TPB CLIMATE CHANGE MITIGATION STUDY OF 2021

Findings from Past TPB and COG Studies

Erin Morrow
TPB Transportation Engineer

Transportation Planning Board
May 19, 2021

National Capital Region
Transportation Planning Board

Findings from Past Studies

- "What Would it Take?" Scenario Study (WWIT) *(TPB, May 2010)*

- Multi-Sector Working Group (MSWG) *(TPB/MWAQC/CEEPC, Jan. 2017)*

- Long Range Plan Task Force (LRPTF) Study *(TPB, Dec. 2017)*

- Metropolitan Washington 2030 Climate and Energy Action Plan (CEAP) *(CEEPC, Nov. 2020)*

Background: Climate Change Reduction Goals

- The Metropolitan Washington Council of Governments (COG) Board of Directors adopted, and National Capital Region Transportation Planning Board (TPB) affirmed, the following GHG reduction goals for the region:

  - By 2012, GHG levels will be 10% below "business as usual" forecasts

  - By 2020, GHG levels will be 20% below 2005 levels

  - By 2030, GHG levels will be 50% below 2005 levels

  - By 2050, GHG levels will be 80% below 2005 levels

On-road Greenhouse Gas Emissions
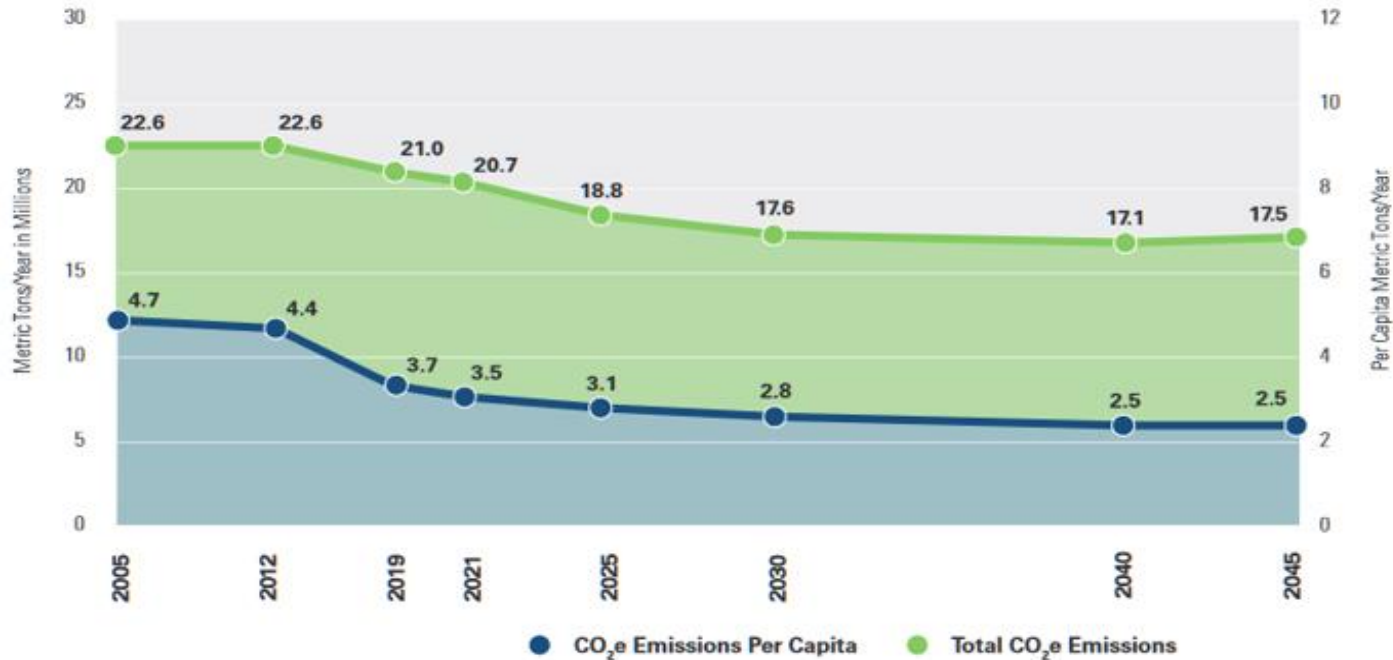
Visualize 2045 (2018):

- 1.3M more people and 1M more jobs (2019-2045)
- Percent growth in walk/bike and transit trips greater than auto trips
- Percent growth in VMT less than in previous LRPs
- VMT per capita reduced (Region Forward Target)
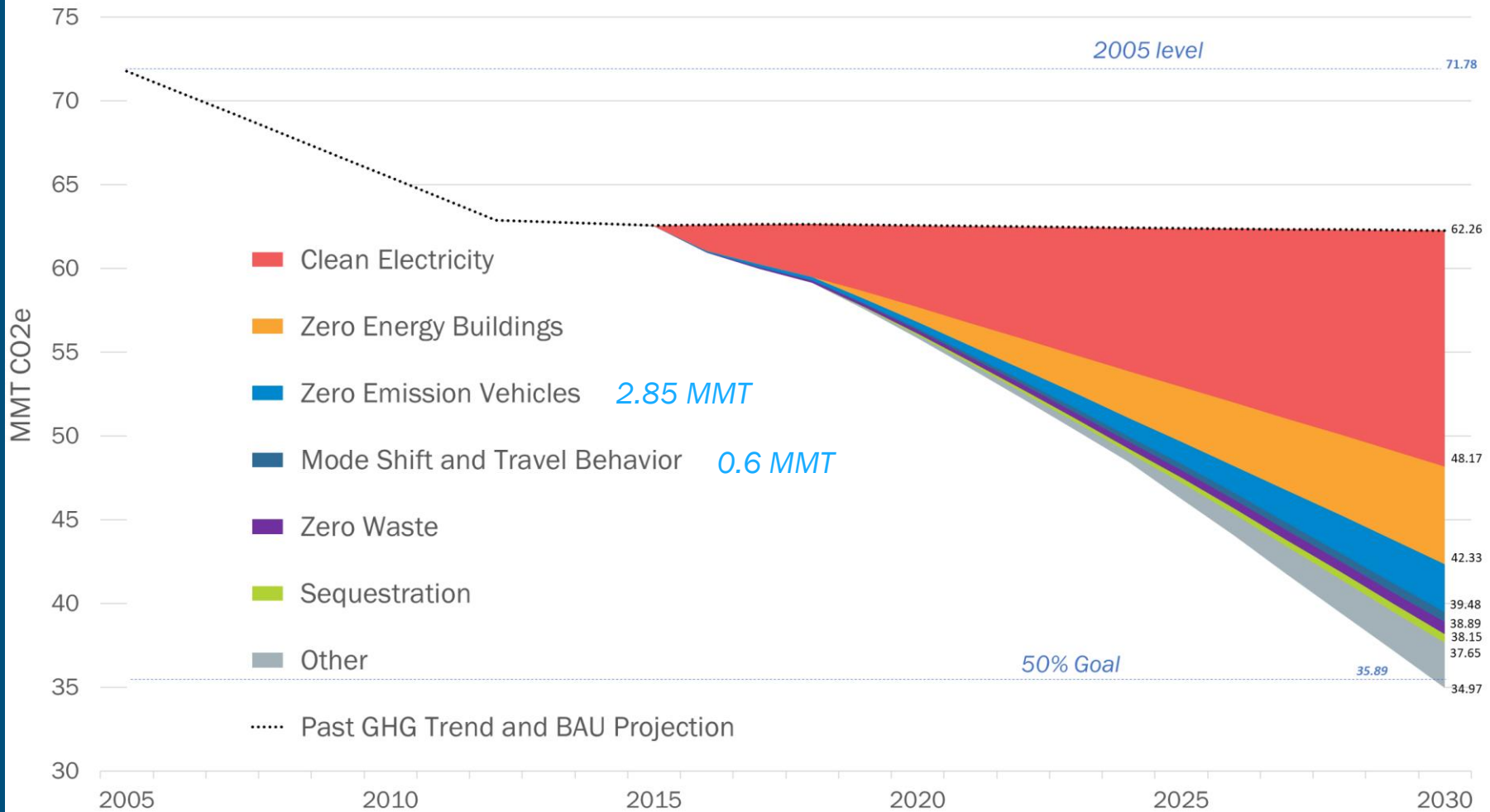- GHG emissions 23% below 2005 levels in 2045

2030 Climate Energy Action Plan (CEAP)

- Plan is fully compliant with Global Covenant of Mayors for Climate and Energy (GCoM) global standards of best practices for climate planning

- 2030 scenario for the plan analyzes the technical potential for metropolitan Washington to reach a 50% reduction in GHG emissions from 2005 levels by 2030

- On-road transportation strategies include Zero Emission Vehicle (ZEV) and Mode Shift and Travel Behavior (MSTB) actions

  - ZEV strategies are based on the "high electric vehicle (EV) adoptions rates from the National Renewable Energy Laboratory's 'Electrification Futures Study'" i.e., adoption rates of greater than 20% for light-duty cars, 9% for light-duty trucks, 4% for medium/heavy-duty trucks, and 30% for transit buses

  - MSTB strategies are from the MSWG study and include increasing transit, carpooling, and non-motorized travel; bringing jobs and housing closer together; and travel demand management (teleworking, transit benefits)

CEAP 2030 Scenario Analysis: Findings

Legend:
- Clean Electricity
- Zero Energy Buildings
- Zero Emission Vehicles — *2.85 MMT*
- Mode Shift and Travel Behavior — *0.6 MMT*
- Zero Waste
- Sequestration
- Other
- Past GHG Trend and BAU Projection

Y-axis: MMT CO_2e

2005 level — 71.78
50% Goal — 35.89

Data labels: 62.26, 48.17, 42.33, 39.48, 38.89, 38.15, 37.65, 34.97

Reducing GHG Emissions from On-Road Transportation

1. Reduce fossil fuels consumed by vehicles

    -   Improve vehicle fuel efficiency

    -   Convert fleet to less-carbon intense fuel

2. Reduce vehicle travel (VT or VMT)

    -   Provide alternatives to single-occupant vehicle (SOV) travel (new transportation projects or service)

    -   Disincentivize SOV travel or incentivize non-SOV travel (policies or programs)

    -   Locate housing, employment, and other activities closer together

3. Reduce inefficiencies in vehicle travel

    -   Invest in programs to reduce non-recurring congestion

    -   Target capital improvements to reduce recurring congestion

Major Findings from Past Studies

- Reducing GHG from on-road transportation in a growing region is difficult

- There is not a single strategy or category of strategies that, if implemented, would achieve the region's GHG reduction goals

- Actions will be required at all levels of government – federal, state, and local

- The effectiveness of a strategy is affected by the scale and timeframe of its implementation

- Benefits from multiple strategies are not always additive and at times are counteractive

Findings: Most Effective Strategies (In Descending Order of Effectiveness)

1. Fuel efficiency, fuel content, and vehicle technology

   - Greatest potential to reduce GHG emissions (e.g., stricter fuel economy and GHG vehicle emissions standards, higher rates of electric vehicle market penetration)

   - GHG reduction potential takes years to be fully realized

   - Equity implications of policies should be considered

   - Actions can be implemented outside the Long-Range Plan

Findings: Most Effective Strategies (In Descending Order of Effectiveness)

2. Aggressive federal/local transportation and land use policy actions that could have a significant impact on travel behavior (**i.e., VMT**)

   - Significant potential, but have not been implemented in the region at levels needed to achieve significant GHG reductions (e.g., large increases in price of gasoline, VMT tax, cordon and parking pricing, significant land use shifts, travel demand management, including telework)

   - Could be implemented in a shorter timeframe contributing to critical near-term GHG reductions

   - Equity implications of policies should be considered

   - Actions can be implemented outside the Long-Range Plan

Findings: Most Effective Strategies (In Descending Order of Effectiveness)

3. Operational efficiency and new transportation projects

   - Operational Efficiency

     - The findings on operational efficiency strategies are mixed, likely due to different assumptions in MSWG and LRPTF; plan to further examine in Phase 2 of Climate Change Mitigation Study of 2021

   - New Transportation Projects (e.g., Long-Range Plan)

     - Have the least significant potential for GHG emissions reductions (even some ambitious packages of projects show low potential for GHG emissions reductions based on past studies)

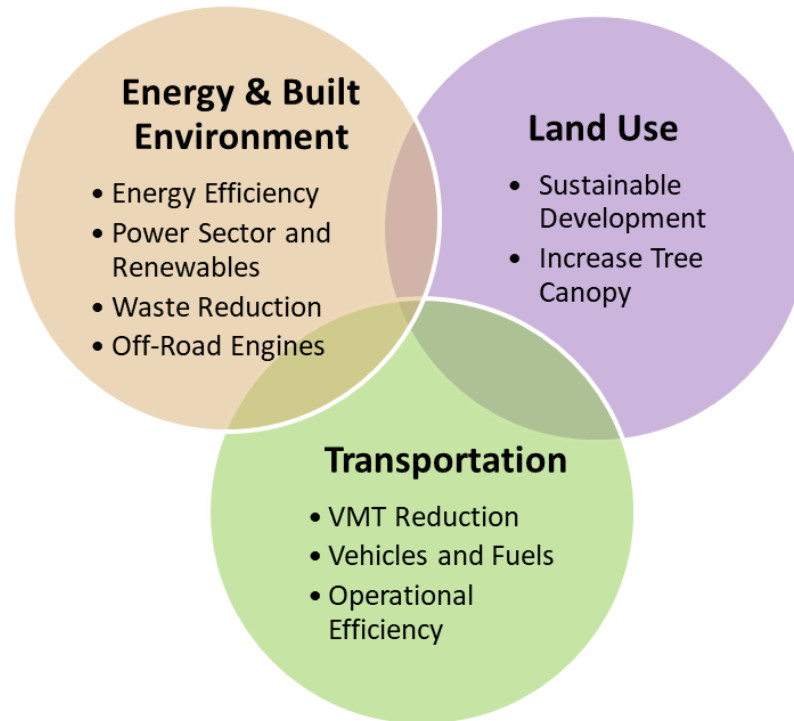   - Important projects to implement from equity and livability perspective

Sample of Findings

- Results from two studies shown for illustration

  - Multi-Sector Working Group (MSWG) Transportation Sector Analysis

  - Long Range Plan Task Force (LRPTF) Study

2017: Multi-Sector Work Group (MSWG)

Energy & Built Environment
- Energy Efficiency
- Power Sector and Renewables
- Waste Reduction
- Off-Road Engines

Land Use
- Sustainable Development
- Increase Tree Canopy

Transportation
- VMT Reduction
- Vehicles and Fuels
- Operational Efficiency

- Existing policies/plans analyzed for potential 2040/2050 reductions

- Additional strategies analyzed at "viable" and "stretch" levels for 2040/2050 reductions

National Capital Region
Transportation Planning Board

MSWG: Transportation and Land Use Results

On-Road Transportation Combustion Emissions	GHGs (MMTCO$_2$e)			
	2005	2020	2040	2050
2005 "Business as Usual" Projections	**22.58**	**28.14**	**33.13**	**35.00**
2015 Current Policies Projections *(includes 2011 CAFE standards, 2012 medium- and heavy-duty fuel efficiency standards)*	**22.58**	**21.54**	**17.80**	**18.64**
Projected Reductions from 2005 Levels (%) (2015 Current Policies)	*-*	*5%*	*21%*	*17%*
VMT Strategies (including Land Use)	-	-0.64	-1.75	-3.27
Vehicle/Fuels Strategies*	-	-0.23	-2.30	-3.53
Operational Efficiency Strategies	-	-0.34	-0.57	-0.86
Total On-Road GHG Reductions+	-	-1.19	-4.30	-6.77
Projected Reductions from 2005 Levels (%) (MSWG Strategies)	*-*	*5%*	*19%*	*30%*
Net Projected Emissions (2015 Current Policies + MSWG Strategies)	**22.58**	**20.35**	**13.50**	**11.86**
Projected Reductions from 2005 levels (%) (2015 Current Policies + MSWG Strategies)		*10%*	*40%*	*47%*
Impacts to Other GHG Source Categories				
*Increased emissions from electricity consumption**		*0.13*	*0.72*	*1.26*
Carbon sequestration benefits		*0.19*	*0.82*	*0.98*

*Note that an increase in electric vehicles reduces on-road transportation combustion emissions but increases electric utility emissions; the level of increase in electric utility emissions will depend on many factors, including the implementation of Energy and Built Environment strategies. Also note that the total does not equal the sum of the individual types of strategies due to off-setting effects

MSWG Actions: Vehicles and Fuel

2040

- 15% zero emissions vehicles (e.g., EVs) in on-road light-duty fleet (LDV) and public sector heavy-duty fleet (PSHD)
- Reduce on-road fuel emissions by 10% by reducing carbon content of fuel

2050

- 25% zero emissions vehicles in on-road LDV fleet and PSHD
- Reduce on-road fuel emissions by 15% by reducing carbon content of fuel

National Capital Region
Transportation Planning Board

MSWG Actions: Travel Efficiency

2040

- Regionwide operational improvements; 80% of drivers adopt "eco-driving" practices

2050

- Regionwide operational improvements; 100% of drivers adopt "eco-driving" practices

MSWG Actions: Reduce Vehicle Travel

2040

- Reallocate future growth <u>within</u> jurisdictions to maximize concentration within Activity Centers and near premium transit (i.e., Metrorail, commuter rail, LRT, or BRT)
- $50/month transit subsidy for 80% of employers
- Reduce transit fares by 25% regionally
- Reduce transit travel times by 15% and reduce headways (wait time) by 15%
- Increased parking charges in 90% of Activity Centers
- $5 cordon pricing entering downtown DC

2050

- Reallocate future growth <u>across</u> jurisdictions to maximize concentration within Activity Centers and near premium transit
- $80/month transit subsidy for 100% of employers
- Reduce transit fares by 40% regionally
- Reduce transit travel time by 20% and reduce headways (wait time) by 20%
- Increased parking charges in 100% of Activity Centers
- $5 cordon pricing entering downtown DC
- $0.10/mile VMT charge

2017: Long Range Plan Task Force (LRP-TF)

Multimodal	Transit	Policy-Focused
1. Regional Express Travel Network	4. Regionwide High-Capacity Transitways	8. Optimize Regional Land Use Balance
2. Operational Improvements & Hotspot Relief	5. Regional Commuter Rail Enhancements	9. Transit Fare Policy Changes
3. Additional Northern Bridge Crossing/Corridor	6. Metrorail Regional Core Capacity Improvements	10. Amplified Travel Demand Management (for commute trips)
	7. Transit Rail Extensions	

- 10 Alternative scenarios of land use and transportation projects/programs/policies evaluated

- To identify potential long-term improvements in the multi-modal system performance outcomes *(not Climate Change focused)*

- Scenario evaluation metrics included changes in VMT, VHD, and GHG emissions

National Capital Region
Transportation Planning Board

2017: LRP-TF Study Findings

	Change in 2040 CO2 Emissions (annual)	Change in 2040 Daily VHD	Change in 2040 Daily VMT	Change in 2040 Daily VMT per Capita
10. Amplified Employer-Based Travel Demand Management	-7%	-24%	-6%	-6%
8. Optimize Regional Land-Use Balance	4%	18%	-3%	-6%
6. Metrorail Regional Core Capacity Improvements	-2%	-9%	-1%	-1%
7. Transit Rail Extensions	-1%	-3%	-1%	-1%
9. Transit Fare Policy Changes	-1%	-2%	-1%	-1%
4. Regionwide Bus Rapid Transit and Transitways	-1%	-2%	<-1%	<-1%
2. Operational Improvements and Hotspot Relief	-1%	-8%	2%	2%
5. Regional Commuter Rail Enhancements	0%	-2%	<-1%	<-1%
1. Regional Express Travel Network	0%	-11%	<1%	<1%
3. Additional Northern Bridge Crossing/Corridor	1%	-3%	1%	1%

LRPTF Case Study 1: Amplified Employer-Based Travel Demand Mgmt

Transit/Vanpool Subsidy: Transit subsidies averaging $50 per month for 80% of employees

Parking Pricing Increase: Charge for 90% of parking for work-trips in Activity Centers with average parking costs of $6 per day (higher in the core and lower in areas not currently charging for parking)

Land-Use Assumptions: 2040 CLRP Round 9.0 Cooperative Land-Use Forecasts were used without any change
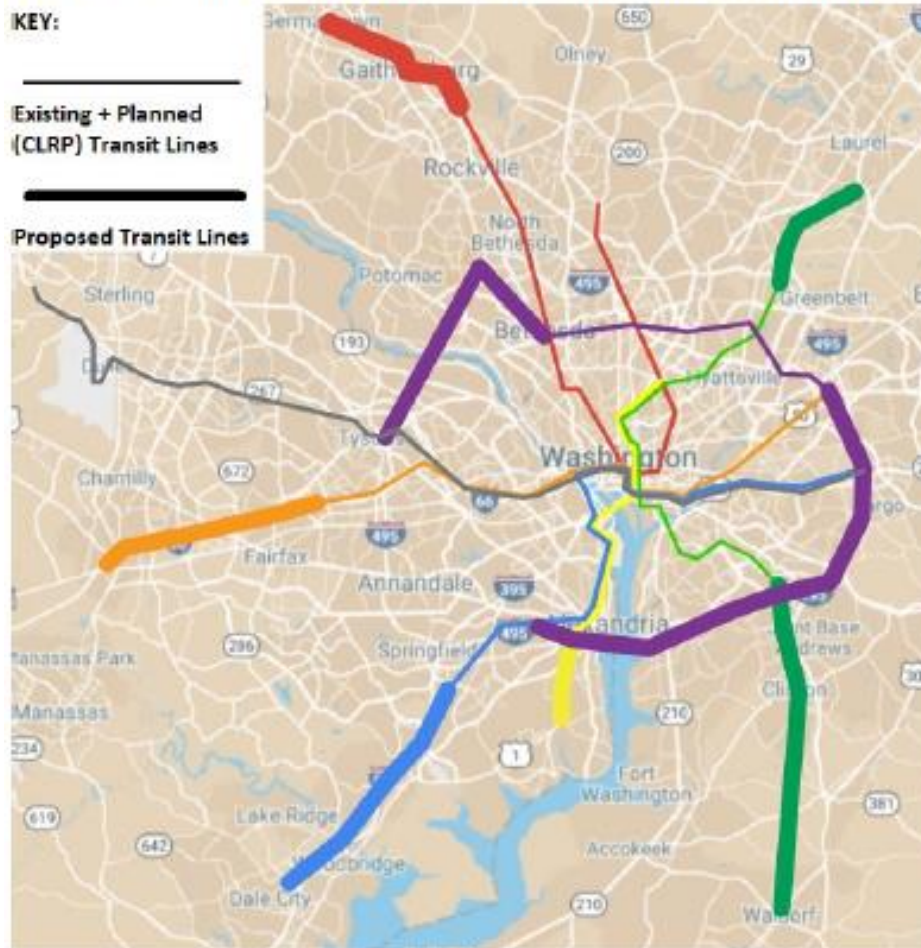
Increase in telework: Regional reduction in the number of commute trips for all modes to achieve a 20% telecommute rate

This initiative resulted in a VMT decrease of 6%, VHD decrease of 24%, and GHG decrease of 7% relative to the 2040 Baseline

LRPTF Case Study 2: Transit Rail Extensions

Figure 12: Existing Metrorail and Proposed Extensions

LRPTF Case Study 2: Transit Rail Extensions

Transit Rail Extensions:

Metrorail: Centreville/Gainesville, Hybla Valley/Potomac Mills, Germantown, and Laurel

Purple Line: Tysons (west) and Eisenhower Avenue (east)

Southern Maryland Rapid Transit: between Branch Avenue and Charles County

Land-use Assumptions: Jobs and households were shifted to Activity Centers in the corridor

This initiative, which included an expansion of the transit system with 62 new stations, resulted in a VMT decrease of 1%, VHD decrease of 3%, and GHG decrease of 1% relative to the 2040 Baseline
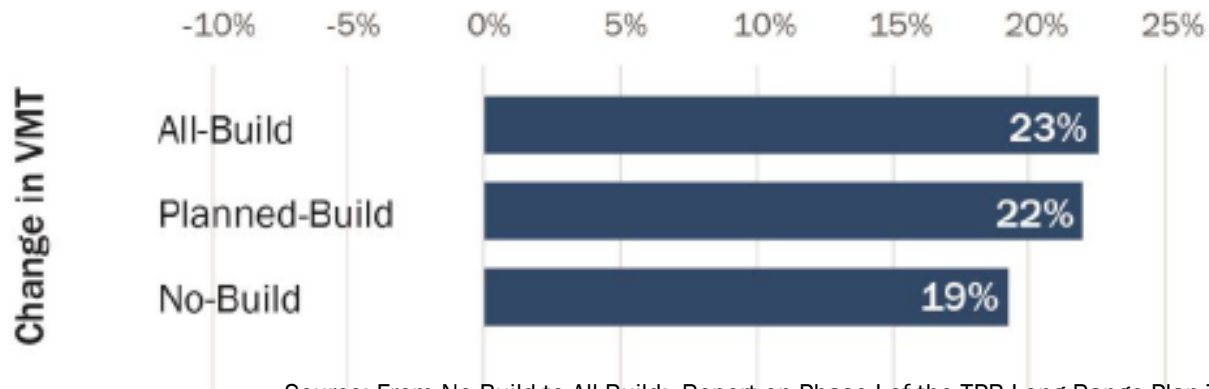
Challenges of Regional Growth on Mobility and Emissions

National Capital Region
Transportation Planning Board

VMT Growth: Population vs. Projects

VMT Growth (2015 – 2040) based on the 2015 CLRP Amendment

Source: From No-Build to All-Build: Report on Phase I of the TPB Long-Range Plan Task Force (December 2016)

- Population growth 24% and employment growth 36% in all scenarios

- No Build adds no new transportation projects from 2015-2040; Planned-Build adds 372 new projects; All-Build adds an additional 550 new projects

- How the region approaches growth will have impact on VMT and GHG emissions

Next Steps

- **Phase 2: Pathways to Greenhouse Gas (GHG) Reductions**

  - Literature review

    - State and local climate planning

    - Climate planning in other regions

    - National policies

  - Technical Analysis

    - Mode Shift and Travel Behavior (VMT and Trip Reduction)

    - Vehicle Fuel, Fuel Efficiency, and Vehicle Technology

    - Operational Efficiency

Erin Morrow

TPB Transportation Engineer
(202) 962-3793
emorrow@mwcog.org

Dusan Vuksan

TPB Transportation Engineer
(202) 962-3279
dvuksan@mwcog.org

Mark Moran

TPB Travel Forecasting and Emissions Analysis Program Director
(202) 962-3392
mmoran@mwcog.org

mwcog.org/tpb

Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

National Capital Region
Transportation Planning Board