2021 COMMUNITY GREENHOUSE GAS INVENTORY

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Town of Germantown, NY

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Introduction

In January of 2021, the Town of Germantown appointed a dozen residents to the Climate Smart Communities Task Force. The Climate Smart Communities (CSC) program encourages local governments around New York State to commit to completing and documenting a suite of actions that mitigate and adapt to climate change at the local level — that means right here in Germantown.

The Community Greenhouse Gas (GHG) Inventory is one of the CSC priority actions.[1] This inventory is an accounting, analysis, and report of the community's GHG emissions. A community GHG inventory accounts for emissions associated with activities occurring within a local government's boundaries, such as electricity used to heat and cool homes or businesses. The community GHG inventory can establish a baseline and identify opportunities to reduce GHG emissions for the community at large.

Not included are the emissions from the day-to-day operations of the Town of Germantown, NY government — which is part of the Government Operations GHG Emissions Inventory, published in September 2021, summarizing the GHG emissions from the consumption of energy and materials in government buildings, wastewater and water treatment facilities, municipal vehicle fleets, government-owned outdoor lighting, and other sources.

Creating a GHG emissions inventory baseline is an important component of long term sustainability planning, which is why, as part of developing regional sustainability plans, NYSERDA funded a series of contractors to prepare regional greenhouse gas (GHG) inventories for each of New York State's ten economic development regions. With the exception of New York City, the baseline year for each of the reports is 2010. The Capital District 2010 Regional GHG Inventory With community GHG inventories for all 160 municipalities in the Capital District, contains community GHG data for the Town of Germantown, NY. The available information in that report is the basis for this report, creating 2010 as the baseline.

We report GHG emissions in this inventory in units of metric tons of carbon dioxide equivalent (metric tons CO_2e). This equivalent represents emissions of carbon dioxide as well as other Greenhouse Gases, such as methane and nitrous oxide, normalized for their Global Warming Potentials (GWPs). The exact methodology used, including data collection, sources, and processing, and other assumptions, can be found in the 2010 regional GHG emissions inventory (CDRPC 2010).

Community Greenhouse Gas Emissions

The Town of Germantown's community greenhouse gas (GHG) inventory (this report) summarizes emissions associated within the community's boundaries based on the 2010 regional GHG emissions inventory (CDRPC 2010), which calculated emissions for the entire Capital District region and provided community-level data for each village, town, city, and county in the region for the 2010 baseline year — including Germantown.

In 2010, The Town of Germantown's community inventory shows that the largest emitting sector are

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[1] Climate Smart Communities Website: https://climatesmart.ny.gov/actions-certification/actions/#open/action/7

buildings (Residential, Commercial, and Industrial) which collectively accounts for 12,839 MTCO2e, or 57% of total community emissions (see **Table 1**). **Table 1** shows further that the residential sector is the largest GHG emitter within the built environment, accounting for 6,654 MTCO2e.

The second greatest contributor to Germantown's emission profile is transportation, accounting for 6,941 MTCO2e, or 31% of the overall GHG emissions in 2010 (**Figure 1**). When combined, transportation and buildings make up 88% of the Town's community-level GHG emissions. Another 6% of the emissions result from agricultural activities (non-energy emissions from crops & livestock, e.g., methane & nitrous oxide emissions from fertilizers), with the remainder being Waste and Industrial Processes with about 3% each.

Compared to the rest of Columbia County, Germantown's emissions come less from transportation (31% vs. 44%) and more from residential (30% vs. 24%) and industrial buildings (16% vs. 5%). In terms of waste and industrial processes, Germantown falls on par with the County average. When comparing County and Town per capita, strong similarities in the emissions distribution become visible – especially in terms of residential housing, waste and industrial processes (see **Table 1**). Germantown might be emitting less per capita in the transportation sector, due to its beneficial location.

Household Energy, Land Use, and GHG Emissions

Germantown's "GHG emissions are driven by a nexus between the residential and transportation sectors. They are linked because while households create energy demand for domestic heating and cooling, household residents create transportation demand that forms the majority of on-road transportation GHG emissions. Together how much an individual household and its residents contribute to GHG emissions depends upon household size and efficiency, choice of heating fuels, community land use patterns, proximity to work, and accessibility of transit." (CDRPC 2010)

Table 2 displays the community's electricity used supplied by the utilities. The community used 21,780 MWh of electricity, 8,072 MWh of that were consumed by residential buildings. Per household, annual electricity consumption averaged 9,714 kWh, which indicates a large potential of energy savings in the residential sector – local energy saving campaigns could help here. On average, Germantown households spent 9% of their income on their energy needs (**Table 4**), which includes all energy paid by households to meet domestic and transportation needs. The County average also lies at 9%, although the County's per-household energy GHG footprint is slightly larger than in Germantown.

"For regional and community planners to find drivers to engage community residents in GHG reduction programs, it's important they understand how and why their households use energy, how much it costs them, and how consumption patterns vary across the region." (CDRPC 2010)

Upgrading the existing housing stock and ensuring that new construction is as efficient as possible (e.g., by following NY Stretch Code suggestions) will help lower the emissions from buildings in the long-run. Any building constructed today will likely remain at the same level of energy-efficiency (or in-efficiency) for the next decades, despite continuing improvements in building envelope design, heating and cooling equipment, etc. This is simply the nature of the longevity of buildings. Hence any bit of increased energy efficiency requirement regulation will provide energy savings for decades to come.

Transportation

With transportation accounting for 31% of all emissions in Germantown, "this is a priority area for regional GHG mitigation efforts. Reducing emissions typically involves around (1) introducing alternative fuels and more efficient vehicles to reduce the impact of current on-road travel demand, and (2) implementing land use policy and transit measured to reduce both existing and future travel demand." (CDRPC 2010)

"While electric vehicles and alternative fuels provide immediate gains to reduce the impact of current transportation demand, the best option to reduce GHG emissions and fuel costs is to simply reduce automobile use. Compact, transit accessible, pedestrian friendly development requires 20-50% less vehicle use and creates less GHG emissions per household (US EPA, 2011). For many communities it is challenging to change existing land use patterns, but it is possible to introduce mixed use development, complete streets, and urban infill to bring people closer to employment and transit." (CDRPC 2010)

Offering incentives for businesses that supply basic needs to settle within our community can limit use of personal vehicles for the residents. The community of Germantown travelled 10,763,627 miles with their vehicles in 2010 (**Table 3**). More and safer sidewalks and bike trails, can help motivate the community to walk or bike instead of using the car.

In addition to that, it makes sense to replace old cars with the most efficient alternatives. "All vehicles, whether alternative or conventional, can always be chosen to be more efficient over the ones they are replacing. This is perhaps the easiest way to reduce emissions and to save money. For example, hybrid-electric gasoline vehicles can cut fuel use in half by themselves." (CDRPC 2010) Similar to the housing stock, cars purchased today will be on the road for years to come, which is why efficiency goes a long way.
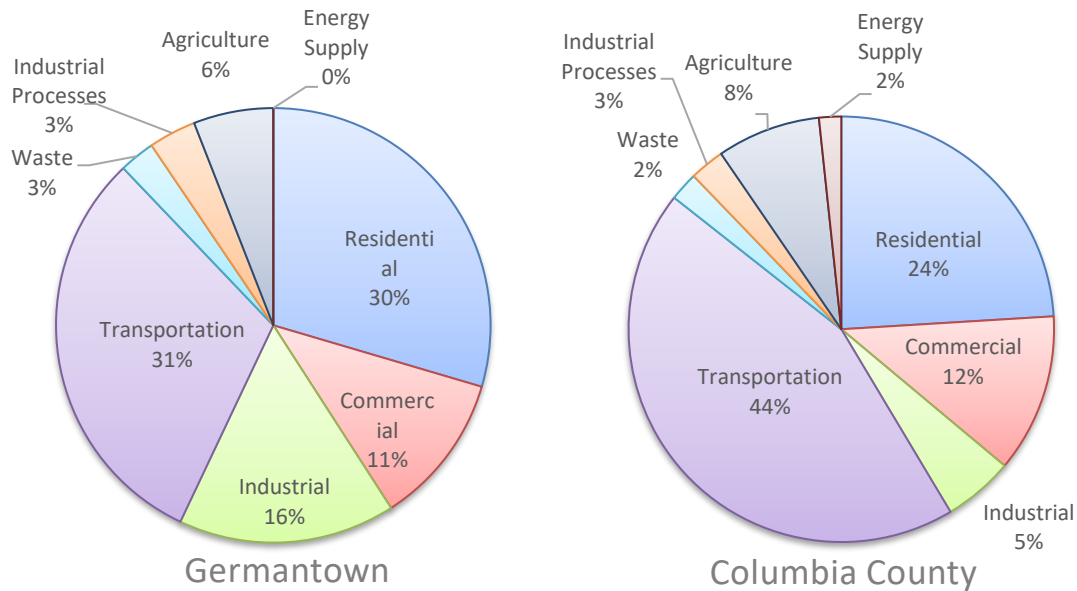

Figure 1 – Community GHG Emissions by Sector (2010): Germantown and Columbia County.

GHG EMISSION SECTORS [MTCO2e*]	Germantown Total / per capita		Columbia County Total / per capita	
Residential	6,654	3.4	213,220	3.4
Commercial	2,549	1.3	106,915	1.7
Industrial	3,636	1.9	47,376	0.8
Transportation	6,941	3.6	392,131	6.2
Waste	599	0.3	19,354	0.3
Industrial Processes	794	0.4	23,420	0.4
Agriculture	1,337	0.7	69,895	1.1
Energy Supply	-	0.0	14,934	0.2
Total Emissions	22,510	11.5	887,245	14.1
Population		1,954		63,096

*Metric Tons of Carbon Dioxide Equivalent

Table 1 Germantown and Columbia County Community GHG Emissions (2010).

	Electricity (MWh)			
Municipality	Total	Res.	Com.	Indust.
Germantown	21,780	8,072	4,065	9,643

Table 2 Utility-Supplied Energy Consumption Data for 2010 to Germantown Community.

	Vehicle Miles Traveled and Fuel Consumption (gallons)			
Municipality	VMT	Gasoline	Ethanol	Diesel
Germantown	10,763,627	418,432	46,492	57,569

Table 3 Vehicle-miles-traveled and Fuel Consumption (gallons) by Germantown Community.

	Per-Household GHG Footprint			Energy Cost of Living (ECOL)		
Municipality	Energy	Transport	HH Total	ECOL ($)	income	% income
Germantown	8.2	8.0	16.1	7,088	77,054	9%
Columbia County	9.9	8.1	18.0	6,910	76,237	9%

Table 4 Germantown Household GHG emissions and Energy Cost of Living.

Data provided in this section originates from the 2010 regional GHG emissions inventory (CDRPC 2010).

Definitions and Sources

Definitions

The available data from the 2010 regional GHG emissions inventory (CDRPC 2010) distinguishes emissions

…by **Sector**

Buildings (Residential, Commercial, Industrial)	Energy used in Residential, Commercial, Industrial buildings & other non-mobile uses (e.g., electricity, fuel oils, wood & propane).
Transportation	Fuel consumption for on-road transportation, passenger & freight rail, aviation, marine transit & off-road vehicles.
Waste & Wastewater treatment	Non-energy process emissions from landfills & wastewater treatment plants or septic systems. (e.g., methane emissions from anaerobic decay).
Industrial Processes	Non-energy process emissions from industrial activity & fugitive emissions from fuel systems (e.g., C02 from cement production, A/C coolants, & leakages).
Agriculture	Non-energy emissions from crops & livestock (e.g., methane & nitrous oxide emissions from fertilizers).
Energy Supply	Energy generation & fugitive emissions including energy losses during transmission & distribution of electricity and natural gas.

…by **Fuel Source**

Electricity / Gasoline, Ethanol and Diesel / Fuel oils, Wood, and Propane

…and on the County-level also by **Scope**

Scope 1: Direct emissions that physically occur within the regional or community boundary such as those emitted by burning natural gas or fuel oil in homes and businesses.

Scope 2: A special category of emissions to attribute a share of regional power plant emissions to individual communities based on how much electricity they use.

Scope 3: Indirect emissions attributed to region or community activities that cause emissions whether the emissions physically occur in-boundary or not.

This inventory accounts for all major GHGs including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydroflourocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexaflouride (SF_6). In the Capital District emissions come from three basic activities:

- Burning fossil fuels creates CO_2 and a small amount of CH_4 and N_2O. Fossil fuels are the dominant source of GHG emissions in the region.

- Solid and sewage waste management, agriculture practices, and chemical processes in Capital District cement and paper industries release fugitive emissions of CH4, N2O, and some PFCs.

- Common refrigerants (HFCs and SF6) used by homes, businesses, vehicles, and the utility industry are GHGs themselves, and they create a net footprint when they leak to the air as fugitive emissions. HFCs are also called Ozone Depleting Substitutes (ODS) because they were created to replace chlorofluorocarbons (CFCs) that had been found to be degrading the ozone layer.

The exact methodology can be found in the 2010 regional GHG emissions inventory (CDRPC 2010).

Energy Cost of Living (ECOL): The total cost for all energy paid by households to meet domestic and transportation needs. ECOL is compared with household incomes to determine how the energy cost burden varies across the counties and municipalities.

Per-Household GHG Footprint: Per-household GHG emissions caused by a household's domestic and transportation energy demand.

Sources

CDRPC, 2010 - Capital District 2010 Regional GHG Inventory, FINAL REPORT: 5/20/2013. Accessed: September 22, 2021: https://climatesmart.ny.gov/fileadmin/csc/documents/GHG_Inventories/capdistghgi nven.pdf