Chemung County, NY
Community Greenhouse Gas Inventory

Prepared by the Chemung County Planning Department

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Introduction

The purpose of collecting greenhouse gas (GHG) emissions data for Chemung County is to assist in identifying key source of emissions to provide guidelines and strategies that may help in reducing them.

This inventory presents the existing available information that is specific to Chemung County and is largely based on the Southern Tier Region from the Cleaner, Greener Southern Tier Greenhouse Gas Inventory, 2012, developed by ICF International.

As mentioned in the Cleaner, Greener Southern Tier Greenhouse Gas Inventory,

> *"To standardize organization and methodologies in the GHG inventories being completed by each of New York's ten regions, NYSERDA has sponsored the NY GHG Protocol Working Group. ICF staff participated in this group throughout the duration of the protocol development process to discuss data sources, methodologies, and organizational structure for the regional GHG inventory. This process resulted in a common inventory protocol to be used by each region in the state. This Working Group also served as the organizing entity for several common data requests to New York State agencies and major electricity and natural gas utilities. Due to differences in data availability between the regions, the protocol did not provide guidance for every methodological decision. Consequently, this inventory was developed based on the available data and methods from the regional perspective."*

In addition to the Cleaner, Greener Southern Tier Greenhouse Gas Inventory, IMPLAN environmental data from 2019 was utilized to provide GHG estimates for various industries that operate within Chemung County and compare overall community GHG emissions.

According to IMPLAN,

> *"IMPLAN's environmental data consist of Industry-specific coefficients of physical emissions or resource use per dollar of Industry Output. IMPLAN's environmental data consist of ratios representing physical emissions or inputs per dollar of Industry Output, with the physical unit depending on the particular pollutant or input under consideration."*

Together, these resources help provide the base data for this Chemung County Community Greenhouse Gas Inventory.

Chemung County Emissions

Table 1 is a summary of Chemung County and emitted gases that was provided by the Cleaner, Greener Southern Tier Greenhouse Gas Inventory, 2012, using 2010 data. The county-level trends are shown in the table and figure below with comparison to the Southern Tier Region. The Gross Emissions per Capita for Chemung County are consistent with that of the Southern Tier Region.

Table 1 Chemung County Total Emissions and gas, 2010 ($MTCO_2e$)

Geography	CO2	CH4	N2O	Other	Gross Emissions	Gross Emissions per Capita	Net Change in Forest C*	Net Emissions
Chemung	1,167,978	106,820	19,974	36,152	1,330,924	15.0	192,003	1,522,927
Southern Tier Region	8,209,808	1,086,455	292,459	264,848	9,853,570	15.0	(6,922,505)	2,931,066

**Net Change in Forest C is emissions from changes in the amount of carbon stored in soil and plants due to land use and forestry practices (e.g., from clearing forest land for residential, commercial, or agricultural use). Chemung County gained another 192,003 in emissions due to changes in land use and forests. In an interesting comparison, Chenango, Delaware, and Schuyler Counties actually have negative net emissions, by sequestering large amounts of carbon in their forests. However, for purposes of this inventory, gross emissions are those counted, tracked, and planned for, and these do not include forest carbon sequestration mitigation.*

Recent IMPLAN data for 2019 indicates C02 emissions increased from 2010 despite population loss within Chemung County. The table below shows the comparison:

	Population	CO2 (metric tonnes)
Chemung County, 2010*	88,830	1,167,978
Chemung County, 2019**	84,895	1,384,914
Change from 2010 to 2019	***-3,935***	***+216,936***

**Data from Cleaner, Greener Southern Tier Greenhouse Gas Inventory, 2012*
***Data from IMPLAN*

Municipalities within Chemung County

For municipalities within Chemung County, the following page includes a table from the Cleaner, Greener Southern Tier Greenhouse Gas Inventory, 2012, and shows a breakdown of the total emissions ($MTCO_2e$) by municipalities within Chemung County.

Table 27 – Chemung County, Emissions by Municipality ($MTCO_2e$)

	Stationary Energy			Mobile Energy	Solid Waste	Wastewater Treatment	Industrial Processes	Agriculture	Energy Supply	All Sectors
Municipality	Residential	Commercial	Industrial							
Town of Ashland	6,862	1,727	272	8,178	485	165	629	1,122	752	20,193
Town of Baldwin	2,884	1,663	0	4,938	238	81	309	1,450	347	11,910
Town of Big Flats	24,581	31,042	13,615	37,050	2,213	752	2,870	3,137	6,826	122,085
Town of Catlin	7,344	1,183	6	12,630	750	255	972	2,425	1,258	26,822
Town of Chemung	8,433	1,720	3,811	11,243	734	249	951	4,265	790	32,195
City of Elmira	85,378	82,955	25,744	117,863	8,360	2,841	10,838	0	20,296	354,275
Town of Elmira	29,244	18,194	46,130	35,214	1,985	675	27,726	1,548	9,663	170,380
Town of Erin	5,227	626	0	8,971	562	191	728	2,311	851	19,467
Town of Horseheads	68,018	51,728	83,627	98,412	5,578	1,896	7,232	2,212	23,005	341,709
Town of Southport	26,488	14,777	3,749	49,909	3,132	1,064	4,061	2,318	4,810	110,308
Town of Van Etten	3,979	2,317	303	5,342	446	151	578	2,028	1,408	16,552
Town of Veteran	12,991	2,140	567	17,635	948	322	1,230	4,783	1,547	42,164
Allocated Total	**281,429**	**210,073**	**177,824**	**407,386**	**25,432**	**8,642**	**58,124**	**27,599**	**71,551**	**1,268,060**
Village emissions, included in town/city totals										
Village of Elmira Heights	*11,804*	*5,464*	*71,983*	*20,802*	*1,173*	*399*	*26,673*	*0*	*11,386*	*149,685*
Village of Horseheads	*18,408*	*21,547*	*7,908*	*36,570*	*1,850*	*629*	*2,398*	*0*	*4,833*	*94,143*
Village of Millport	*1,396*	*180*	*0*	*2,059*	*89*	*30*	*116*	*0*	*155*	*4,026*
Village of Van Etten	*1,727*	*1,072*	*0*	*2,170*	*154*	*52*	*199*	*0*	*152*	*5,527*
Village of Wellsburg	*2,095*	*595*	*41*	*2,114*	*166*	*56*	*215*	*0*	*281*	*5,564*

As shown in Figure 1 below, Chemung County reported the third largest total gross emissions within the Southern Tier Region, behind Broome and Steuben counties.

Figure 1 – Total Gross Emissions by County and by Source

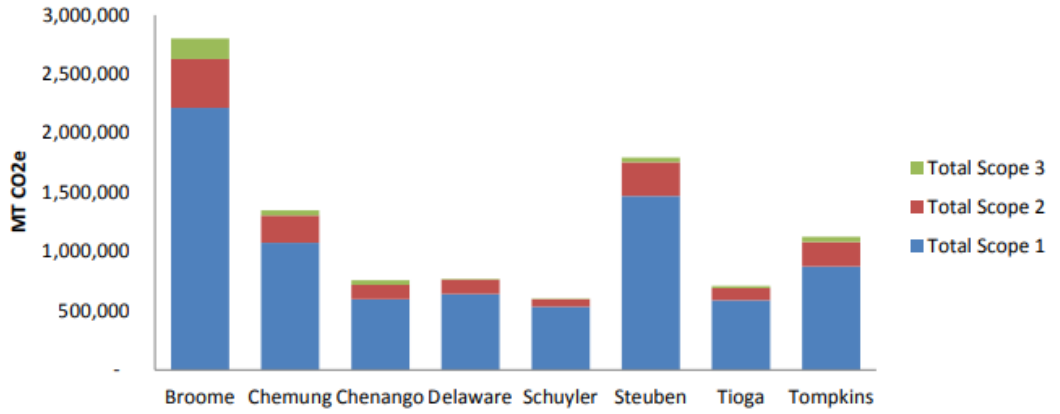
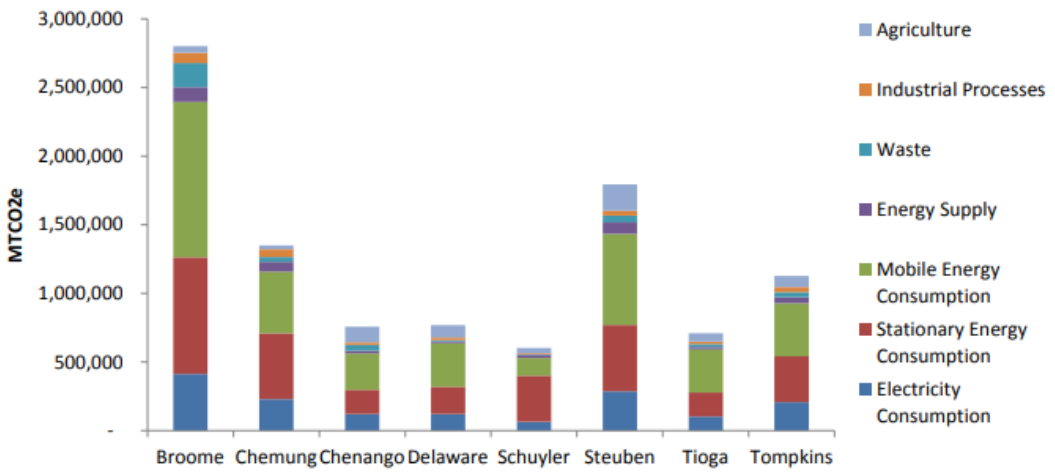


Figure 1 Scope measurements:

- **Scope 1:** All direct emissions from sources within the geopolitical boundary of the community.
- **Scope 2:** Energy-related indirect emissions that occur outside the community boundary as a consequence of consumption/use of grid-supplied electricity, heating and/or cooling within the community boundary.
- **Scope 3:** All other indirect emissions that occur outside the boundary as a result of activities within the community's geopolitical boundary, as well as trans-boundary emissions due to exchange/use/consumption of goods and services.

Figure 2, shows that in Chemung County, leading emissions are mobile energy consumption, stationary energy consumption, and electricity consumption.

Figure 2 – 2010 Emissions by County and Source ($MTCO_2e$)



Definitions for Sources of Emissions:

Sources: The activities selected for the regional inventory are based on those defined by the U.S. Environmental Protection Agency (EPA) and the Intergovernmental Panel on Climate Change (IPCC). These categories are:

- **Agriculture**—non-energy emissions from agriculture, including both crops and livestock (e.g., methane emissions associated with livestock and nitrous oxide emissions associated with fertilizer application);
- **Industrial Processes**—non-energy emissions associated with industrial activity (e.g., carbon dioxide emissions associated with cement production or emissions associated with coolants for air conditioners) and fugitive emissions from fuel systems (leakages in the production, distribution, and transmission of fossil fuels), and;
- **Waste Management**—non-energy emissions related to managing solid waste, including trash and wastewater (e.g., methane emissions associated with the anaerobic decay of waste disposed of in landfills);
- **Energy Supply**— these emissions include electricity transmission and distribution (T&D) losses, natural gas T&D losses, the use of sulfur hexafluoride (SF_6) in the utility industry, and natural gas production emissions.
- **Mobile Energy Consumption**—use of energy in transportation, including on-road transportation, passenger and freight rail, aviation, marine transportation, and off-road vehicles;
- **Stationary Energy Consumption**—fuel and electricity use in homes, businesses, and other non-mobile settings for purposes such as space and water heating, lighting, appliances and electronics, and industrial processes;
- **Electricity Consumption**— emissions are calculated using a combination of reported usage from utilities and, where utility data are unavailable, consumption estimates.

In order to look closely at energy used, as opposed to GHGs emitted, all energy use was converted to one consistent unit: Million British Thermal Units (MMBTU). Total energy use for the Southern Tier region in 2010 was about 133 million MMBTU (or 133 trillion BTU).

Table 2 Chemung County Total Energy Use (2010)

County	Population	Total Energy Use (MMBTU)	Percent of Southern Tier Total
Chemung	88,830	19,130,549	14%
Southern Tier Total	657,909	132,717,890	100%

Because of the prominent role of transportation and building energy, the region's primary energy sources consumed in 2010 were gasoline, natural gas and electricity, which accounted for the bulk of regional emissions, at 30 percent, 27 percent, and 18 percent, respectively. These fuel sources are the most important energy means for transport and buildings in the region.

Data and Methods for Stationary Fuel Combustion GHG Emissions by Fuel

Different methods are used to estimate consumption and emissions from natural gas (for all sectors), residential stationary fuels, commercial stationary fuels, and industrial stationary fuels.

Stationary energy consumption in this inventory includes:

1) Scope 1, direct emissions from the combustion of natural gas, coal, kerosene, distillate fuel oil, motor gasoline and other fuels in residential, commercial, and industrial buildings, and

2) Scope 2, indirect emissions from grid-supplied electricity consumption for these same sectors' buildings. To avoid double-counting, Scope 1 emissions from electricity generation (i.e., from grid-tied power plants in the region) are not included in the regional GHG emissions total, but are reported here for informational purposes only.

Table 3 Chemung County Stationary Fuel Consumption GHG Emissions

County	Scope	Residential	Commercial	Industrial	Total
Chemung	1	204,252	123,804	152,161	480,217
	2	77,177	86,269	66,169	229,615
Southern Tier Total	1	1,371,583	780,913	879,779	3,032,276
	2	602,494	552,146	392,108	1,546,748

Data and Methods for Emissions from Energy Supply Activities

To estimate losses due to electricity T&D, total electricity consumption (in MWh) is multiplied by a T&D loss factor to determine the quantity of electricity lost during T&D. This analysis used the Eastern regional loss factor from eGRID, 5.28%. The total electricity lost is then multiplied by the electricity emission factors to estimate emissions from electricity T&D.

Table 4 Chemung County Emissions from Energy Supply Activities (2010)

County	Electricity T&D Emissions	Natural gas T&D Emissions	Utility SF Emissions	Natural Gas Production Emissions	Total
Chemung	12,124	52,401	3,180	3,846	71,551
Southern Tier Total	81,668	249,309	21,419	27,846	380,243

On-Road GHG Emissions

The following information was gathered through New York State's Department of Transportation to understand the following:

1. Vehicle Mix. Data on the on-road vehicle mix for each functional class of road (e.g., rural interstate, urban freeways and expressways) were obtained for each NYSDOT region from NYSDOT's Environmental Science Bureau dataset.
2. Distance. Data on vehicle miles traveled (VMT) were obtained from Tompkins County and NYSDOT modeled data for all other counties. County-level VMT data were available by functional class, whereas Tompkins County VMT data were presented as totals.
3. Fuel Economy. National average fuel economy values by vehicle class are used, based on the Federal Highway Administration's Highway Statistics 2010 series.

Table 5 Chemung County on Road GHG Emissions (2010)

County	**Total CO2 Emissions**	**Total GHG Emissions**
Chemung	379,497	385,060
Southern Tier Total	3,147,104	3,193,240

Chemung is one of three counties in the Southern Tier that has an airport within its borders. Air travel contributed another 17,817 $MTCO_2e$. Air travel emissions for the three counties were equally distributed with Chemung contributing 34% and each remaining county contributing 33%. Rail and Marine travel in Chemung County were not significant contributors.

Solid Waste

Solid waste Scope 1 accounts for emissions from landfills located within the Southern Tier counties. Municipal solid waste landfill facilities in the region include Broome County Landfill, Chemung County Sanitary Landfill, Chenango County Landfill, Delaware County Solid Waste Management Facility, and Bath Sanitary Landfill in Steuben County.

Data on emissions from landfills came from EPA's Greenhouse Gas Reporting Program data for calendar year 2010. This dataset includes emission information from large facilities (defined as those that emit >25,000 MTCO2e per year) in nine industry groups, including landfills. The landfill facilities in the Southern Tier that reported emissions were Broome County Landfill, Chemung County Sanitary Landfill, and Bath Sanitary Landfill. Methane emissions from the facilities' landfill processes were reported as solid waste Scope 1 emissions. Chemung County reported data from the Chemung County Sanitary Landfill.

Table 6 Chemung County Solid Waste Emissions (2010)

County	Total MTCO2e
Chemung	63,102
Southern Tier Total	235,569

Scope 3 solid waste emissions accounts for emissions from waste generated within the Southern Tier counties, regardless of where the waste is sent. Broome County accounted for half the emissions in this category.

County	MSW CH_4 Emissions ($MTCO_2e$)	C&D CH_4 Emissions ($MTCO_2e$)	Total CH_4 Emissions ($MTCO_2e$)	Percent of Total
Chemung	22,023	3,409	25,432	8%
Southern Tier Total	293,458	15,517	308,976	100%

Wastewater

Wastewater emissions are calculated based on the population served by each wastewater treatment process.

The Chemung County Sewer Districts own and operate two wastewater treatment plants; the Lake Street Wastewater Treatment Plant, and the Milton Street Wastewater Treatment Plant.

Table 7 Chemung County Wastewater Emissions (2010)

County	Ch4 Emissions	N2O Emissions	Total Emissions
Chemung	5,975	2,667	8,642
Southern Tier Total	44,251	19,756	64,007

Industrial Processes

Industrial processes relate to activities such as manufacturing of products, including transportation equipment, computer and electronic products, electrical equipment, machinery, furniture, metal, and glass. Emissions were collected from EPA;s Greenhouse Gas Reporting Program data for 2010. Data was collected from facilities such as power plants, landfills, metals manufacturing, mineral production, petroleum refineries, pulp and paper manufacturing, chemicals manufacturing, and government and commercial facilities. Chemung County accounts for the only contribution made by glass production in the Southern Tier.

Table 8 Chemung County Industrial GHG Emissions (2010)

County	Glass Production	ODS Substitution	Total
Chemung	25,153	32,972	58,124
Southern Tier Total	25,153	243,428	268,581

Agriculture

Agriculture is a critical component of Chemung County's economy. Farms are local businesses providing jobs and economic growth as they spend most of their money on local goods and services, which in turn support other local businesses. Farm expenses include feed, seeds, fertilizers, chemicals, livestock, farm equipment, trucking and transportation, fuel and utilities. Banks, hardware stores, food processors and other local establishments are supported by farmers. Farms in Chemung County represent a diversity of agriculture from dairy, poultry, sheep, horses, and other livestock, to vegetables, flowers, grasses, and grains.

Table 9Chemung County Agricultural GHG Emissions by Source (2010)

County	Enteric Fermentation	Manure Management	Agriculture Soils	Total
Chemung	15,778	3,109	8,711	27,599
Southern Tier Total	390,329	78,724	182,336	651,389

Land Use/Forestry Changes

Land use changes in the Southern Tier in (from 2005-2010) resulted in a net sequestration of 6,922,505 $MTCO_2e$. Given the high rate of sequestration and the region's plentiful forest resources, improved forest management and targeted reforestation can help increase carbon stocks in the Southern Tier.

Broome, Chemung and Tompkins Counties showed net emissions from LULUCF, meaning these three counties marked forestland loss during this period of time, while Chenango, Delaware, Schuyler, and Steuben Counties had net carbon sequestration from LULUCF, perhaps resulting from an increase in marginal agricultural lands naturally reforesting.

County	**Net Emissions ($MTCO_2e$)**
Broome	415,668
Chemung	192,003
Chenango	(2,612,113)
Delaware	(2,371,521)
Schuyler	(1,670,944)
Steuben	(1,078,995)
Tioga	(434,567)
Tompkins	637,964
Southern Tier Total	**(6,922,505)**