

TPB CLIMATE CHANGE MITIGATION STUDY OF 2021

Findings from Past TPB and COG Studies

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Draft Scope of Work

- Phase 1: Findings from Past TPB and COG studies (Memorandum)
 - “What Would it Take?” Scenario Study (WWIT) (Nov. 2008 – May 2010)
 - Multi-Sector Working Group (MSWG) Study (Jan. 2015 – Jan. 2017)
 - Long Range Plan Task Force (LRPTF) (Jan. 2017 – Dec. 2017)
- Phase 2: Scenario Study
 - Literature review
 - Technical Analysis
 - Mode Shift and Travel Behavior (VMT and Trip Reduction)
 - Vehicle Fuel, Fuel Efficiency, and Vehicle Technology
 - Operational Efficiency



Draft Memorandum

- First product of the proposed climate change mitigation work activity for 2021 (Phase 1)
- Reviews and expands upon the summary of these three studies that was provided to the TPB in October 2020 at the TPB Work Session on Climate Change Planning in the National Capital Region
- Discusses the collaborative actions proposed to reduce GHG emissions from the on-road transportation sector that were identified in the Metropolitan Washington 2030 Climate and Energy Action Plan (CEAP) to support the region in achieving its 2030 GHG emission reduction goals
- The findings from the studies and the CEAP provide a useful reference regarding the potential effectiveness of strategies to reduce GHG emissions and will inform the second phase of the TPB's climate mitigation study

Draft Memorandum

A. Background

B. Past TPB and COG Studies

C. Summary Findings of Past Studies

D. Key Differences Between Past Studies

E. Conclusion

Appendix A: Major Findings from Past TPB and COG Studies

Appendix B: Detailed Strategy Descriptions

Appendix C: Technical Approach and Documentation



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



Background: 2030 Climate and Energy Action Plan (CEAP)

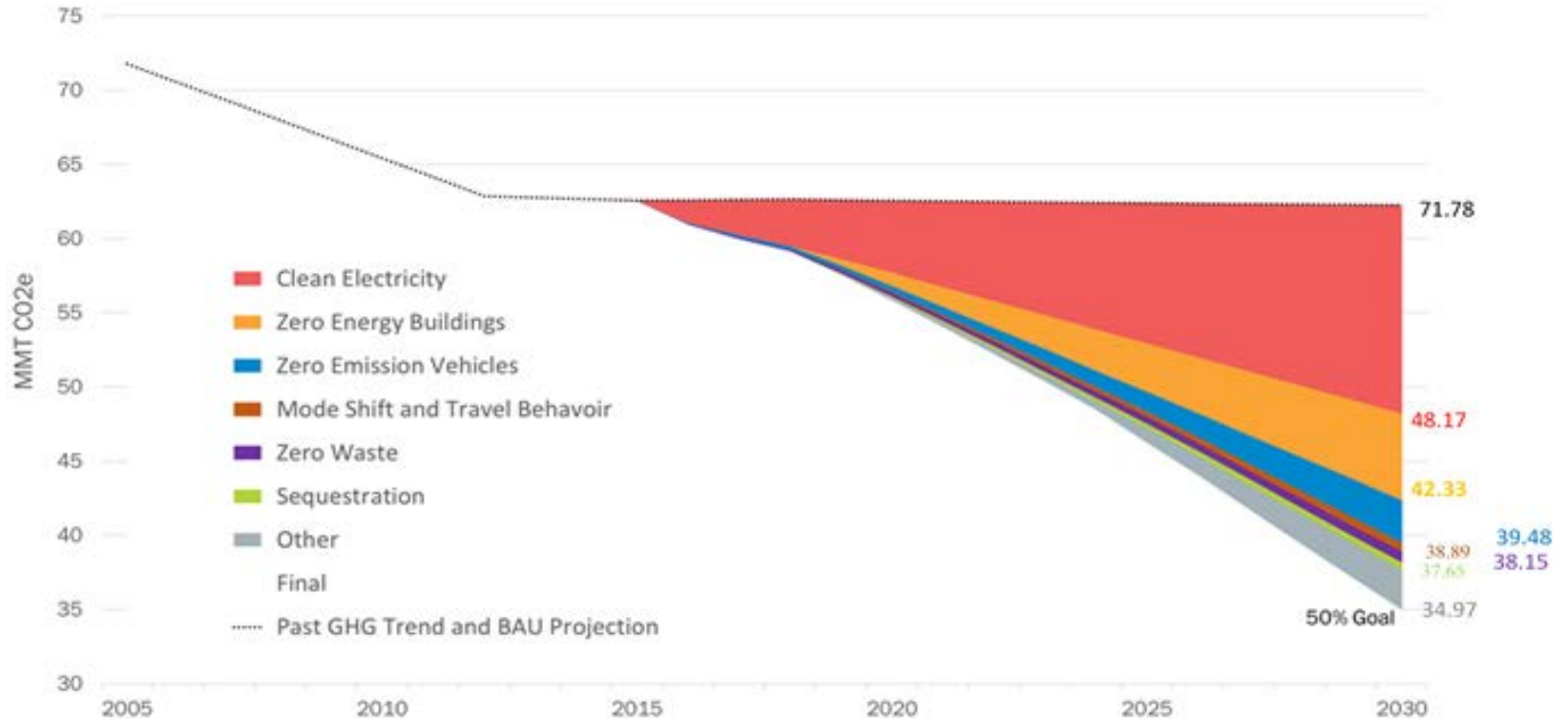
- Consistent with the Global Covenant of Mayors (GCoM) climate change planning protocol, CEEPC developed the Metropolitan Washington 2030 Climate and Energy Action Plan (CEAP)
- Establishes priority collaborative actions for COG and its members to work on together over the next ten years to help move the region towards meeting the 2030 goals
- Notes that “achieving the regional goals would require unprecedented, aggressive cross-sectoral action from all COG members and its state and federal partners”

Background: 2030 Climate and Energy Action Plan (CEAP)

- The CEAP scenario analysis showed the technical potential for the region to achieve the 2030 goal
- In addition to strategies related to other sectors, the analysis identified potential reductions from various strategies in the Zero Emission Vehicle (ZEV) and Mode Shift and Travel Behavior (MSTB) categories
 - ZEV strategies were based on EV adoption rates in the National Renewable Energy Laboratory’s “Electrification Futures Study”
 - MSTB strategies were based on the MSWG / LRPTF studies
- The analysis is not sufficient to provide detailed information on the levels of outcomes for all of the different transportation strategies for VT/VMT reductions



2030 Scenario Analysis from CEAP



Background: Visualize 2045



- GHG emissions in 2045 are forecasted to be 23% below 2005 emissions levels, and 16% below 2019 emissions levels (largely due to increased fuel efficiency standards)
- The region is forecast to experience a 23% growth in population and a 29% growth in employment between 2019 and 2045

Source: Visualize 2045: A Long-Range Transportation Plan for the National Capital Region. Washington, D.C.: National Capital Region Transportation Planning Board. October 17, 2018.

https://www.mwcog.org/assets/1/28/Visualize_2045_Plan_2018_10_23_No_Crops_Single.pdf



“What Would It Take?” Scenario Study

- Completed in 2010
- Evaluated what it would take if the newly adopted multi-sectorial greenhouse gas reduction goals had to be met within the on-road transportation sector
- Considered local, state and federal strategies, including travel demand management, bicycle and pedestrian improvements, traffic signal optimization, the purchase of more fuel-efficient transit vehicles, high price of gasoline, and improvements in fuel efficiency
- Local/state/regional efforts could help the region achieve short-term GHG reduction goals, but actions implemented at the federal level would be required to meet long-term goals
- Federal strategies were found to be highly effective and increasing the efficiency of vehicles showed to be “a clear strategy for reducing mobile CO2 emissions”



Multi-Sector Working Group Study

- Completed in 2016
- Tasked with identifying potentially viable and implementable local, regional, and state strategies for reducing GHG emissions across key sectors, including transportation, land use, energy and built environment
- Analyzed the GHG reductions based on 1) actions taken between 2005 and 2015, 2) strategies developed by MSWG members, and 3) additional regional and federal strategies that could make the 80% reduction goal by 2050 achievable
- Found that vehicle and fuel strategies have the highest long-term potential of all on-road transportation-related strategies
- Noted that VMT reduction strategies show long-term potential as well, due to some very aggressive assumptions, including a 10-cents-per-mile VMT tax and significant shifts in land use projections



Long-Range Plan Task Force

- Completed in 2017
- Analyzed on-road transportation sector only
- Developed ten initiatives to analyze their potential to improve the performance of the long-range transportation plan
- Initiatives mainly focused on regional policies (e.g., travel demand management) and transportation projects (e.g., express lane network expansion, transit system expansion)
- Showed that policies that optimize the regional land-use balance and increase employer-based travel demand management (such as teleworking policies) can improve the performance of the transportation network as well as have a noticeable impact on GHG emissions (similar to MSWG)



Summary Findings

1. Fuel Efficiency, Fuel Content, Vehicle Technology
2. Automobile Travel Reduction
 - a. Shifting Land Use Patterns
 - b. Travel Demand Management
 - c. Pricing
 - d. Transit
 - e. Bicycle and Pedestrian
3. Operational Efficiency
 - a. Operational Efficiency
 - b. Express Highway (Toll) Network Expansion



Key Differences Between Past Studies

- The three studies were conducted over approximately one decade
- Different planning assumptions
- Different modeling tools (travel demand modeling, emissions modeling, and strategy analysis)
- Strategies chosen for analysis and the level of implementation for those strategies differed between studies
- Comparing the effectiveness of a particular strategy and comparing its exact ranking among other strategies across studies, for example, is not advisable
- Major high-level findings still useful



Findings: Most Effective Strategies (In 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



Findings: Most Effective Strategies (In Order of Effectiveness)

2. Aggressive federal/local transportation and land use policy actions that could have a significant impact on travel behavior
 - 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
 - Some of these strategies may not be popular



Findings: Most Effective Strategies (In Order of Effectiveness)

3. New transportation projects

- Important projects to implement from equity and livability perspective
- 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)

Other Findings

- 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
- Energy and building sectors were found to have more potential for reducing GHG emissions, in part due to the fuel efficiency improvements already assumed for on-road vehicles
- Due to synergy, some strategies can amplify total benefits, whereas other strategies can counteract each other, resulting in reduced total benefits



Other Findings

- Future emissions reductions are not guaranteed; CAFE standards assumed in the current policies for the MSWG and LRPTF were rolled back when the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule was finalized in 2020
- Most of the strategies analyzed are not cost-effective as GHG reduction strategies alone, but should be evaluated as part of an equitable regional transportation network



Next Steps

- Please send feedback on Phase 1 memo by Friday, February 12 to Dusan Vuksan (dvuksan@mwkog.org)
- Finalize the memorandum and brief TPB in March 2021 on findings from past TPB and COG studies
- Finalize scope of work for Climate Change Mitigation Study of 2021 and brief TPB Technical Committee and TPB in March 2021
- Begin Phase 2 analysis



References and Key Materials

- Morrow, Erin, Dusan Vuksan, and Mark S. Moran. Memorandum to the TPB Technical Committee. “Greenhouse Gas Emissions Reductions Strategies: Findings from Past Studies.” Memorandum, February 3, 2021.
<https://www.mwcog.org/file.aspx?&A=aMaQvPDUaQPVgHYglcz3TIV%2bIFojOGgmo%2bo%2fRTbluPs%3d>
- Srikanth, K. Memorandum to the Transportation Planning Board. “Overview of COG and TPB Climate Change Planning Work Activities in the Metropolitan Washington Region.” Memorandum, October 15, 2020.
<https://www.mwcog.org/file.aspx?&A=IXr81RdQN3mqk%2bshOxOy7IpWrxfo7oywjYOo12NYsw%3d>
- Metropolitan Washington Council of Governments. “Metropolitan Washington 2030 Climate and Energy Action Plan.” Washington, D.C. November 2020.
<https://www.mwcog.org/documents/2020/11/18/metropolitan-washington-2030-climate-and-energy-action-plan/>



References and Key Materials (Cont.)

- Final Report: What Would It Take? Transportation and Climate Change in the National Capital Region. Washington, D.C.: Metropolitan Washington Council of Governments. May 18, 2010. <https://www.mwcog.org/documents/2010/05/18/what-would-it-take-scenario-land-use-projects/>
- Final Technical Report: Multi-Sector Approach to Reducing Greenhouse Gas Emissions in the Metropolitan Washington Region. Washington, D.C.: Metropolitan Washington Council of Governments (submitted by ICF International). January 31, 2016. <https://www.mwcog.org/documents/2016/08/01/multi-sector-approach-to-reducing-greenhouse-gas-emissions-in-the-metropolitan-washington-region-final-technical-report/>
- An Assessment of Regional Initiatives for the National Capital Region: Technical Report on Phase II of the Long-Range Plan Task Force. Washington, D.C.: National Capital Region Transportation Planning Board (prepared by ICF International). 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/>



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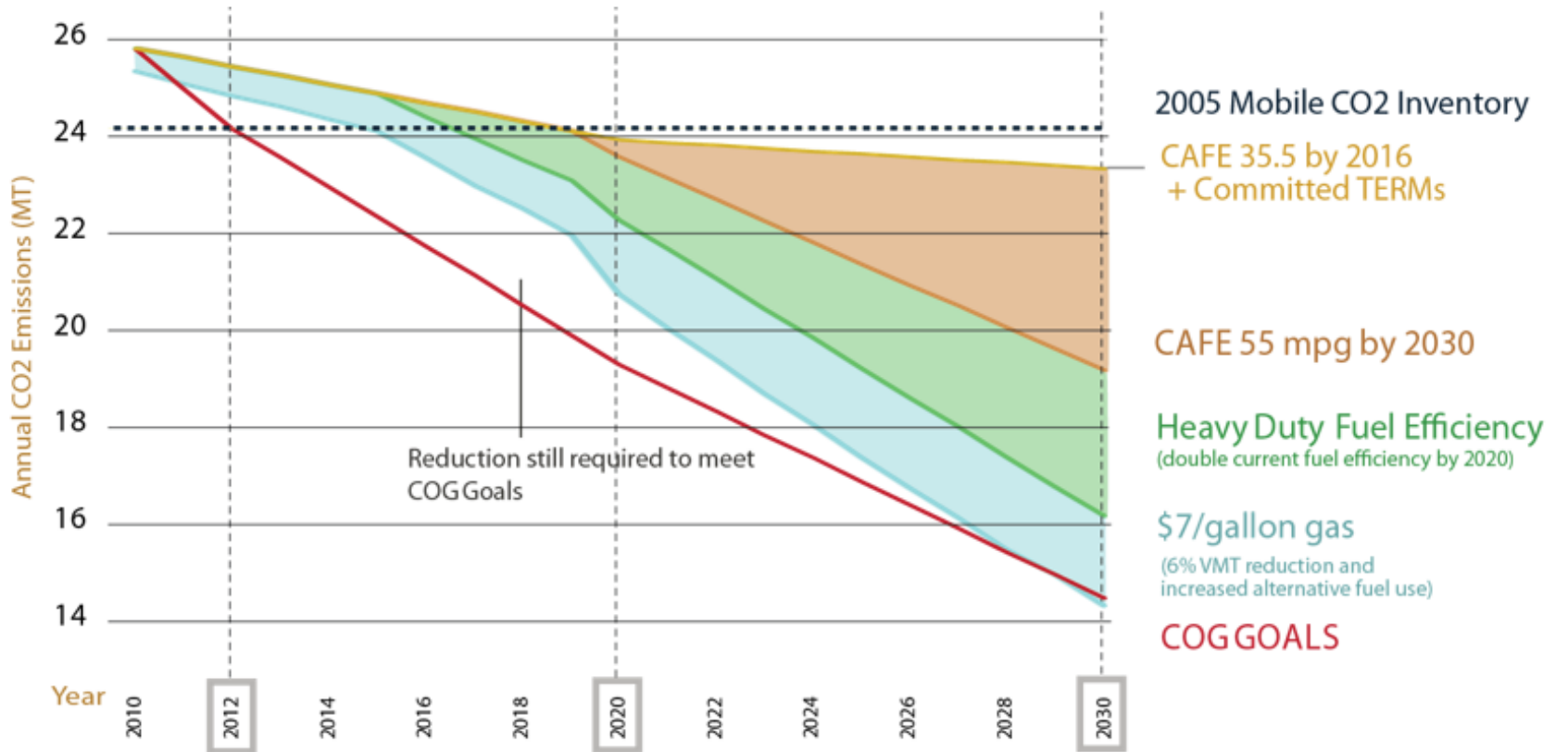
National Capital Region
Transportation Planning Board

Additional Slides



WWIT Results (Appendix A.I)

Figure 4 GHG Reductions from “High Federal Role” Strategies (as defined in WWIT study)

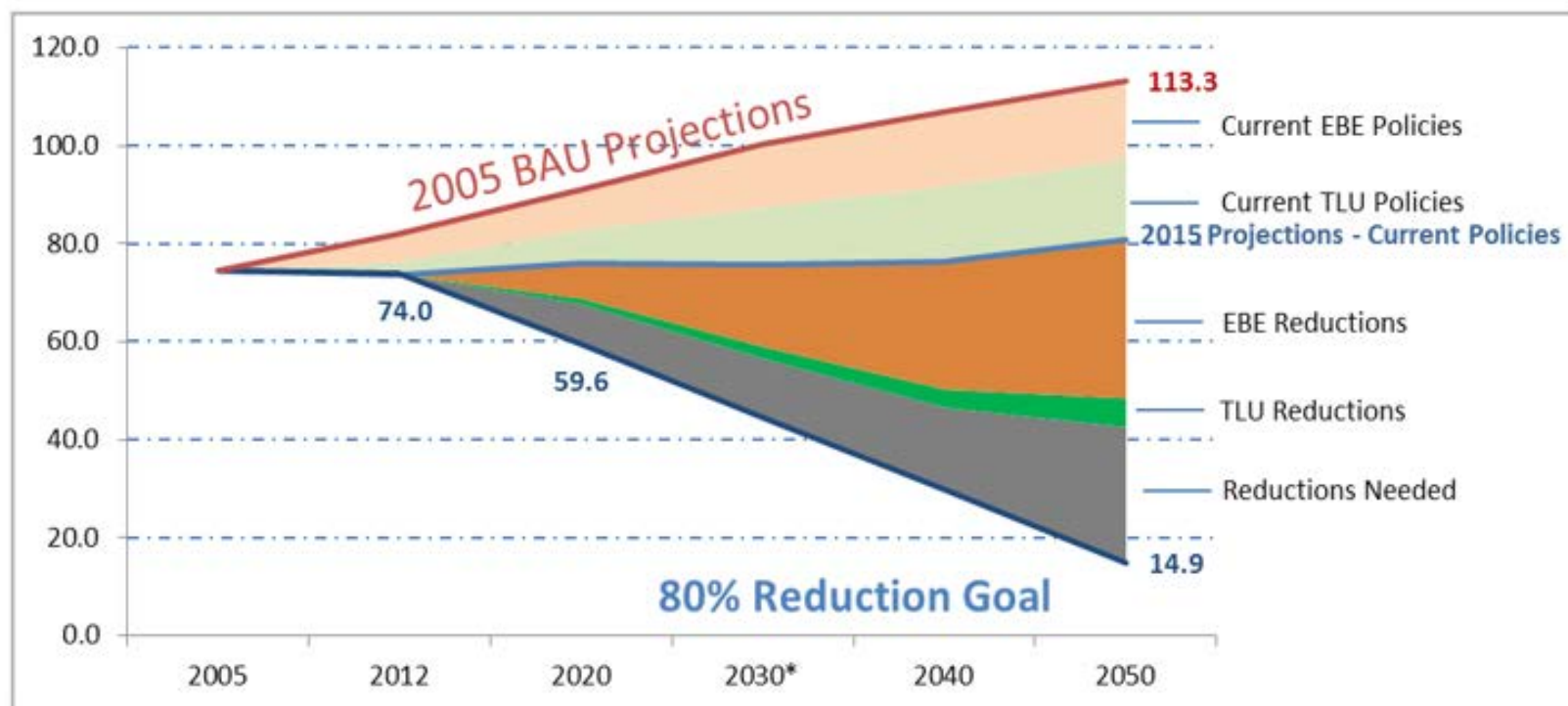


Source: What Would it Take? Scenario Study (2010)



MSWG Results (Appendix A.II)

Figure 5: Estimated GHG Reductions from Current Policies and Potential Future Regional Strategies



MSWG Results (Appendix A.II)

Table 1: Estimated GHG Reductions from Current Policies and Potential Future Regional Strategies

	GHG Emissions (MMTCO _{2e})				
	2005	2012	2020	2040	2050
2005 BAU Projections	74.5	82.3	91.3	103.3	106.3
Revised 2005 BAU Projections	74.5	82.2	91.0	106.9	113.3
Impacts of Current EBE Policies	--	-5.9	-8.3	-15.2	-16.2
Impacts of Current TLU Policies		-2.5	-6.6	-15.3	-16.4
2015 Current Policies Projection	74.5	73.7	76.1	76.4	80.8
Impacts of additional regional EBE Strategies	--	--	-7.3	-26.1	-32.4
Impacts of additional regional Land Use Strategies [^]			-0.4	-1.5	-1.9
Impacts of additional regional Transportation Strategies [^]	--	--	-0.7	-2.4	-4.2
<i>Total Impacts of New Regional Strategies</i>	--	--	-8.4	-29.8	-38.3
Net Projected Emissions	74.5	73.7	67.7	46.6	42.6
Goal Emissions*	74.5	74.0	59.6	29.8	14.9
Further Reductions Needed to Meet Goal	--	-0.2	8.1	16.8	27.7
Projected Reductions from 2005 levels (%)			9%	37%	43%
Projected Reductions from 2005 BAU Projections (%)		10%	26%	56%	62%

Note: Results are presented by type of strategy (rather than emissions source).

[^]Land use strategies impact includes reductions in on-road transportation combustion and building energy emissions; transportation strategies impact includes net impact of reductions in on-road transportation combustion and increase in electricity emissions. Carbon sequestration is not included in these figures since not part of the baseline inventory.

*The goal emissions were determined by using the goal of reducing GHGs to 20% below 2005 levels by 2020 and to 80% below 2005 levels by 2050. The interim years were linearly interpolated based on these data points.

MSWG Results (Appendix A.II)

Table 2 Estimated GHG Reductions from Potential Future Regional Strategies (in Descending Order of GHG benefits in 2050)

Strategy	Strategy Name	GHG Reductions (MMTCO _{2e})		
		2020	2040	2050
EBE-6	Targeted reductions in power sector emissions	1.97	8.05	10.74
EBE-1	Reduce energy and water consumption in existing buildings	2.73	10.55	10.55
EBE-4	Improve new building energy and water efficiency performance	1.03	4.18	6.59
EBE-2	Support existing building-level renewable energy development	1.15	1.86	2.78
TLU-2	Sustainable development patterns & urban design (including enhancements for non-motorized modes)	0.34	1.32	1.67
TLU-6	Low carbon fuel standard	0	1.02	1.29
TLU-1	Increase tree canopy and reduce loss of vegetation through sustainable development patterns ²	0.19	0.82	0.98
TLU-3	Improve fuel economy of light-duty vehicle fleet	0.09	0.50	0.88
TLU-7	Enhancing system operations	0.34	0.56	0.85
EBE-9	Reduce emissions from non-road engines	0.28	0.85	0.85
TLU-12	Road pricing	0	0.03	0.79
TLU-9	Travel demand management	0.13	0.24	0.54
EBE-3	Encourage development in activity centers	0.02	0.34	0.44
EBE-5	Achieve annual and cumulative reductions in fossil energy use by improving Infrastructure efficiency and increasing renewable energy use	0.05	0.23	0.32
EBE-8	Achieve targeted reduction in municipal solid waste	0.08	0.15	0.27
TLU-11	Transit incentives / fare reductions	0.12	0.10	0.19
EBE-7	Achieve targeted reductions in reduce natural gas pipeline leaks	0.02	0.11	0.11
TLU-4	Increase alternative fuels in public sector fleets	0.007	0.05	0.09
TLU-10	Transit enhancements	0.06	0.06	0.08
TLU-8	Reduce speeding on freeways	0.005	0.006	0.006
TLU-5	Truck stop electrification	<0.001	0.002	0.006



LRPTF Results (Appendix A.III)

Table 5 Percent change in GHG, VHD, VMT, and VMT per Capita versus 2040 (2016 CLRP)

	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%

