2019 Inventory of Government Operations Greenhouse Gas Emissions

Town of Hurley, New York

CLIMATE SMART TASK FORCE

December 2022

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Background

The Town of Hurley recognizes that global greenhouse gas (GHG) emissions from human activity are catalyzing profound climate change, the consequences of which pose substantial risks to the future health, wellbeing, and prosperity of our community. New York State provides municipalities with a pathway to address climate change on the local level by becoming certified in the state Climate Smart Communities (CSC) program. The Town joined the program when it adopted the Climate Smart Communities Pledge in April 2019 and subsequently created the Hurley Climate Smart Task Force.

This GHG inventory was created by the Hurley CS Task Force using guidance from the CSC program with the goal of providing reliable estimates of GHG emissions resulting from activities within the Town's government operations. The gathering and analysis of a GHG inventory is a critical step in reducing those emissions. The baseline year of 2019 was chosen because it was the most recent year that predated the pandemic. The Inventory Results section of this report provides a detailed profile of emissions sources from local government operations, information that is key to guiding local reduction efforts. These data will also provide a baseline against which the town will be able to compare future performance and demonstrate progress.

Methodology

The Hurley Climate Smart Task Force used the Local Government Operations Protocol (LGOP) to inventory GHG emissions from government operations, its buildings, and sites. It provides the principles, approach, methodology, and procedures to develop a local government operations GHG emissions inventory. Using the LGOP provides a consistent set of methodologies for US

governmental inventories to facilitate benchmarking between local governments.

The basic methodology laid out by the LGOP consists of gathering activity data for the baseline year and using emissions factors to calculate the resulting GHG emissions. (i.e., Activity Data x Emissions Factors = Emissions). To perform these calculations, the Hurley Task Force utilized the ClearPath GHG Inventory Tool provided by ICLEI – Local Governments for Sustainability, a nationally recognized science-based tool used by local governments for this purpose.[1] The emissions factors used by ClearPath are based on the Intergovernmental Panel on Climate Change 5th Assessment 100-Year Values and eGRID values for the Upper New York Region.[2]

The resulting emissions amounts are expressed in units of Metric Tons of Carbon Dioxide Equivalent or $MTCO_2e$. This methodology provides a way to quantify the cumulative effect of different types of greenhouse gasses so that the global warming potential of each gas, and their environmental damage relative to carbon dioxide is calculated and accounted for. The calculations used to convert gases to $MTCO_2e$ are quite complex and should not be considered exact. For this reason, numbers in reports such as this one should be considered close approximations. Appendix A provides an explanation of the types of greenhouse gasses and their role in climate change.

[1] https://icleiusa.org/
[2] https://www.epa.gov/egrid

Activity Data Sources

An examination of receipts, bills, vouchers and invoices for purchases by the Town was made by task force members and diligently recorded. Most of the activity data came from Central Hudson Gas and Electric bills and invoices quantifying heating and vehicle fuel purchases. Appendix B contains the detailed data report produced using ClearPath software.

Landfill GHG Emissions

In order to estimate the amount of methane vented by Hurley's capped landfill, the CS Task Force used the Landfill Gas Emissions Model (LandGEM) Version 3.03 provided by the US Environmental Protection Agency[3]. The model uses estimates of waste deposition rates based on town population during the period when the landfill was in operation. Appendix C details the data used and the model output.

Emissions by Scope

The Local Government Operations Protocol delineates emissions by Scopes 1, 2 and 3. This framework provides a systematic method to account for direct and indirect emissions from operational activities[4].

Scope 1 activities encompass operations that the municipality has complete operational and financial control over. Aside from solid waste emissions, the two largest categories for Hurley are "Stationary" and "Mobile" combustion. Examples of Stationary sources include fuel oil-fed furnaces and generators. Gasoline and diesel vehicles are examples of Mobile sources.

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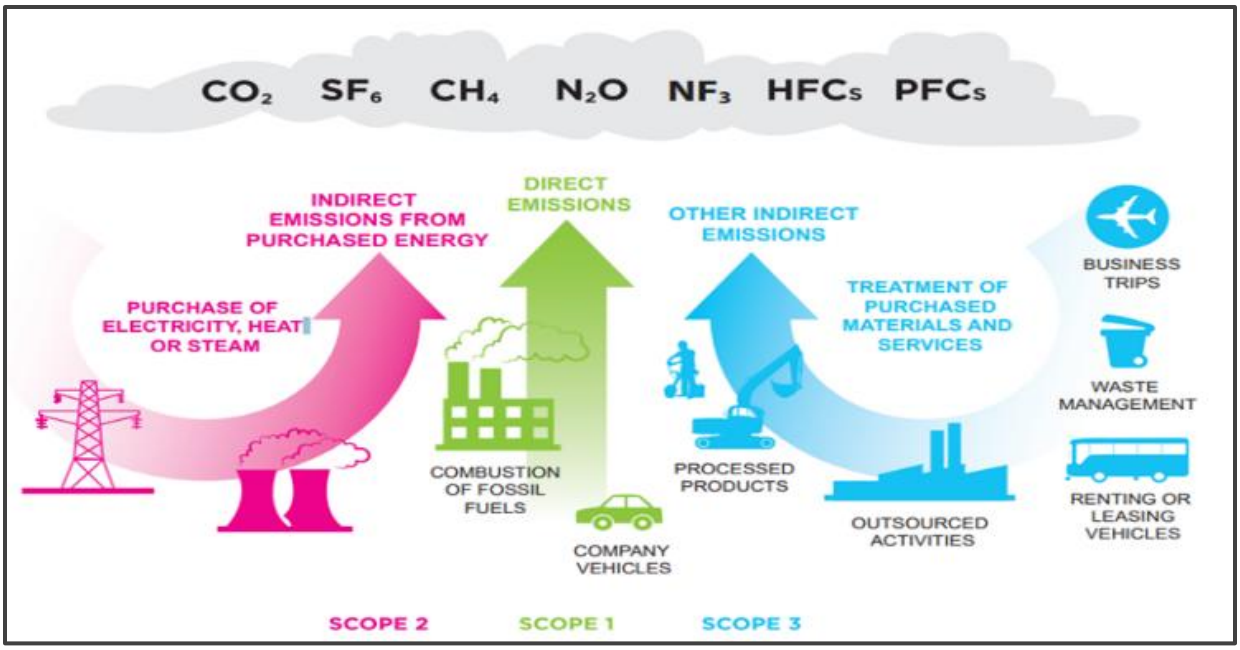
[3] https://tinyurl.com/LandGEMUsers-GuideUSEPA
[4] https://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance

Governmental operations can also result in fugitive emissions that are not physically controlled but result from releases of gasses that often arise from the production, processing, transmission, storage, and use of fuels and other substances, often through joints, seals, packing, etc. Refrigerant leakage from air conditioning units, and off gassing from municipal septic tanks are other sources of fugitive emissions specific to Hurley municipal operations. The Hurley CS Task Force does not have the capacity or expertise to measure fugitive emissions and they are not included in this inventory.

Scope 2 emissions are categorized as gasses generated by electricity or steam purchased from a utility.

Lastly, Scope 3 emissions result from "indirect" sources such as employee commutes, solid waste disposal and wastewater treatment and are considered optional and are beyond the scope of this inventory.

Emissions Delineated by Scope



Source: https://www.savemoneycutcarbon.com/learn-save/what-is-the-difference-between-scope-1-2-and-3-emissions/)

2019 Inventory Results

Total Hurley government GHG emissions for 2019 are estimated at 5,523 Metric Tons of Carbon Dioxide Equivalent ($MTCO_2e$).

Scope 1 Emissions

Type/Department	Scope 1 Emissions MTCO2e*		Percentage of Scope 1
Stationary (Heating)		**517.5**	**9.4%**
Highway Garage	498.8		9.3%
Town Hall	18.7		0.3%
Mobile (Vehicle Fleet)		**142.0**	**2.6%**
Highway	136.6		2.5%
Town Hall	5.4		0.1%
Solid Waste/Transfer Station		**4863.7**	**88.1%**
Total		**5523.2**	
*Metric Tons Carbon Dioxide Equivalent			

Stationary Combustion Sources (Heating)

Highway Garage: The current Highway Dept. facility uses a combination of diesel and kerosene heating units. In 2021, the Town Board committed to replace the obsolescent Highway Department facility. It is expected that

significant reductions in GHG emissions will result from the use of energy efficient building practices and codes.

Town Hall: In October 2021, four air-source electric heat pumps were installed at Town Hall to largely replace the oil burning furnace and window air conditioners. Future GHG inventories will capture the resulting reduction in emissions from this improvement.

Mobile Combustion Sources (Vehicle Fleet)

Highway Department: The majority of the Highway Fleet is comprised of medium and heavy vehicles. It is anticipated that newer vehicles will provide reductions in emissions, but significant improvements are not expected in the near future. It should be noted that Highway Department vehicles are shared with the Transfer Station for the purpose of managing piles of composting materials and mowing the landfill cover for example. It would have been difficult to allocate the GHG emissions of these activities based on the available data, and it was assumed that the emissions created by these activities were small compared to overall Highway Department activities.

Town Hall: A Chevy Bolt was purchased by the Town in April 2020 to replace a conventional gasoline fueled vehicle. The Bolt is charged using an electric vehicle charger installed at the Town Hall parking lot also in 2020. Future benchmarking of activity data will capture the resulting emissions reductions from these investments.

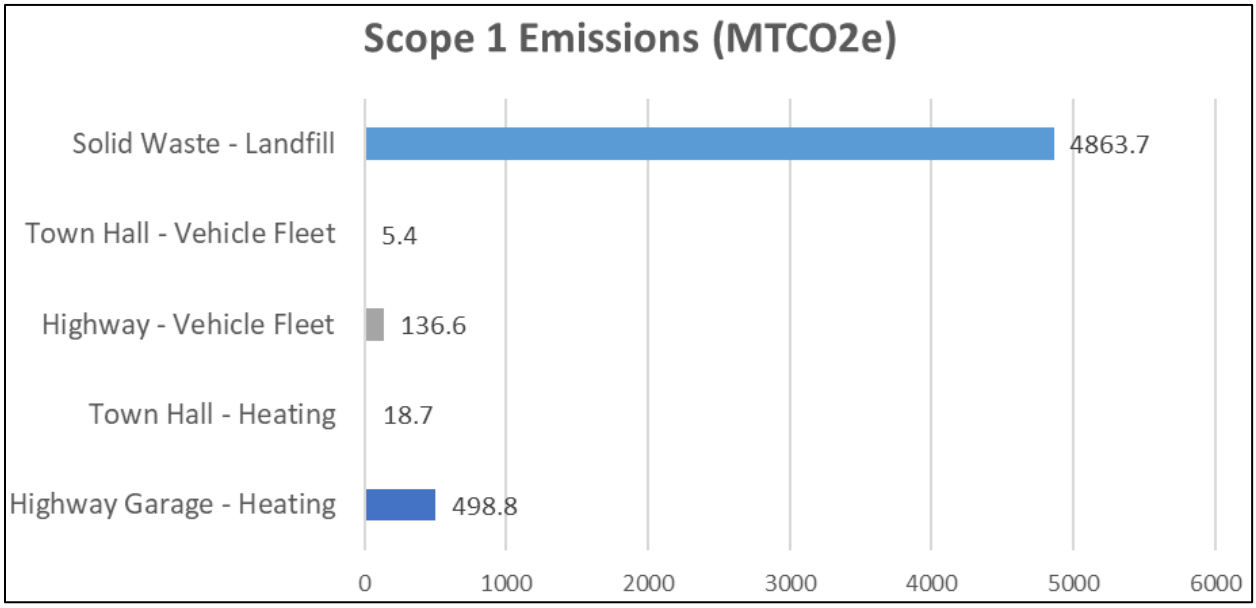
Solid Waste GHG Emissions

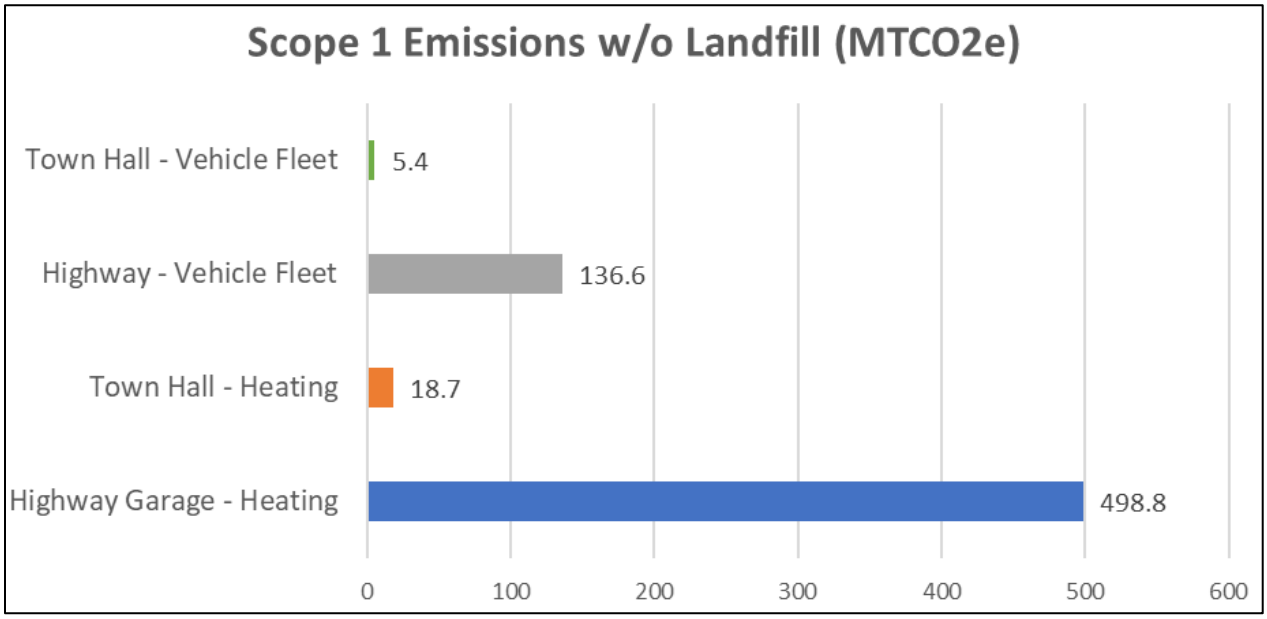
The Town of Hurley maintains a capped landfill which produces GHG emissions primarily in the form of methane and carbon dioxide resulting from the decomposition of deposited solid waste materials. The landfill was

designed to discharge the resulting gases through eight (8) "candy cane" shaped vents which permeate the landfill cover. The landfill accepted solid waste from the early 1960's until it was slated for closure and the capping process was initiated in 1994.

Based on LandGEM results, emissions from the landfill account for the lion's share of the GHGs generated in 2019, far outpacing any other department. These results merit further investigation before decisions on mitigation are pursued. To provide a more in-depth look at Hurley's local government operations, some graphs are presented with and without landfill emissions.

Scope 1 Emissions





Scope 2 Emissions

Hurley Scope 2 municipal emissions result entirely from the purchase of Grid Electricity.

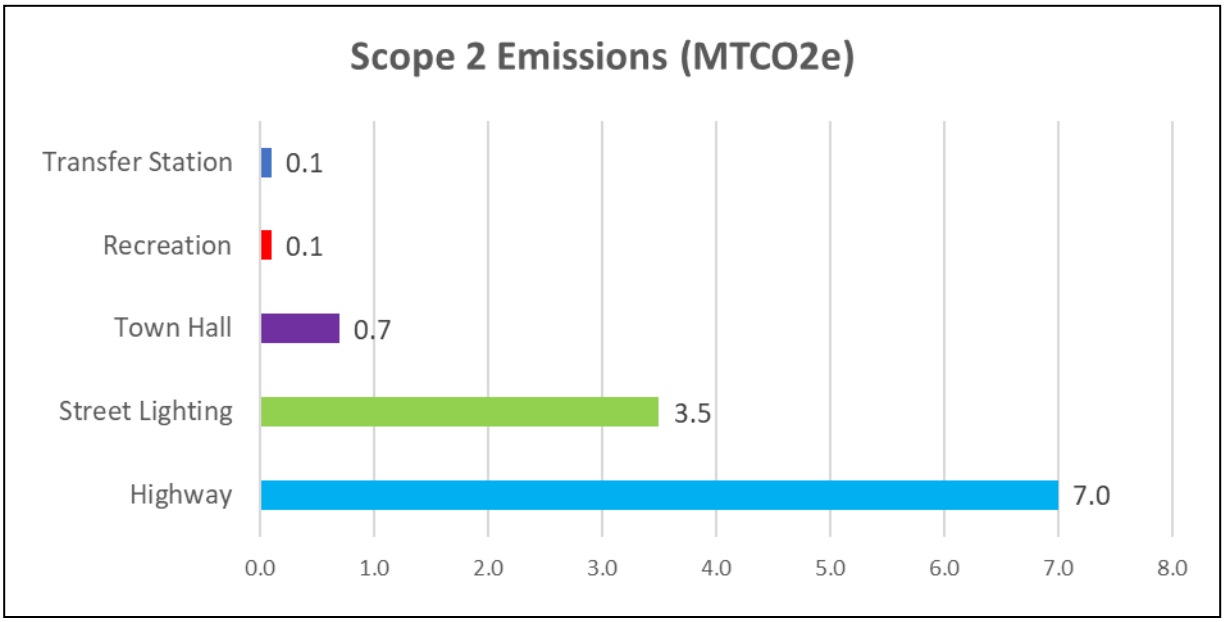
Department	Scope 2 Emissions MTCO2e*	Percentage of Scope 2
Highway	7.0	61%
Street Lighting	3.5	31%
Town Hall	0.7	6%
Recreation	0.1	1%
Transfer Station	0.1	1%
Total	**11.4**	
*Metric Tons Carbon Dioxide Equivalent		

Highway Department: The planned replacement of the aging Highway complex provides the opportunity to significantly reduce GHG emissions using clean energy technologies and energy efficient equipment and practices.

Street Lighting: The 72 streetlight fixtures within the jurisdiction of the Town are owned and maintained by Central Hudson Gas and Electric. The Town contracted with Central Hudson to install LED cobra heads as the older technology lights cease to operate. Currently, approximately 30% of the town's streetlights are LED. Purchasing the lights from Central Hudson and replacing the balance with LED lights provides an opportunity for immediate GHG emissions reduction and long-term cost savings. Note that there are no town-owned traffic signals to account for in this sector.

Town Hall: Grid Electricity usage for Town Hall has been offset by a 26 KW solar photovoltaic array since 2015 and building lights were replaced by LEDs in 2014. Installation of air-source heat pumps in 2021 is expected to increase electric usage but will reduce GHG emissions compared to the oil-burning furnace and window air conditioners that were supplanted.

Recreation (West Hurley Park) and Transfer Station: Grid Electricity usage from activities at these 2 facilities is small compared to other Hurley municipal sites. It is expected that any renovations at these sites will incorporate energy efficient equipment such as Energy Star appliances and LED lighting fixtures.



Emissions by Sector

Sector	Emissions MTCO2e*	Percentage of LGO
Street Lighting	3.5	0.1%
Vehicle Fleet	142.0	2.6%
Buildings & Facilities	525.3	9.5%
Solid Waste	4863.7	87.9%
Total	**5534.5**	
*Metric Tons Carbon Dioxide Equivalent		

Town of Hurley Sectors

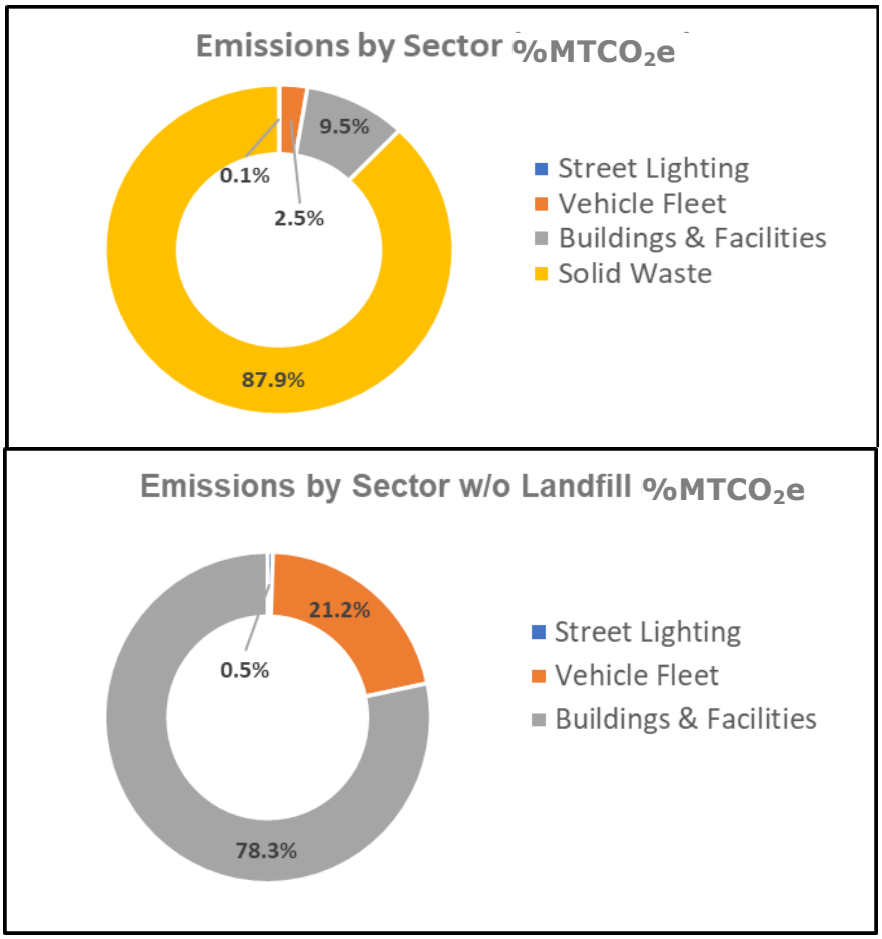
Street Lighting: There are two (2) lighting districts for a total of 72 lights. In 2019 the streetlight stock consisted of 48-sodium vapor, 21-LED and 3-mercury vapor lamps.

Vehicle Fleet: The vast majority of the vehicle fleet consists of heavy vehicles used for road maintenance and snow plowing. In 2019 the Town also owned a gasoline fueled car used by Town Hall staff (replaced in 2020 with an electric vehicle) and a Jeep used by the Building Department and Code Enforcement Officer.

Buildings and Facilities: Includes the Town Hall building, the Highway Department complex and the Transfer Station and West Hurley Park facilities.

Solid Waste: Gases vented from the capped landfill

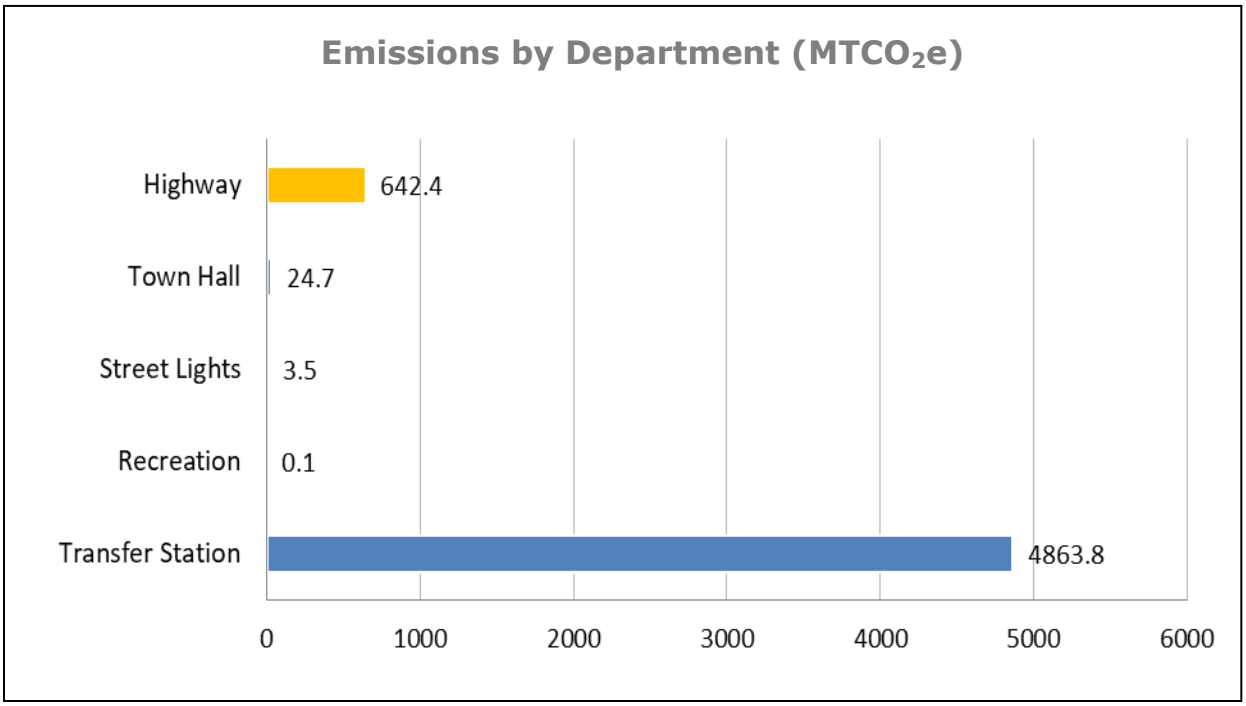
Emissions by Sector

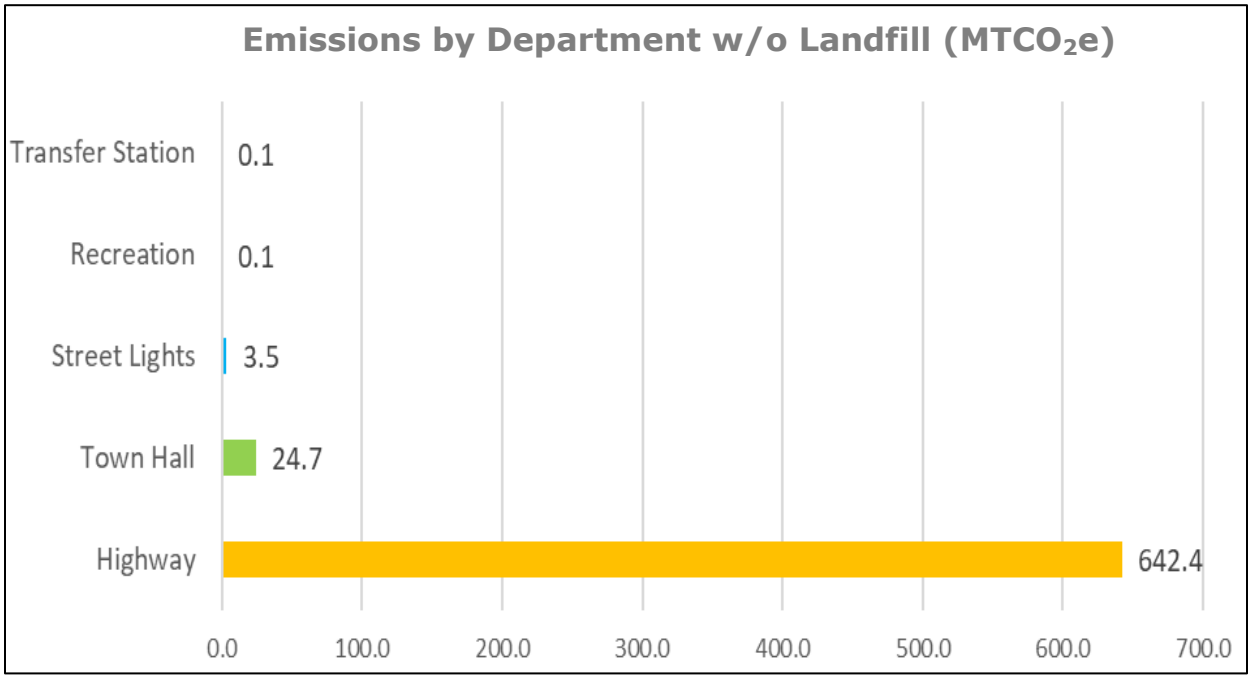


Emissions by Department

Department	Emissions MTCO2e*	Total Emissions MTCO2e*	Percentage of Town
Highway		**642.34**	**11.61%**
Stationary Combustion (Heating)	498.73		9.01%
Mobile Combustion (Vehicle Fleet)	136.62		2.47%
Grid Electricity	6.99		0.12%
Town Hall		**24.74**	**0.45%**
Stationary Combustion (Heating)	18.69		0.37%
Mobile Combustion (Vehicle Fleet)	5.37		0.10%
Grid Electricity	0.68		0.01%
Street Lighting Districts		**3.47**	**0.06%**
Rolling Meadows (28 streetlights)	1.61		0.02%
General Town (44 streetlights)	1.86		0.03%
Recreation (W. Hurley Park)		**0.11**	**0.00%**
Transfer Station		**4863.81**	**87.88%**
Grid Electricity	0.11		0.00%
Landfill GHG Emissions	4863.70		87.88%
Total		**5534.47**	

*Metric Tons Carbon Dioxide Equivalent


Emissions by Department (MTCO2e)
Highway
642.4
Town Hall
24.7
Street Lights
3.5
Recreation
0.1
Transfer Station
4863.8
0
1000
2000
3000
4000
5000
6000


Emissions by Department w/o Landfill (MTCO2e)
Transfer Station
0.1
Recreation
0.1
Street Lights
3.5
Town Hall
24.7
Highway
642.4
0.0
100.0
200.0
300.0
400.0
500.0
600.0
700.0

Acknowledgements

Town Supervisor – Melinda McKnight

Town Board Members – Michael Boms, Peter Humphries, Jana Martin, Gregory Simpson

Supervisor's Secretaries – Annie Reed, Samara Genee

Highway Superintendent – Michael Shultis

Town Clerk – Judy Mayhon

Former Town Board Members – John Perry (Supervisor), Barbara Zell

Hurley Climate Smart Task Force – Lynne Bailey, Michael Boms (Board Liaison), Felicia Legge (Intern, SUNY Ulster), Peter McKnight, Erin Nylen, Kristen Schara (Coordinator),

GHG Inventory Contributors – Lynne Bailey, Felicia Legge, Kristen Schara

ClearPath Training and Support – Kale Roberts and Eli Yewdall, ICLEI – Local Governments for Sustainability, USA

Appendices

A: About Greenhouse Gasses

Greenhouse gasses trap heat between the earth's surface and its atmosphere. The most abundant GHG emissions contain carbon. Humans have altered the carbon cycle by:

- Releasing long-stored carbon into in the atmosphere as GHG through activities like burning fossil fuels and cement production;[5] and
- Reducing the ways that carbon is naturally stored through land use changes such as deforestation development.[6]

Types of Greenhouse Gasses

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous oxide (N_2O) from agricultural loss of soil, and wetlands
- Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs); Sulfur hexa-fluoride (SF6): these are all man-made chemicals, typically used for refrigeration and cooling, and do not occur in nature;
- Water Vapor (H_2O), often evidenced as clouds, is also a GHG, but is not measured in these studies as these vapors are a component of the water cycle[7]. The aggregate of water in all forms on our planet, ice, liquid and gas, does not change.[8]

[5] https://earthobservatory.nasa.gov/features/CarbonCycle
[6] https://news.climate.columbia.edu/2021/09/23/natural-climate-solutions-why-we-need-them/
[7] How Much Water Is on Earth? - Earth How;
[8] Is Earth's total water finite? | Questions | Naked Scientists (thenakedscientists.com)

B: ClearPath Data Table

Town of Hurley Gov't Operations All GHG Emissions for Calendar Year 2019, by Type, Source and Scope*

Inventory Record	Source of Emissions	LGOP Scope	CO_2 Carbon Dioxide (MT)	CH_4 Methane ($MTCO_2e$)	N_2O Nitrous Oxide (MTCO2e)	Total $MTCO_2e$
Rolling Meadows Lighting District	Grid Electricity	Scope 2	1.6073	0.0033	0.0037	1.6143
General Lighting District	Grid Electricity	Scope 2	1.8465	0.0038	0.0042	1.8545
West Hurley Park Electric Usage	Grid Electricity	Scope 2	0.1075	0.0002	0.0002	0.1079
Town Hall Electric Usage	Grid Electricity	Scope 2	0.6803	0.0014	0.0016	0.6833
Transfer Station Electric Usage	Grid Electricity	Scope 2	0.1041	0.0002	0.0002	0.1045
Highway Panel #1 Electric Usage	Grid Electricity	Scope 2	0.3709	0.0008	0.0008	0.3725
Highway Panel #2 Electric Usage	Grid Electricity	Scope 2	1.6164	0.0033	0.0037	1.6234
Highway DHR Panel Electric Usage	Grid Electricity	Scope 2	2.5515	0.0052	0.0058	2.5625
Highway Garage Electric Usage	Grid Electricity	Scope 2	2.4167	0.0050	0.0055	2.4272
Landfill GHG Emissions	Solid Waste Facilities	Scope 1	434.1	4429.6	0	4863.7
Town Hall Heating Fuel Usage	Stationary Fuel Combustion	Scope 1	18.5656	0.0764	0.0482	18.6902
Highway Department Heating Fuel Kerosene	Stationary Fuel Combustion	Scope 1	10.5073	0.0435	0.0274	10.5782
Highway Garage Heating Fuel Diesel	Stationary Fuel Combustion	Scope 1	484.8997	1.9954	1.2590	488.1541
Highway Vehicles	Fleet Vehicles	Scope 1	136.6201	0	0	136.6201
Town Vehicles	Fleet Vehicles	Scope 1	5.3734	0	0	5.3734
TOTAL EMISSIONS			**1101.3672**	**4431.7385**	**1.3603**	**5534.466**

* Converted to MTCO2e as applicable

C: LandGEM Data

Waste Acceptance Rates

LandGEM calculations are based on yearly waste acceptance rates. This data was not available in Town of Hurley records. Yearly waste acceptance rates were estimated using 5.15 lbs. of waste per person per day.[9] Population levels for the town during the years of 1961-1994 were calculated based on extrapolation of historical US Census data as reported in 10-year intervals.

Yearly Waste Acceptance Rate = 5.15 lb/person x Est. Population x 365 days/yr x 1Mg/2204.62 lb

[9] Beyond Waste A Sustainable Materials Management Strategy for New York State, Adopted 12/27/10, p. 118

Estimated Waste Acceptance Rates

Year	*Mg/year*	*Short tons/year*
1961	4,023	4,425
1962	4,192	4,611
1963	4,360	4,796
1964	4,528	4,981
1965	4,697	5,166
1966	4,865	5,352
1967	5,034	5,537
1968	5,202	5,722
1969	5,370	5,907
1970	5,539	6,093
1971	5,581	6,139
1972	5,623	6,186
1973	5,666	6,232
1974	5,708	6,279
1975	5,750	6,325
1976	5,792	6,372
1977	5,835	6,418
1978	5,877	6,465
1979	5,919	6,511
1980	5,962	6,558
1981	5,940	6,534
1982	5,919	6,511
1983	5,897	6,487
1984	5,876	6,464
1985	5,855	6,440
1986	5,833	6,417
1987	5,812	6,393
1988	5,790	6,369
1989	5,769	6,346
1990	5,748	6,322
1991	5,733	6,306
1992	5,717	6,289
1993	5,702	6,273
1994	5,687	6,256

LandGEM 2019 Inventory Report for Town of Hurley Landfill

Gas / Pollutant	Emission Rate				
	(Mg/year)	(m^3/year)	(av ft^3/min)	(ft^3/year)	(short tons/year)
Total landfill gas	**5.924E+02**	**4.743E+05**	**3.187E+01**	**1.675E+07**	**6.516E+02**
Methane	1.582E+02	2.372E+05	1.594E+01	8.376E+06	1.741E+02
Carbon dioxide	4.341E+02	2.372E+05	1.594E+01	8.376E+06	4.776E+02
NMOC	1.020E+00	2.846E+02	1.912E-02	1.005E+04	1.122E+00
1,1,1-Trichloroethane (methyl chloroform) - HAI	1.263E-03	2.277E-01	1.530E-05	8.041E+00	1.390E-03
1,1,2,2-Tetrachloroethane - HAP/VOC	3.643E-03	5.218E-01	3.506E-05	1.843E+01	4.007E-03
1,1-Dichloroethane (ethylidene dichloride) - HAI	4.686E-03	1.138E+00	7.649E-05	4.020E+01	5.155E-03
1,1-Dichloroethene (vinylidene chloride) - HAP/	3.825E-04	9.487E-02	6.374E-06	3.350E+00	4.208E-04
1,2-Dichloroethane (ethylene dichloride) - HAP/	8.005E-04	1.945E-01	1.307E-05	6.868E+00	8.805E-04
1,2-Dichloropropane (propylene dichloride) - HA	4.013E-04	8.538E-02	5.737E-06	3.015E+00	4.414E-04
2-Propanol (isopropyl alcohol) - VOC	5.930E-02	2.372E+01	1.594E-03	8.376E+02	6.523E-02
Acetone	8.021E-03	3.320E+00	2.231E-04	1.173E+02	8.823E-03
Acrylonitrile - HAP/VOC	6.595E-03	2.988E+00	2.008E-04	1.055E+02	7.255E-03
Benzene - No or Unknown Co-disposal - HAP/VC	2.928E-03	9.013E-01	6.056E-05	3.183E+01	3.221E-03
Benzene - Co-disposal - HAP/VOC	1.695E-02	5.218E+00	3.506E-04	1.843E+02	1.865E-02
Bromodichloromethane - VOC	1.002E-02	1.470E+00	9.880E-05	5.193E+01	1.102E-02
Butane - VOC	5.733E-03	2.372E+00	1.594E-04	8.376E+01	6.307E-03
Carbon disulfide - HAP/VOC	8.712E-04	2.751E-01	1.849E-05	9.716E+00	9.583E-04
Carbon monoxide	7.737E-02	6.641E+01	4.462E-03	2.345E+03	8.510E-02
Carbon tetrachloride - HAP/VOC	1.214E-05	1.897E-03	1.275E-07	6.701E-02	1.335E-05
Carbonyl sulfide - HAP/VOC	5.807E-04	2.324E-01	1.562E-05	8.208E+00	6.388E-04
Chlorobenzene - HAP/VOC	5.552E-04	1.186E-01	7.968E-06	4.188E+00	6.107E-04
Chlorodifluoromethane	2.218E-03	6.167E-01	4.143E-05	2.178E+01	2.440E-03
Chloroethane (ethyl chloride) - HAP/VOC	1.655E-03	6.167E-01	4.143E-05	2.178E+01	1.820E-03
Chloroform - HAP/VOC	7.067E-05	1.423E-02	9.561E-07	5.025E-01	7.773E-05
Chloromethane - VOC	1.195E-03	5.692E-01	3.825E-05	2.010E+01	1.315E-03
Dichlorobenzene - (HAP for para isomer/VOC)	6.091E-04	9.961E-02	6.693E-06	3.518E+00	6.700E-04
Dichlorodifluoromethane	3.817E-02	7.590E+00	5.099E-04	2.680E+02	4.198E-02
Dichlorofluoromethane - VOC	5.279E-03	1.233E+00	8.287E-05	4.355E+01	5.807E-03
Dichloromethane (methylene chloride) - HAP	2.346E-02	6.641E+00	4.462E-04	2.345E+02	2.581E-02
Dimethyl sulfide (methyl sulfide) - VOC	9.561E-03	3.700E+00	2.486E-04	1.307E+02	1.052E-02
Ethane	5.280E-01	4.222E+02	2.837E-02	1.491E+04	5.808E-01
Ethanol - VOC	2.455E-02	1.281E+01	8.605E-04	4.523E+02	2.700E-02
Ethyl mercaptan (ethanethiol) - VOC	2.819E-03	1.091E+00	7.330E-05	3.853E+01	3.101E-03
Ethylbenzene - HAP/VOC	9.635E-03	2.182E+00	1.466E-04	7.706E+01	1.060E-02
Ethylene dibromide - HAP/VOC	3.707E-06	4.743E-04	3.187E-08	1.675E-02	4.077E-06
Fluorotrichloromethane - VOC	2.060E-03	3.605E-01	2.422E-05	1.273E+01	2.266E-03
Hexane - HAP/VOC	1.122E-02	3.131E+00	2.104E-04	1.106E+02	1.234E-02
Hydrogen sulfide	2.421E-02	1.708E+01	1.147E-03	6.031E+02	2.663E-02
Mercury (total) - HAP	1.148E-06	1.376E-04	9.243E-09	4.858E-03	1.263E-06
Methyl ethyl ketone - HAP/VOC	1.010E-02	3.368E+00	2.263E-04	1.189E+02	1.111E-02
Methyl isobutyl ketone - HAP/VOC	3.755E-03	9.013E-01	6.056E-05	3.183E+01	4.130E-03
Methyl mercaptan - VOC	2.373E-03	1.186E+00	7.968E-05	4.188E+01	2.610E-03
Pentane - VOC	4.698E-03	1.565E+00	1.052E-04	5.528E+01	5.167E-03
Perchloroethylene (tetrachloroethylene) - HAP	1.211E-02	1.755E+00	1.179E-04	6.198E+01	1.332E-02
Propane - VOC	9.569E-03	5.218E+00	3.506E-04	1.843E+02	1.053E-02
t-1,2-Dichloroethene - VOC	5.355E-03	1.328E+00	8.924E-05	4.690E+01	5.891E-03
Toluene - No or Unknown Co-disposal - HAP/VO	7.089E-02	1.850E+01	1.243E-03	6.533E+02	7.798E-02
Toluene - Co-disposal - HAP/VOC	3.090E-01	8.064E+01	5.418E-03	2.848E+03	3.399E-01
Trichloroethylene (trichloroethene) - HAP/VOC	7.259E-03	1.328E+00	8.924E-05	4.690E+01	7.985E-03
Vinyl chloride - HAP/VOC	9.002E-03	3.463E+00	2.327E-04	1.223E+02	9.902E-03
Xylenes - HAP/VOC	2.513E-02	5.692E+00	3.825E-04	2.010E+02	2.765E-02

Projected Landfill Emissions Per Year