce emissions. These strategies may be implemented by transportation agencies but do not directly impact on-road transportation emissions. Maryland DOT included "Innovative Clean Construction Pilot Projects" to reduce embodied carbon in the Maryland CRS, and several other states, such as Minnesota and Washington State also included these strategies in their CRS documents.

- **Add renewable energy generation on transportation infrastructure/right-of-way (ROW)**
  Although this strategy does not directly address on-road transportation emissions, transportation agencies may contribute to overall regional emissions reductions through generation of renewable energy on transportation facilities and ROW. Solar panels or use of wind energy on highway ROW, at transit stations, rest stops, parking facilities, and

[15] Roundtrip Carsharing in New York City: An Evaluation of a Pilot Program and System Impacts, 2021. https://escholarship.org/uc/item/5kb1r71v

[16] Center for American Progress, The Impact of Vehicle Automation on Carbon Emissions, November 18, 2016. https://www.americanprogress.org/article/the-impact-of-vehicle-automation-on-carbon-emissions-where-uncertainty-lies/

other transportation infrastructure can generate clean energy that can be used to provide clean energy to displace traditional power sources for lighting or electric vehicle fleets. Maryland and Virginia have efforts to explore solar on highway ROW.

Priority Implementation Considerations

Each of the strategies selected for further exploration will be assessed in relation to implementation issues that are important for state and local governments to consider. To identify implementation considerations, ICF reviewed the 2021 CCMS, TPB's Synthesized Policy Framework, the federal Carbon Reduction Program, the U.S. Environmental Protection Agency's Carbon Pollution Reduction Grants Program, and the Federal Highway Administration (FHWA)/ Federal Transit Administration (FTA) Planning Emphasis Areas. The recommended implementation considerations for evaluation include:

- **Relative effectiveness in reducing GHG emissions**
  The potential to reduce GHG emissions is important to understand for developing a comprehensive transportation GHG reduction strategy. The assessment will rely on literature assessments and studies from within the region, and will not involve modeling. ICF will assess both ***level of impact*** and likely ***timeframe of effectiveness***.
- **Implementing organizations, legislative authority, and necessary enabling actions**
  Some strategies may require actions at the federal, state, or local levels, and in some by the private sector (e.g., employers, developers) or individual households. ICF will identify the ***organizations that will need to be involved in implementation*** of the strategy, as well as the ***legislative authority*** necessary to implement each strategy to reveal relative feasibility. ICF will also identify ***enabling actions*** that may be necessary in the case where there is no current authority.
- **Costs associated with implementation**
  ICF will identify the costs associated with implementation. Generally, these costs will be assessed qualitatively using a relative scale but may be quantitatively estimated in some cases. The costs will be identified as those to be borne by governments/public sector (which ultimately must generally generate revenues from the public), as well as costs to the private sector, and households for each strategy.[17]
- **Implication of the strategies on other regional goals and priorities**
  ICF will assess the implications of strategy implementation on regional goals and priorities. Drawing from the TPB Principles and Goals[18], these have been consolidated into the following topics for assessment:
    - ***Accessibility and Affordability*** – impacts on mobility, access to jobs/education/health care and other destinations, and affordability of access
    - ***Environmental Quality*** - impacts on air quality, water quality, and other aspects of the natural environment

[17] Potential social costs and savings (i.e., changes in externality costs) are considered as part of a strategy's implication on other regional goals and priorities.
[18] MWCOG, TPB's Synthesized Policy Framework, 2022. https://www.mwcog.org/documents/2024/02/06/tpb-synthesized-policy-framework/.

- ***Equity*** - impacts on different population groups within the region, particularly low-income and historically disadvantaged populations and those who have been overburdened by the transportation network.
- ***Infrastructure Condition*** – impacts on state of good repair and on existing infrastructure
- ***Livability and Prosperity*** – impacts on community and economic vitality, including community quality of life, job creation and economic activity, and a sense of place
- ***Reliability and Efficiency*** – impacts on travel time reliability and efficient system operations
- ***Resiliency*** – implications in addressing potential threats from climate change and severe weather, as well as other natural and human-caused hazards
- ***Safety*** – impacts on fatalities and serious injuries, as well as public safety

The evaluated implications will include an assessment of both potential *benefits* and *adverse effects* or unintended consequences. This will reveal strategy alignment with regional policy goals.

- **Other considerations**
  Finally, this will be a "catch all" assessment to address any other factors that may be useful to consider. It may include a discussion of potential indirect or unintended consequences and actions to consider to best support positive outcomes from the strategy.