MWCOG Greenhouse Gas Inventory: 2020 Prince William County Update

Prince William County Sustainability Commission

Draft Working Document

Oct 27, 2022

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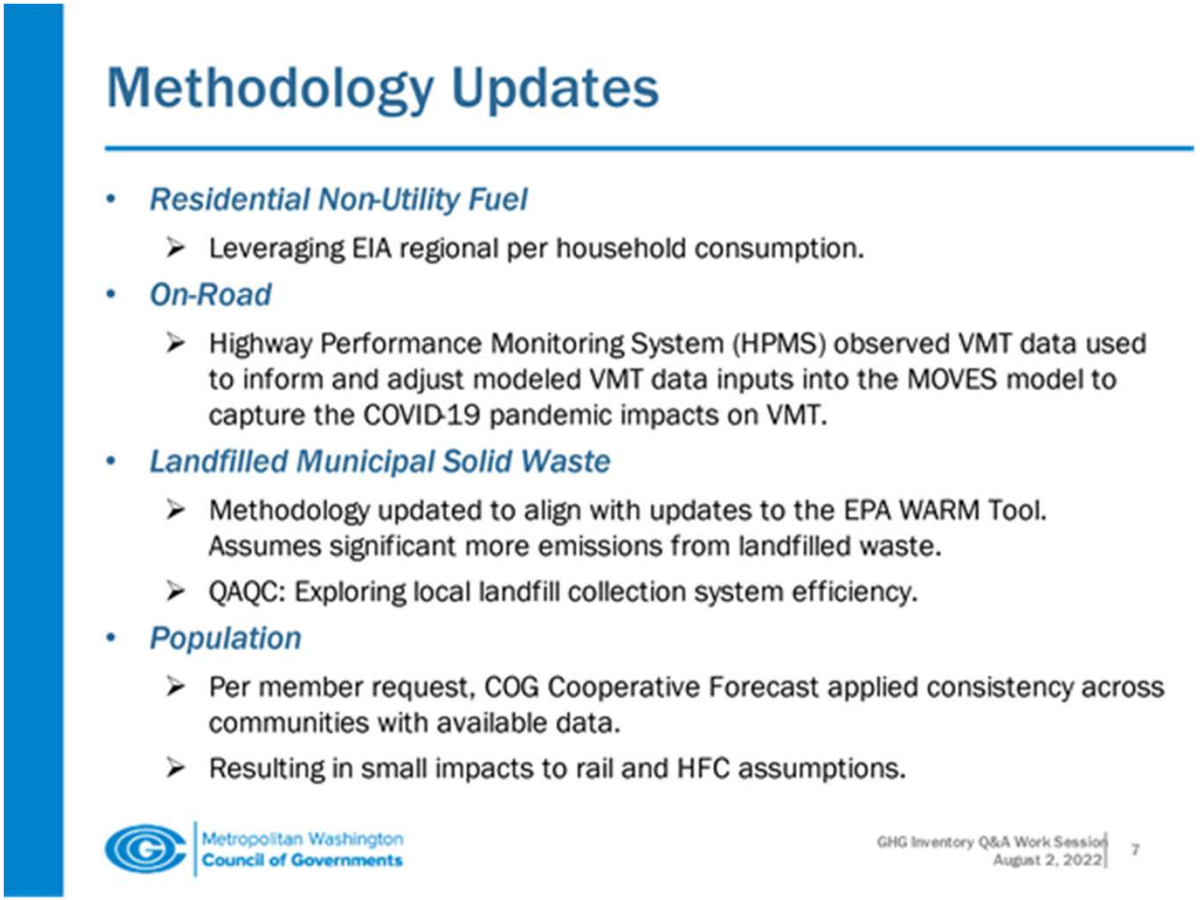
Outline

- Briefing Objectives –
  - Summarize key points from updated MWCOG inventory relevant to the SC's work
  - Provide initial scan of the missing sector – Land Use, Land Use Change, and Forestry (LULUCF)
- MWCOG Methods and Results
- LULUCF Methods and Results
- Summary

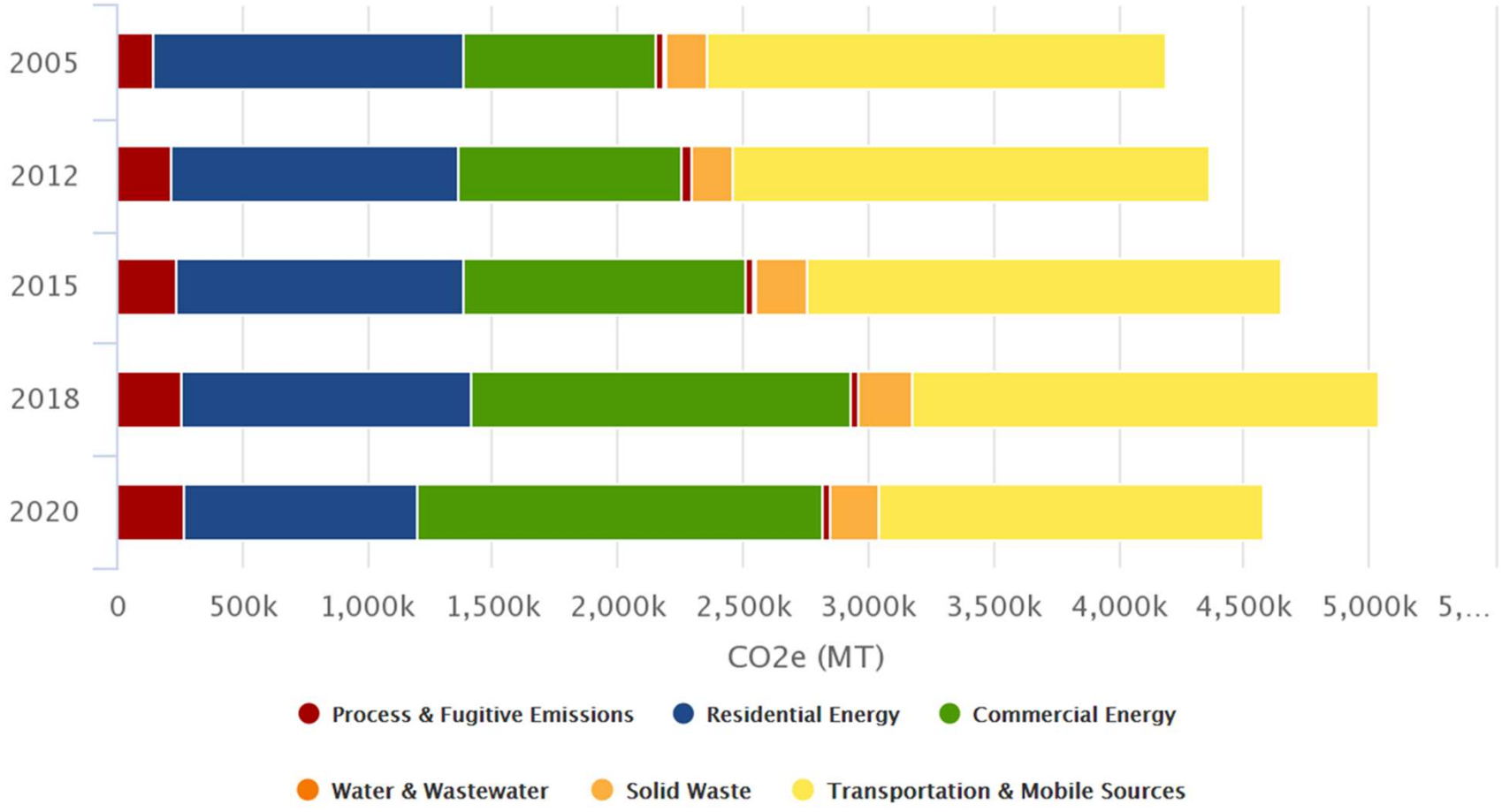
MWCOG Methodology

- Based on scaled down methods applied for national GHG inventories
- Uses US Communities Protocol and ClearPath model developed by ICLEI (Intl Council on Local Environmental Initiatives) - https://icleiusa.org/clearpath/
- Details are in Appendix F of Metropolitan Washington 2030 Climate and Energy Action Plan | Metropolitan Washington Council of Governments (mwcog.org)
- Assumptions on boundary conditions
  - Residential and commercial electricity are based on consumption within county, not generation within county
  - Transportation emissions based on “travel occurring on the roadways in each jurisdiction, regardless of where the trips originate and terminate”
- Methods and data sets periodically updated

MWCOG Methodology Changes since 2018 (applied to for all inventory years)

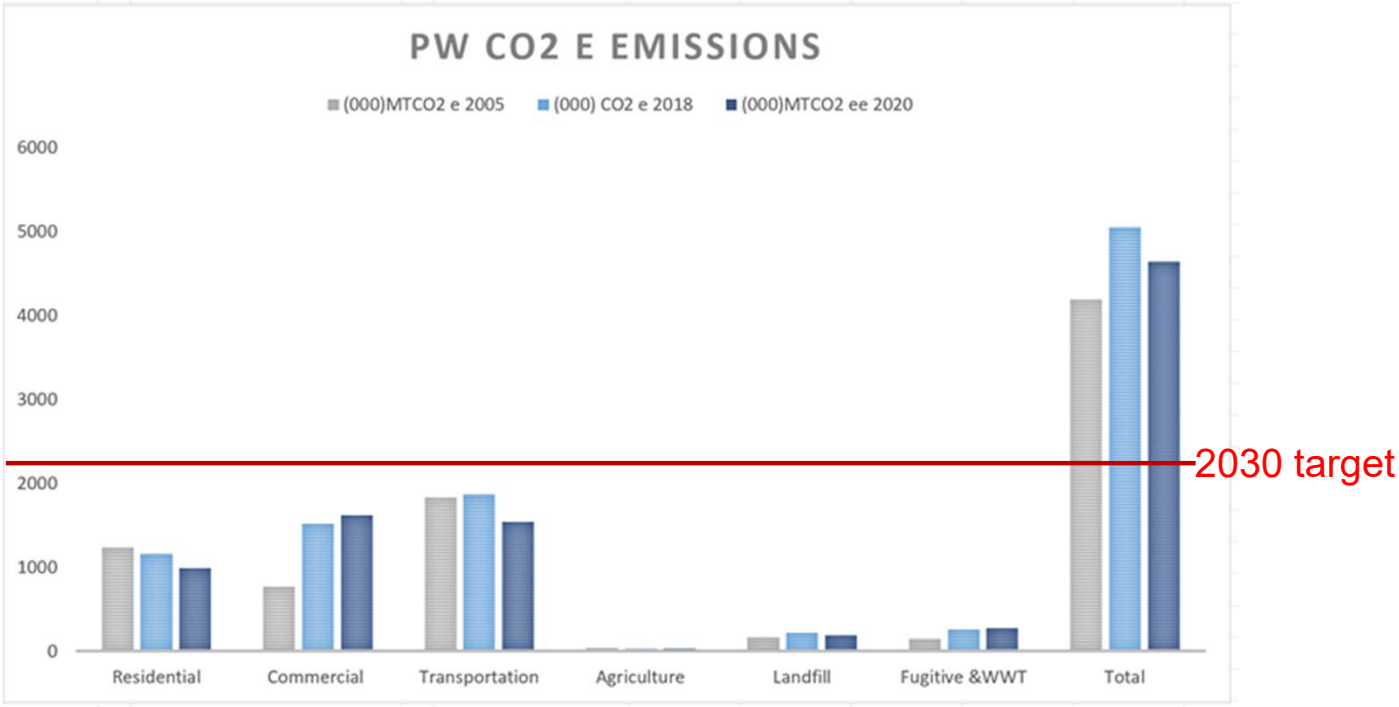


MWCOG Results: Emissions by Sector, 2005-2020



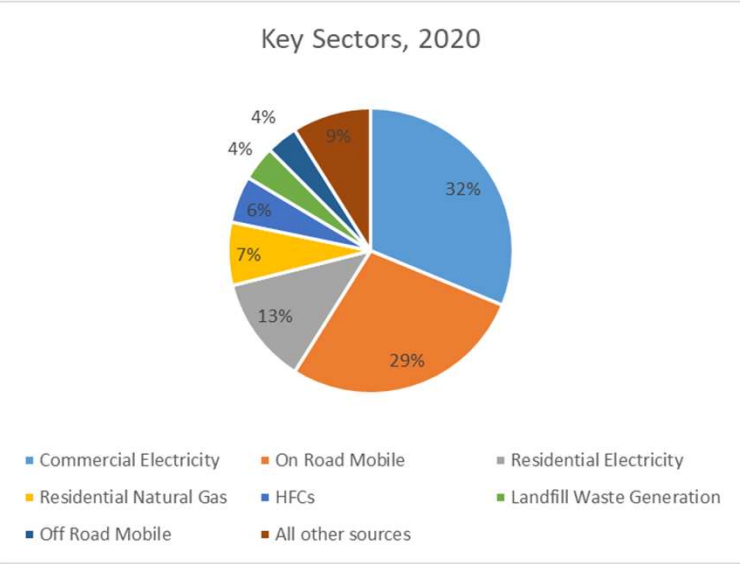
Changes since 2005

- In vertical bar chart form for 2005, 2018, 2020



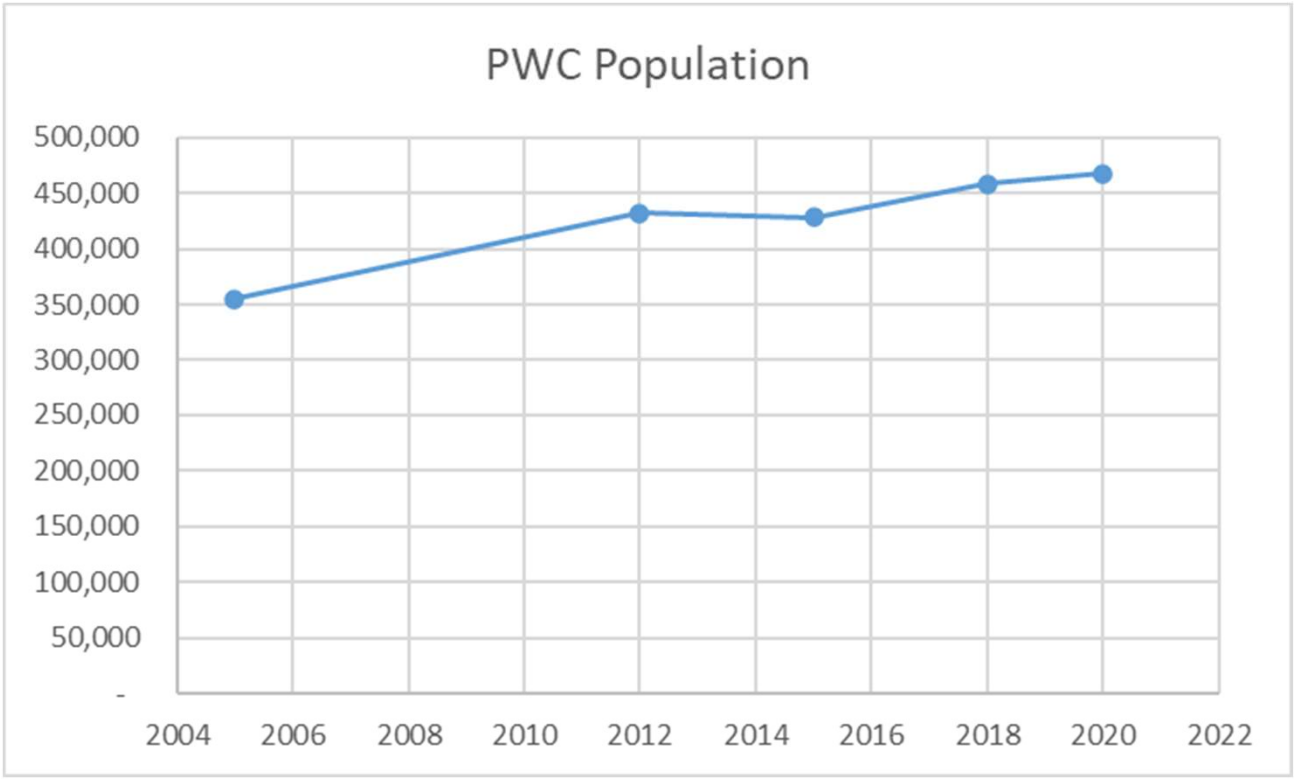
MWCOG Results: Emissions by Source Category

Emissions Type (Main ClearPath Tab)	Emissions Activity or Source (ClearPath Calculator)	Inventory Records (Entered in ClearPath)	Emissions ($MTCO_2e$)					
			2005	2012	2015	2018	2020	% Change, 2005-2020
BUILT ENVIRONMENT								
Residential Energy	Emissions from Grid Electricity	Residential Electricity	886,938	842,434	759,515	724,067	576,631	-35%
	Emissions from Stationary Fuel	Residential Natural Gas	314,151	284,280	366,509	412,703	339,663	8%
		Residential Fuel Oil	27,014	15,384	12,620	9,889	9,889	-63%
		Residential LPG	7,618	5,518	5,836	7,150	7,150	-6%
Commercial Energy	Emissions from Grid Electricity	Commercial Electricity	638,640	784,848	1,004,289	1,359,354	1,482,519	132%
	Emissions from Stationary Fuel Combustion	Commercial Natural Gas	128,434	103,671	122,554	157,959	132,822	3%
		Commercial Fuel Oil	1,632	2,401	2,491	2,621	2,907	78%
		Commercial LPG	1,329	1,141	1,184	1,246	1,401	5%
TRANSPORTATION AND MOBILE EMISSIONS								
Transportation and Mobile Emissions	On Road Transportation	On Road Mobile	1,451,622	1,621,782	1,657,749	1,636,658	1,316,112	-9%
	Aviation Travel	Passenger Air Travel	169,085	97,675	76,217	62,539	53,936	-68%
	Rail Transportation	Rail Transportation	0	2,229	2,179	2,598	2,029	#DIV/0!
	Emissions from Off Road Vehicles	Off Road Mobile	214,994	177,387	159,778	164,404	169,052	-21%
WASTEWATER TREATMENT								
Water and Wastewater	Fugitive Emissions from Septic Systems	Septic System	1,182	1,334	1,378	1,502	1,541	30%
	Nitrification/Denitrification Process N2O Emissions from Wastewater Treatment	Sewer System	897	1,095	1,084	1,160	1,183	32%
	Process N2O from Effluent Discharge to Rivers and Estuaries	N2O Effluent Discharge	1,082	649	688	668	644	-40%
AGRICULTURE								
Agriculture	Emissions from Agricultural Activities	Enteric Fermentation	16,760	19,164	13,916	13,397	11,825	-29%
		Manure Management	2,267	2,210	1,689	1,461	2,451	8%
		Ag Soils	14,664	17,044	14,532	15,051	14,068	-4%
SOLID WASTE TREATMENT								
Solid Waste	Waste Generation	Landfill Waste Generation	165,487	168,230	206,534	214,717	187,176	13%
	Combustion of Solid Waste Generated by the Community	Combustion of Solid Waste	0	0	0	0	0	#DIV/0!
OTHER								
Process and Fugitive Emissions	Hydrofluorocarbon & Refrigerant Emissions	HFCs	133,368	202,442	224,435	238,364	252,471	89%
	Fugitive Emissions from Natural Gas Distribution	Natural Gas Fugitive	12,894	11,302	14,248	16,625	13,765	7%
TOTAL GROSS GREENHOUSE GAS EMISSIONS			**4,190,056**	**4,362,219**	**4,649,425**	**5,044,135**	**4,579,236**	**9%**



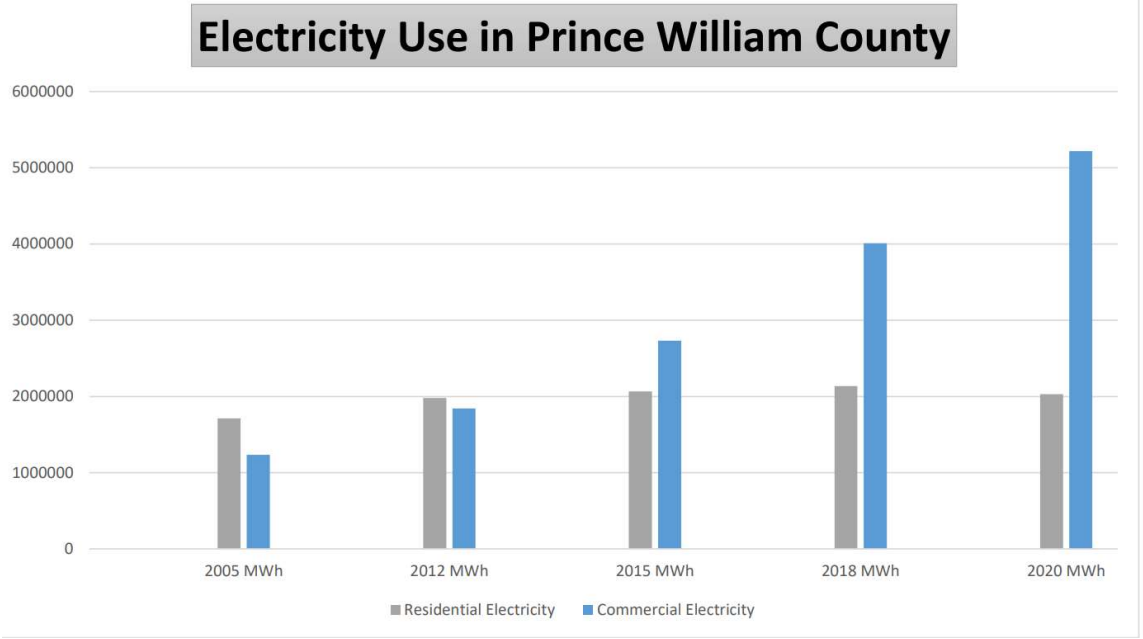
Drivers of Change

- Population growth – 32% higher in 2020 than 2005, compared to 20% increase for the MWCOG region



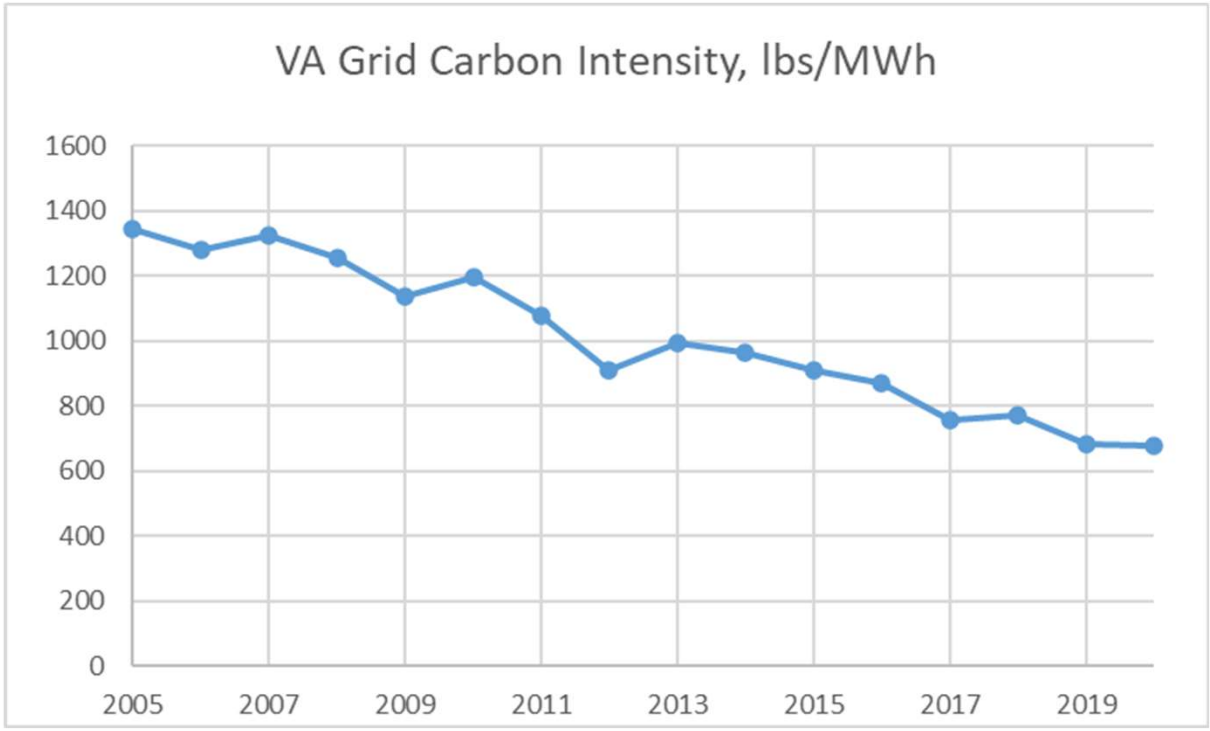
Drivers of Change

- Increased commercial energy intensity and building floorspace -> more commercial electricity use
- Commercial electricity emissions in 2020 were 844,000 MTCO2e higher than 2005 (+132% of 2005 levels)



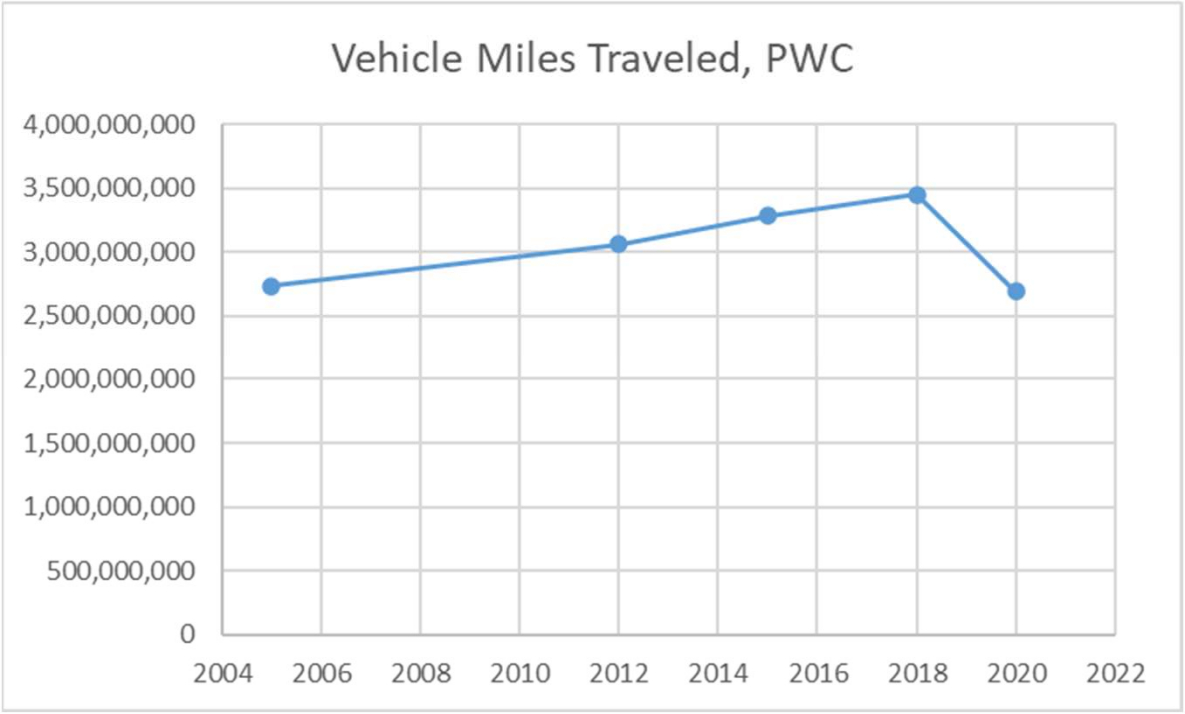
Drivers of Change

- Decreased carbon intensity of VA's grid – 2020 C intensity is 51% of 2005 C intensity (source: Energy Info Admin state electric power reports)



Drivers of Change

- Decreased VMT (vehicle miles traveled) and improved vehicle fuel efficiency

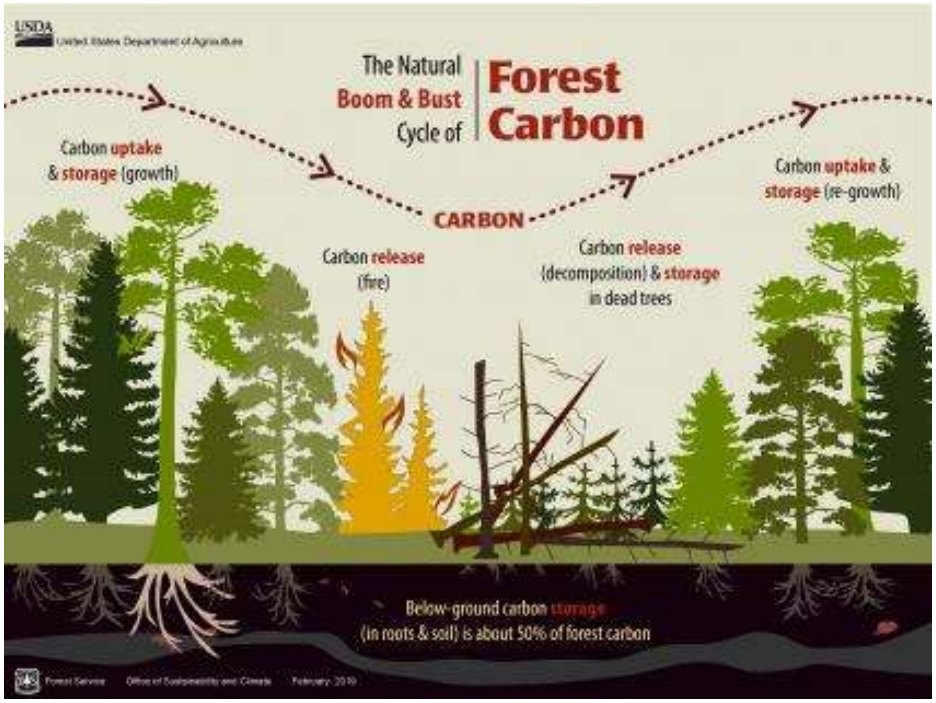


Key Points

- Updated 2005 baseline is 4.2 million tons CO2e, so updated 2030 target is 2.1 million tons CO2e
- Method changes since 2018 had little effect (2005 value is 0.6% higher in latest inventory; 2018 value is 1.7% higher)
- 2018 emissions were 20% higher than 2005; 2020 emissions were 9% higher than 2005
- Of the 465,000 MTCO2 total reduction for 2020 vs 2018, 321,000 MTCO2 were reduced in on-road mobile. Much of this reduction is probably temporary due to covid.
- Need to revise our GHG Fact Sheet to reflect the new info, and need to decide whether to focus on 2018 or 2020

Land Use, Land Use Change, and Forestry

- Forests accumulate carbon when trees remove CO_2 from the atmosphere and store it as organic material (e.g., wood, leaves, humus).
- Forests lose carbon through decomposition and fires.
- In the US, most forests are net accumulators of carbon. Nationally, LULUCF (mostly forests) offset 13% of gross emissions in 2020, i.e., they are essentially "negative emissions."



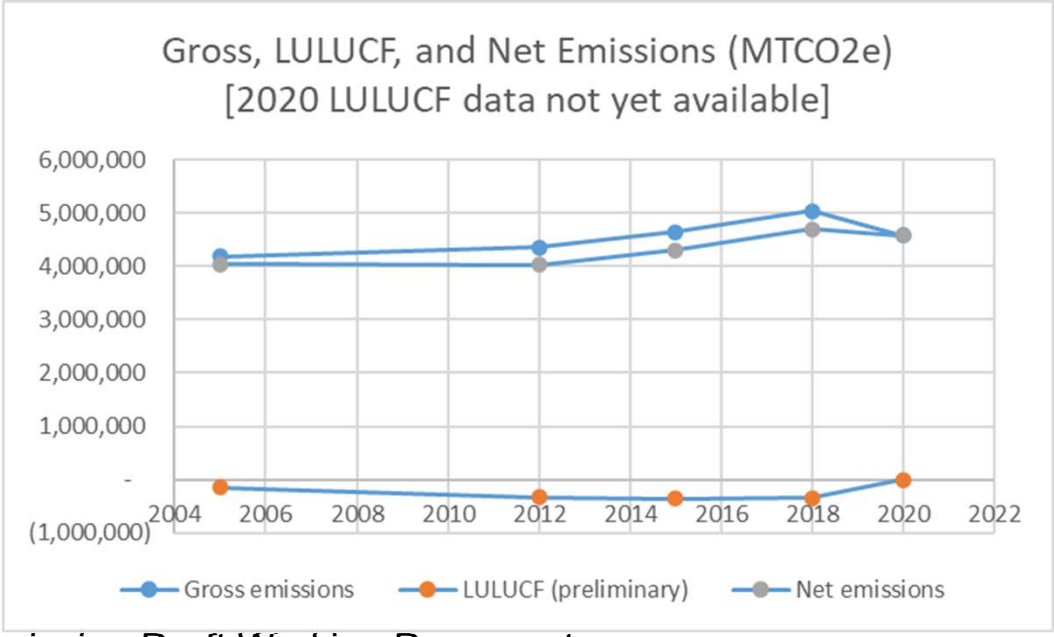
LULUCF Methods

- LULUCF is one of the most technically complex and data-hungry source categories in a GHG inventory ➡ usually omitted from local inventories.
- ICLEI is working with USDA-FS to develop Land Emissions And Removals Navigator (LEARN) tool (https://icleiusa.org/LEARN/).
- LEARN is based on the National Land Cover Database (NLCD), a Landsat-based, 30-meter resolution land cover database for the US.
- MWCOG is testing use of this method; they'll provide QC'd results soon.
- In the meantime, used LEARN to run ***preliminary*** estimates to determine what the order-of-magnitude results might be for PWC, and how they could influence our CESMP.

LULUCF Results

- LULUCF carbon flux (negative emissions) have generally increased since 2005

	2005	2012	2015	2018	2020
Gross GHG Emissions	4,190,056	4,362,219	4,649,425	5,044,135	4,579,236
LULUCF (from LEARN)	**(148,675)**	**(331,401)**	**(351,774)**	**(345,812)**	**TBD**
Net GHG Emissions	4,041,381	4,030,818	4,297,651	4,698,323	TBD



Key Points

- Including LULUCF in a GHG inventory makes it more comprehensive and more accurate.
- Forestry measures (afforestation, reforestation, urban forestry) are among the most cost-effective approaches for reducing GHG emissions, and thus their inclusion in GHG inventories is important for understanding mitigation opportunities.
- Based on ***preliminary*** estimates, it appears that net carbon storage from LULUCF in PWC has been increasing since 2005. If this trend continues through 2030, incorporating LULUCF will make it easier to reach the GHG reduction target.
- For these reasons, it will be important to
  - Encourage MWCOG to further develop methods to accurately characterize LULUCF
  - Cultivate expertise within PWC staff to make sure that we are accurately understanding our current conditions and our opportunities related to LULUCF options

Summary

- The updated inventory reinforces the importance of focusing on commercial electricity, on-road mobile transportation, and (to a lesser extent) residential electricity as the key source categories in Prince William.
- The 2020 inventory indicates lower gross emissions than the 2018 inventory, but given the effect of covid on the local economy, the decline must be interpreted carefully.
- Preliminary analysis indicates that LULUCF deserves special consideration.
- We need to build institutional capacity within PWC staff on the key source categories in terms of understanding baseline conditions and analyzing mitigation opportunities.
- The SC should update the GHG fact sheet with due consideration for choosing an inventory year and including LULUCF once updated information is available.