Interim Findings from the Multi-Sector Working Group Convened by COG to Examine and Analyze Greenhouse Gas Reduction Strategies in the Metropolitan Washington Region

Draft Presentation for Review by: Multi-Sector Working Group

MSWG Meeting September 3, 2015

Establishment of a Multi-Disciplinary Multi-Sector Working Group (MSWG) to Examine and Analyze Greenhouse Gas Reduction Strategies

In December, 2014 TPB and MWAQC affirmed the region's greenhouse reduction goals and committed staff and resources to support a multi-sector, multi-disciplinary professional working group convened by COG to:

- **Identify viable, implementable local, regional, and state actions to reduce GHG emissions in four sectors (Energy, the Built Environment, Land Use, and Transportation)**
- **Quantify the benefits, costs and implementation timeframes of these actions;**
- Explore specific GHG emission reduction targets in each of the four sectors; and
- Jointly develop an action plan for the region

MSWG Organization and Oversight

Transportation Planning Board (TPB)

COG Board of Directors

Climate, Energy & Environment Policy Committee (CEEPC)

Metropolitan Washington Air Quality Committee (MWAQC)

Multi-Sector Working Group

(Local Jurisdiction, Regional & State Agency Staff)

Energy/Environment Subgroup – Energy & Built Environment Sectors

Planning Subgroup – Land Use Sector

Transportation Subgroup – Transportation Sector

COG/TPB Committee Input

Region Forward Coalition
Planning Directors
TPB Technical Subcommittee
Built Environment Energy Advisory Committee (BEEAC)
MWAQC – Technical Advisory Committee

Additional Input from

Subject Matter Experts
Citizen Advisory Committees
General Public

COG Staff Support

Consultant Support

MSWG Project Time Line

- **January 2015**
  - MSWG Established and Convened
- **February – April 2015**
  - MSWG identifies GHG Reduction Potential Strategies for Analysis
  - Contractor Support Obtained
- **May – August 2015**
  - MSWG recommends Strategies for Detailed Analysis
  - Consultant performs Analysis and prepares Draft Interim Report
- **September – October 2015**
  - Review of Interim Report Findings by TPB,MWAQC, CEEPC and COG Board
  - Exploration of potential Goals and Targets by Sector
- **November – December 2015**
  - Draft Final Report including exploration of Goals and Targets prepared by consultant and reviewed by TPB,MWAQC, CEEPC
- **January 2016**
  - Final Report to COG Board

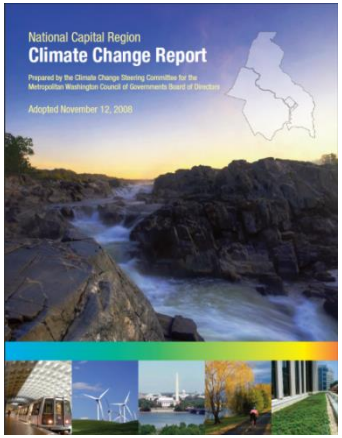
Region's Voluntary GHG Reduction Goals

Regional GHG Reduction Goals

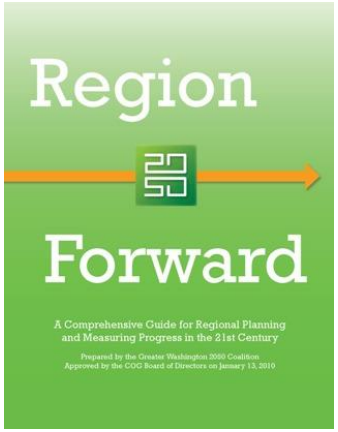
Regional Compact on GHG Reduction Goals

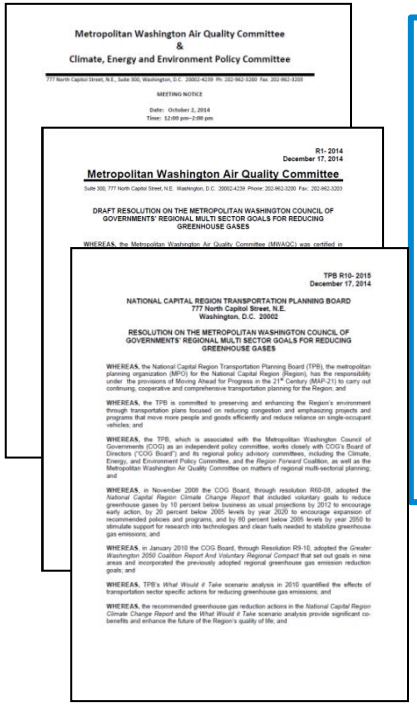
Regional Boards Affirm GHG Reduction Goals

2008 → 2009 → 2010 → 2014 → 2015



COG Board establishes Climate, Energy, Environment Policy Committee (CEEPC)





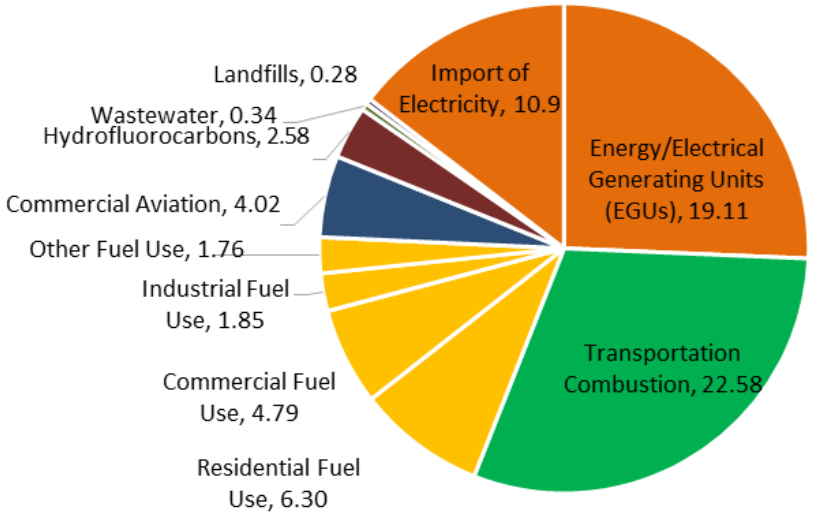
January 30: **COG Launches Multi-Sector Working Group (MSWG)**

COG GHG Reduction Goals:

2012 – 10% Below BAU
2020 – 20% Below 2005 Level
2050 - 80% Below 2005 Level

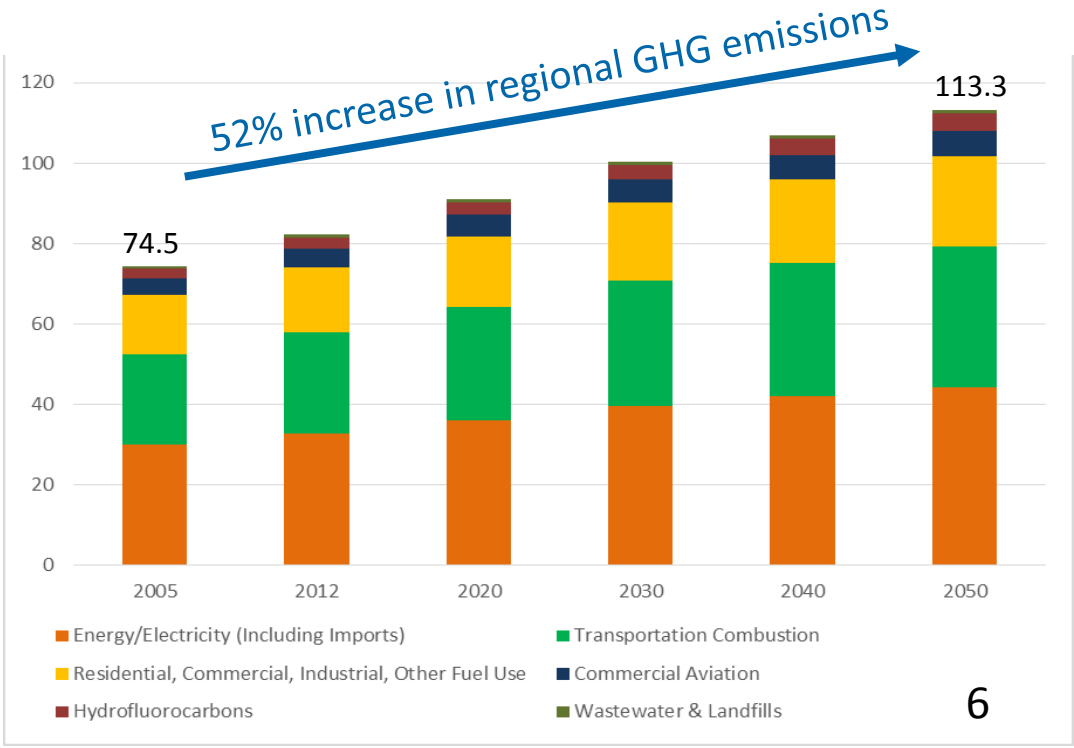
GHG Emissions in a Growing Region

2005 Regional GHG Inventory Sources ($MMTCO_2e$)

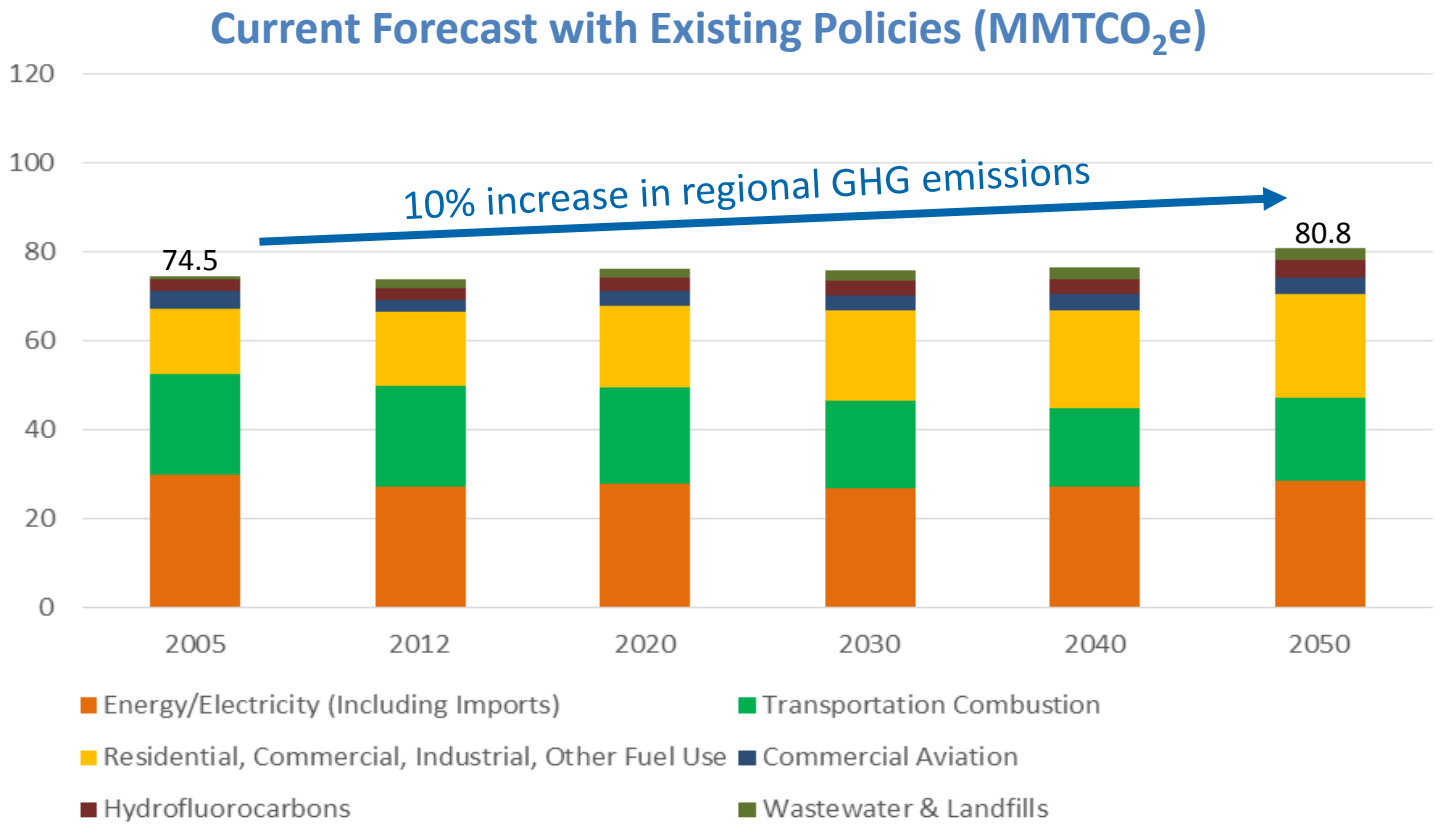


With the region's population increasing from 4.7 million in 2005 to nearly 7 million in 2050, per capita GHG reductions of 87% will be needed to achieve the region's GHG reduction goal.

2005 Business as Usual (BAU) Regional GHG Forecast - Updated ($MMTCO_2e$)



Existing Policies are Making a Difference



With current policies:

- 17% reduction in transportation combustion GHG emissions from 2005 level, due to higher fuel economy standards and CLRP strategies
- Limited growth in energy/electricity GHG emissions, due to shifts in energy efficiency and generation fuel mix; increasing renewables.

Pathways to Further GHG Reductions

Energy and Built Environment Strategies

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

Land Use Strategies

- Sustainable Development
- Increase Tree Canopy

Transportation Strategies

- VMT Reduction
- Vehicles and Fuels
- Operational Efficiency

- **Consultant analyzed different strategy scenarios reflecting effects of *timing feasibility* and *potential levels of aggressiveness***
  - 2020 scenario, 2040 scenario, and a 2050 scenario that generally reflects a *stretch* scenario
- **Strategy implementation would occur at state, regional, and/or local levels**

Energy and Built Environment Strategies

(Stand-alone GHG Reduction Potential of Individual Strategies – 2040 Viable/2050 Stretch)

- **Energy Efficiency Strategies**
  - Reduce Energy and Water Consumption in Existing Buildings (-10.55 MMT/-10.55 MMT)
  - Improve New Building Energy Performance and Water Efficiency (-4.18 MMT/-6.59 MMT)
  - Improve Infrastructure Efficiency and Renewable Energy Use (-0.23 MMT/-0.32 MMT)
  - Reduce Emissions from Non-Road Engines (-0.85MMT/-0.85MMT)
- **Power Sector and Renewable Energy Strategies**
  - Targeted Reductions in Power Sector Emissions (-8.05 MMT/-10.74 MMT)
  - Renewable Energy for Existing Buildings (-1.86 MMT/- 2.78 MMT)
  - Targeted Reductions in Natural Gas Pipeline Emissions (-0.11 MMT/-0.11 MMT)
- **Waste Reduction Strategies**
  - Targeted Reductions in Municipal Solid Waste (-0.15 MMT/-0.27 MMT)

Land Use Strategies

(Stand-alone GHG Reduction Potential of Individual Strategies – 2040 Viable/2050 Stretch)

- **Land Use Strategies to Reduce Growth in VMT**
  - Sustainable Development Patterns and Urban Design (-1.32 MMT/-1.67 MMT)

- **Land Use Strategies to Improve Energy Efficiency**
  - Encourage Development in Activity Centers (-0.16 MMT/-0.19 MMT in addition to Sustainable Development Pattern Strategy)

- **Land Use Strategies to Increase Carbon Sequestration**
  - Increase Urban Tree Canopy and Land Stewardship (-0.82 MMT/-0.98 MMT)

Transportation Strategies

(Stand-alone GHG Reduction Potential of Individual Strategies– 2040 Viable/2050 Stretch)

- **Vehicle and Fuels Strategies**
  - Improve Fuel Economy of Light Duty Fleet (-1.23 MMT/-2.14 MMT without electricity offset)
    (-0.50 MMT/-.0.88 MMT with electricity offset)
  - Increase Alternative Fuels in Public Sector Fleet (-0.050 MMT/-0.093 MMT)
  - Low Carbon Fuel Standard (-1.02 MMT/-1.29 MMT)
  - Truck Stop Electrification (-0.002 MMT-0.006 MMT)
- **Operational Efficiency Strategies**
  - Enhance System Operations (-0.56 MMT/-0.85 MMT)
  - Reduce Speeding on Freeways (-0.006 MMT/-0.006 MMT)
- **VMT Reduction Strategies**
  - Travel Demand Management (-0.24MMT/-0.54 MMT)
  - Transit Enhancements (-0.06 MMT/-0.08 MMT)
  - Transit Fare Reductions (-0.10 MMT/-0.19 MMT)
  - Road Pricing (-0.03 MMT/-0.79 MMT)

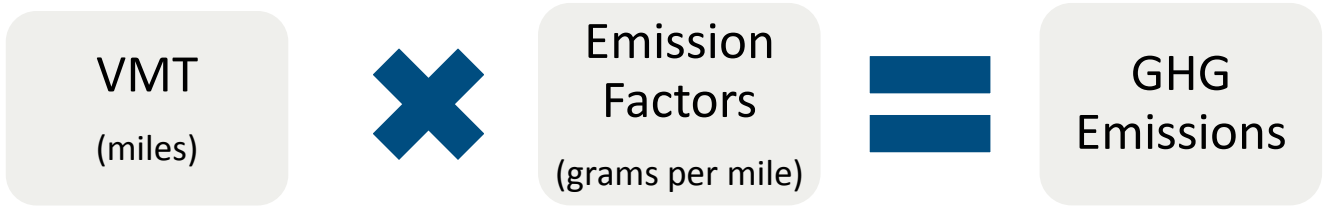
Public and Community Strategies

- **Educate and Motivate the Public through Community Engagement**
  - Public and Community Engagement Strategies are an essential enabling mechanism to implement the strategies identified for the Energy, Built Environment, Land Use and Transportation Sectors
    - Public information campaigns on benefits and costs on clean energy technology
    - Increase motivation through incentives linked to utility customer cost savings
    - Create a culture of responsibility for less energy use and daily vehicle travel via school curricula and public information on the need to reduce per capita GHG by 87%.
    - Increase transparency in transportation planning and land development processes
  - GHG Reduction benefits of this strategy are encompassed in the calculations of the other strategies analyzed

Accounting for Combined Strategies

- Because of inactive effects between strategies, the GHG reductions benefits of individual stand-alone strategies are not additive and must be analyzed in combination to avoid double counting

EXAMPLE:



Strategy 1	Reduce VMT 10%			10% reduction in CO2 e
Strategy 2			Reduce Emissions Rate by 10%	10% reduction in CO2 e
Strategy 1 & 2	Reduce VMT 10%	&	Reduce Emissions Rate by 10%	19% reduction in CO2 e

Combined GHG Reductions from Strategies by Major Emissions Source Category

Electricity, Other Fuel Use, and Waste Emissions ($MMTCO_2e$)

	2005	2012	2020	2030*	2040	2050
2005 BAU Projections	**51.87**	**57.00**	**62.86**	**69.15**	**73.75**	**78.35**
2015 "Current Policies" Projections	**51.87**	**51.10**	**54.56**	**56.04**	**58.59**	**62.18**
Energy Efficiency			-3.82	-9.31	-14.96	-17.46
Power Supply			-3.14	-6.58	-10.02	-13.63
Non-Road Engines			-0.28	-0.57	-0.85	-0.85
Waste			-0.08	-0.12	-0.15	-0.27
Land Use (Smaller dwelling units)			-0.01	-0.09	-0.16	-0.19
Increased Electricity from ZEVs			0.12	0.43	0.61	0.92
Total Impact from All Strategies			***-7.21***	***-16.24***	***-25.53***	***-31.48***
Net Projected Emissions	**51.87**	**51.10**	**47.35**	**39.80**	**33.06**	**30.69**
Projected Reductions from 2005 levels (%)			9%	23%	36%	41%

Transportation Combustion Emissions ($MMTCO_2e$)

	2005	2012	2020	2030*	2040	2050
2005 BAU Projections	**22.58**	**25.17**	**28.14**	**31.25**	**33.13**	**35.00**
2015 "Current Policies" Projections	**22.58**	**22.63**	**21.54**	**19.67**	**17.80**	**18.64**
Land Use -Sustainable Development			-0.34	-0.83	-1.32	-1.67
VMT Reduction (Transit, TDM, Pricing)			-0.30	-0.37	-0.43	*-1.60
Vehicle / Fuels Strategies			-0.23	-1.26	-2.30	-3.53
Operational Efficiency Strategies			-0.34	-0.46	-0.57	-0.86
Total On Road GHG Impacts			***-1.19***	***-2.74***	***-4.30***	***-6.77***
Net Projected Emissions	**22.58**	**22.63**	**20.35**	**16.92**	**13.50**	**11.86**
Projected Reductions from 2005 levels (%)			10%	25%	40%	47%

*includes full VMT-based pricing

Key Findings – Energy and Built Environment

- **Energy efficiency strategies, especially those to reduce energy and water consumption in existing and new buildings, have the greatest potential to reduce GHG emissions (17.7 MMT).**
  - Significant Co-Benefits: Additional Reductions in Air Pollution, Cost Savings, Local Job Growth and Improved Occupant Comfort, Health and Safety
  - Costs are in the Low to Medium range
  - Implementation would require such actions as updating of planning/zoning/building code policies and provisions and greater code compliance efforts
- **Power sector and renewable energy strategies also have large impacts (13.6 MMT).**
  - Significant Co-Benefits: Additional Reductions in Air Pollution, and Job Growth
  - Costs are in the Medium to High range
  - Implementation would be through state actions taken under the federal Clean Power Plan. Such implementation actions would primarily reside in the hands of utility companies and state and federal regulators

Key Findings – Land Strategies

- **Directing more of the region's anticipated growth to walkable, mixed-use activity centers has significant GHG reduction potential (1.9 MMT)**
  - Significant Co-Benefits: Additional Reductions in Air Pollution, Increased Accessibility, Reduced Stormwater Run-Off and Pedestrian-Oriented Community Amenities
  - Costs: Trade-off between cost and savings are complex, but overall reductions in per-capita infrastructure and service costs should out-weigh other costs. Greater investments in transit would be required.
  - Implementation would require such actions as direction of 100% of the region's future growth to less auto reliant locations serviced by premium transit. Also, transportation strategies to further improve vehicle fuel efficiency would reduce VMT-related GHG reductions estimated for this strategy.

- **Reducing tree and land cover loss from new development and expanding the region's tree canopy through replanting have the potential for additional GHG reduction benefits (1.0 MMT)**
  - Significant Co-Benefits: Reduced Stormwater Run-Off , Increased Resiliency, and Urban Area Amenity.
  - Costs: Low incremental costs
  - Implementation would require such actions as tree plantings to expand the region's tree canopy by 5%.

Key Findings – Transportation Strategies

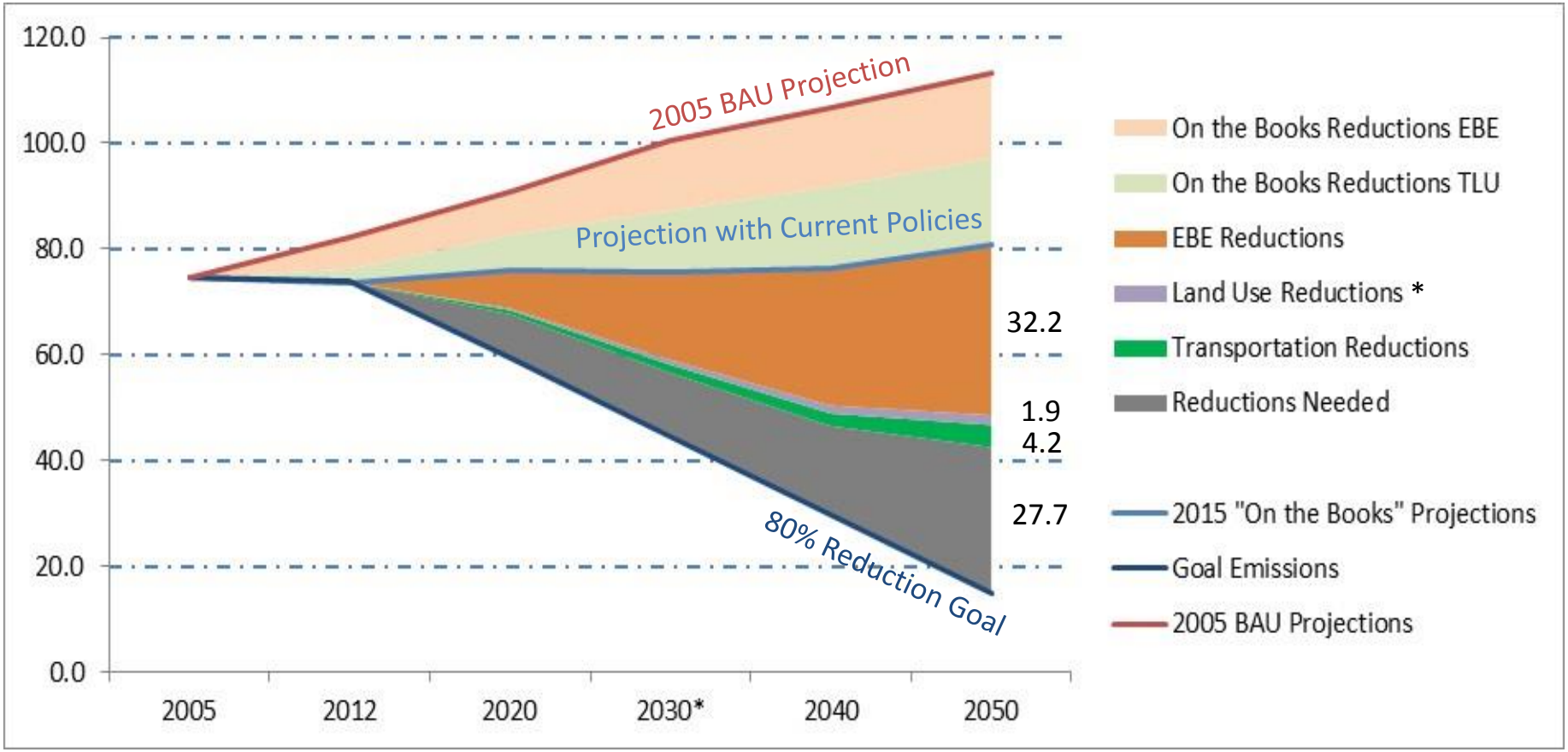
- **Vehicle and fuels strategies have the potential to significantly reduce GHG emissions (3.5 MMT)**
  - Significant Co-Benefits: Additional Reductions in Air Pollution
  - Costs: Medium ($50 million to $500 million)
  - Implementation would require such actions as the adoption of a Low Carbon Fuel Standard (LCFS) and require programs to incentivize the purchase zero emission vehicles (ZEVs) and investments in recharging stations. Emissions reductions from ZEVs are also slightly offset by increased emissions in the power sector. A more aggressive ZEV stretch strategy than analyzed would have significantly greater GHG reduction impacts.
- **Travel demand management, transit, and pricing strategies also have potential to make measureable reductions in GHG emissions (1.60 MMT)**
  - Significant Co-Benefits: Additional Reductions in Air Pollution, Congestion Reduction, and Safety,
  - Costs: TDM-Low, Transit-High, Road Pricing- Medium
  - Implementation would require such actions as significantly increasing parking costs, a downtown DC cordon charges and VMT-based road pricing. These actions may be politically difficult to implement. Implementation would also require increased investments in transit capacity. Transportation strategies to further improve vehicle fuel efficiency would reduce VMT-related GHG reductions estimated from this strategy.

Key Findings – Transportation Strategies (cont'd)

- **Enhanced system operational efficiency strategies that promote "eco-driving", and support roadside and vehicle technology improvements, including the use of connected and autonomous vehicles, have potential for reducing GHG emissions (0.9 MMT)**
  - Significant Co-Benefits: Additional Reductions in Air Pollution, Congestion Reduction and Safety.
  - Costs: Medium ($50 million to $500 million)
  - Implementation of actions such as a mass marketing campaign to promote "eco-driving" would have impacts in the short-term. It could take another 10 to 15 years before use of semi-autonomous and autonomous vehicles become wide spread. Transportation strategies to further improve vehicle fuel efficiency would reduce VMT-related GHG reductions estimated for this strategy.

Projected and Potential GHG Emission Reductions Compared to the Region's GHG Reduction Goals

GHG Emissions (MMTCO2Eq)



*Sequestration benefits from Tree Canopy Strategy are not counted in relation to 80% GHG reduction goal

*2030 reductions are a linear interpolation between 2020 and 2040.

Closing the Gap

- **27.7 MMTCO$_2$e gap in GHG emissions between the potential GHG reductions identified from state, regional, or local strategies and the region's adopted voluntary 80% reduction goal for 2050**

- **Additional strategies for closing the gap may include:**
  - New Natural Gas Pipeline Rule
  - New Fuel Efficiency Standards for Medium and Heavy-Duty vehicles and Engines
  - New DOE Energy Efficiency Standards for Buildings, Appliances and Equipment
  - Life Cycle GHG reductions from Products
  - Reduction in Commercial Aviation GHG emissions
  - Expanded Use of Biofuels
  - More Nuclear Power, Improvements Solar and Wind Power
  - Decarbonize Power Sector and Carbon Capture and Storage
  - Faster Deployment of Zero Emission Vehicles, 100% Deployment by 2050
  - Increased Fuel Taxes / Carbon Tax
  - Technology Improvements

Next Steps

- Presentation of Interim Findings to TPB, MWAQC, CEEPC and COG Board
- MSWG meets on September 25th to Explore and Discuss GHG Reduction Goals and Targets by Sector
- Consultant Refines Technical Report on Strategy Analysis in Response to Comments and prepares Draft Final Report that incorporates MSWG Recommendations from Exploration of GHG Reduction Goals and Targets
- Draft Final Report is presented to TPB, MWAQC, CEEPC in November and December, 2015 and the COG Board in January, 2016
- Development of a Proposed Action Plan begins in January, 2016.