Schenectady County Local Government Operations Greenhouse Gas Inventory

A Preliminary Report for Baseline Year 2021

A report for the NYS CSC Strategy for Schenectady County

Report date: May 15, 2023

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Key Findings

Schenectady County began a 2023 municipal operations greenhouse gas (GHG) emissions inventory using 2021 as the base year. The County has undergone various sustainability initiatives since then, which are detailed in text throughout this inventory. This report summarizes data gathered and analyzed thus far. Some of key findings include:

- Based on available data, the County spent over **$1.1 million on energy** in 2021 and created over **10,000 metric tons of GHG emissions** from its operations.
- Eighty-one percent of the GHG emissions from County operations came from the energy consumed in **County-owned buildings and facilities**. Therefore, the County should focus on energy conservation in its facilities to bring down emissions and costs.
    - This information is incomplete, as solar energy usage in buildings and facilities has not been entirely incorporated into County energy datasets. For example, the County owns several solar fields in Glenville, Niskayuna, and Rotterdam through a contract with Monolith Solar. In 2021, those solar sites **generated 3.4 million kWh of electricity** which translated to renewable energy credits for the County.
    - Additionally, energy costs of County-owned streetlights and fleet vehicles are not currently available.
- In order to set realistic GHG emissions targets, the County may need to expand this study in future years to incorporate data on refrigerant use within County-owned buildings.
- Primary energy sources used in County operations and perceived inefficiencies in County-owned streetlights, fleets, buildings, and facilities are costly to Schenectady, and reducing GHG emissions by just ten percent could **save the County over $100,000 annually**.
    - Select County facilities, such as the **Glendale Nursing Home** and the **Correctional Facility** are some of the highest GHG emitters due to the nature of the services they provide. Conducting building audits on these facilities to reduce GHG emissions could have a large impact on County savings.

GHG Accounting Overview and Sources Included

Municipal GHG inventories provide a baseline of emissions released due to day-to-day government functions. This baseline helps to set realistic emissions reduction targets and closely measure the impact of future municipal actions in climate change mitigation efforts. The information in this report can help Schenectady County reduce energy use, save taxpayer dollars and cut GHG emissions.

Communities typically chose one or more recent prior years to set a baseline. Schenectady County selected 2021 as the baseline year for this GHG inventory. When the preliminary assessment is finalized, the information in this report will serve as a baseline from which to track progress and measure the impact of future actions taken to reduce GHG emissions.

GHG Sources

This preliminary assessment considers most major GHG sources with a few exceptions, as noted below:

- Electricity consumption. Purchased electricity causes indirect emissions as the direct emissions are created at the power plants which the County does not run or own. LGOP requires electric consumption to be included in the analysis since municipalities can lessen the indirect emissions caused by purchased electricity by reducing their use of electricity. All metered use is considered in this study. National Grid is the main provider for Schenectady County.
- Stationary fossil fuels. The County facilities and operations only utilize natural gas. Some facilities utilized propane in the past, but no longer report the usage of propane in any of its facilities. Natural gas usage was collected from National Grid bills.
- Transportation fossil fuels. Within the combined fleet the County reported usage of gasoline, diesel, and electricity (for plug-in vehicles). This includes fuel used in both on-road fleet vehicles and off-road equipment.
- Landfill solid waste emissions. Schenectady County does not own or operate a landfill, meaning it has no direct emissions. The County elected not to use the LGOP option of estimating indirect footprint from solid waste generated by government facilities. Emissions from solid waste are often not included because the volume generated by government operations is difficult to measure and this source is usually less than 1-2 percent of a typical inventory.
- Refrigerant usage. Refrigerant usage and type in Schenectady County facilities, fleets, and operations was not available at the time of the report. To most County facilities, refrigerant usage is difficult to estimate and amount to less than 2 percent of a typical GHG inventory.

Data Organization

Schenectady County used the LGOP model to identify useful categories for organizing the data. Emissions were analyzed by fuel type, operational sector, and individual facility. Operational sectors were used as the high-level categories for GHG emissions (Table 1.).

Table 1. Sectors and Fuel Types Included in this Report

Sectors	Fuel Types Reported
Buildings & Other Facilities	Natural Gas and Electricity
Streetlights	Electricity
Vehicle Fleet	Gasoline and Diesel
Solid Waste	-

Solid waste refers to waste collected from various County operations. The County does not utilize solid waste for fuel purposes at this time and therefore estimated energy outputs were not included in this document. To provide standardized units across fuel types, energy use was measured in million British Thermal units (MMBtu) and GHG Emissions were measured in metric tons of carbon dioxide equivalents (MTCDE). Energy costs were recorded as nominal values from 2021. Expenditures were not adjusted for inflation due the fact that the baseline year chosen is a recent year.

Emissions and Energy Costs by Sector

County buildings and facilities and the County fleet together contributed to 97 percent of emissions in 2021. This remaining 3 percent is from County-owned streetlights and solid waste generated from County operations (Figure 1). Streetlights were kept as their own sector due to not being a part of the building emissions, and solid waste was kept as its own category since energy is not generated from solid waste created by County operations at this time. Despite comprising less than half of the overall County fleet, diesel-based vehicles emit over half of the fleet GHG emissions (Figure 2) Since solid waste was not used for energy purposes and did not have a fuel type, the solid waste sector was omitted from Figure 2.

Figure 1.
GHG Emissions by Sector

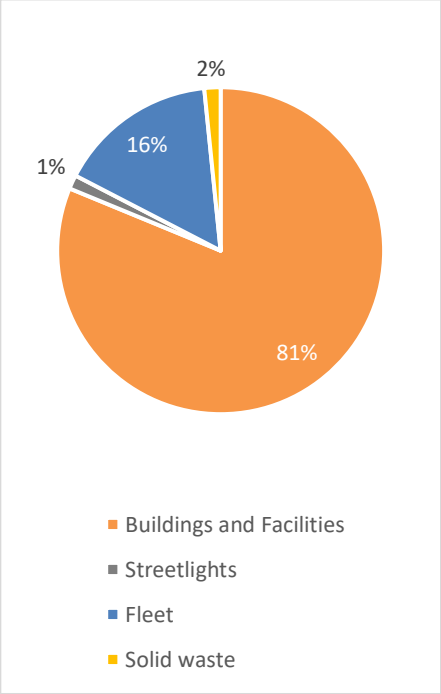
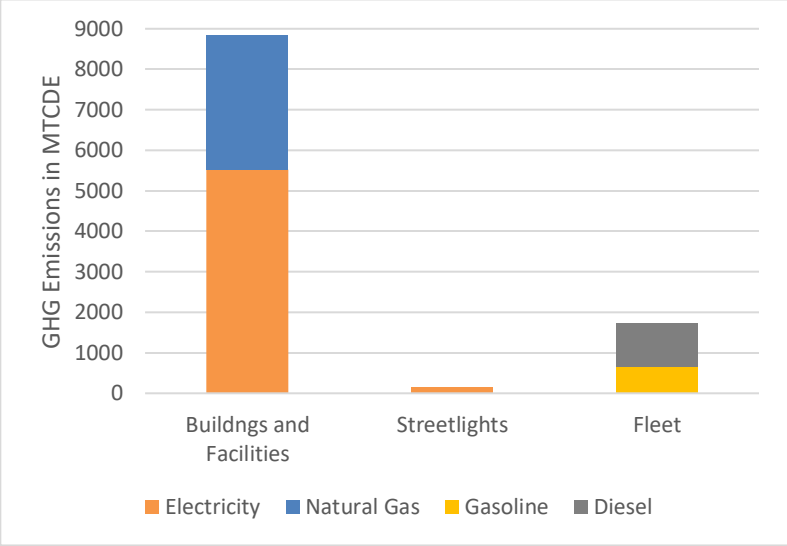


Figure 2.
GHG Emissions by Sector and Fuel Type



In 2021 Schenectady County's operations produced an estimated 10,883.9 metric tons of GHG emissions (Table 2). The County's emissions came from fossil fuel combustion, electricity consumption, and solid waste. The County consumed 202,111.9 MMBtu of energy and spent over $1 million dollars on known energy costs ($1,138,586.55) (Table 2). Cutting back just ten percent off this cost through energy conservation and continued efficient vehicle procurement would save over $100,000 annually.

Table 2 shows the amount of GHG emissions produced, the amount of energy used, and the cost of the energy consumed across all sectors.

Table 2. Annual Energy Use, Cost and Emissions for 2021, by sector

Sector	GHG Emissions (MTCDE)	Energy Use (MMBtu)	Energy Cost (USD)
Buildings and Facilities	8,840	166,752.6	$1,138,586.55

Streetlights	150	283	-
Fleet	1,718.9	32,424.3	-
Solid Waste	175	-	-
Total Government	**10,883.9**	**199,459.9***	**$1,138,586.55****

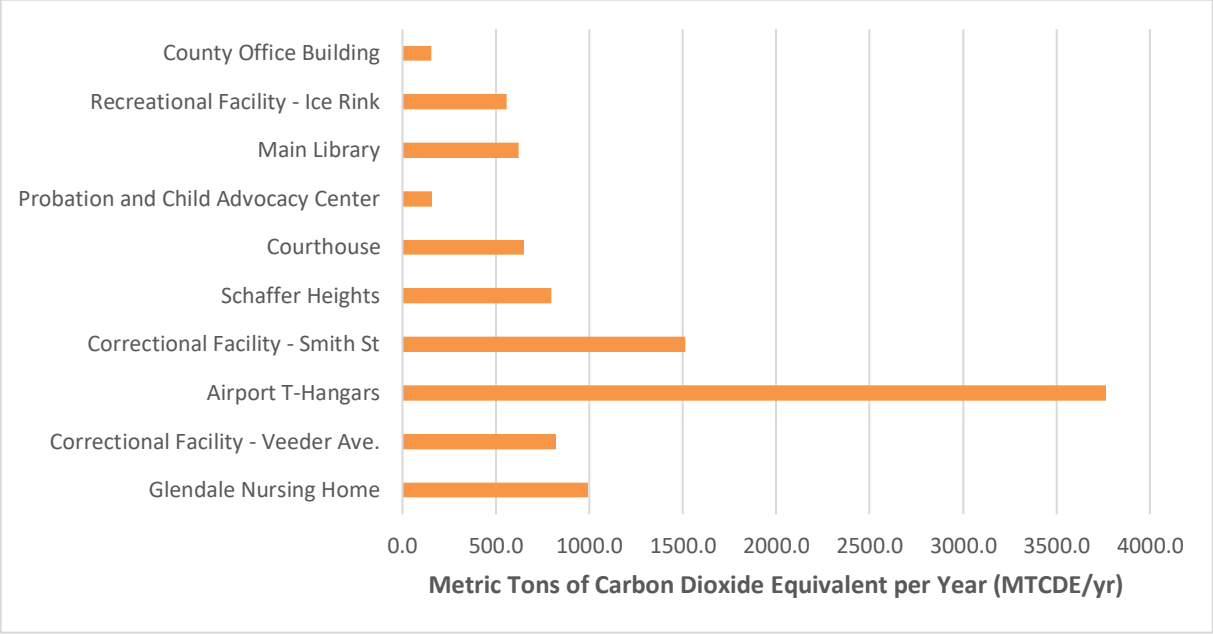
*The listed total does not include solid waste energy use because the County does not use solid waste for fuel purposes at this time

**The listed total does not include streetlight, fleet, or solid waste costs, and the estimated building and facilities cost may not accurately reflect additional energy costs from renewable energy sources

County Buildings and Facilities (83% of GHG Emissions)

County buildings and facilities made up the largest share of GHG emissions at an estimated **8,840 MTCDE in 2021**. Schenectady County operates a total of 35 buildings and facilities that were examined in this study. These facilities consume natural gas and electricity. Figures 3 and 4 show GHG emissions and energy costs for the top ten emitters and costliest buildings and facilities in the County. Of the top 10, the highest sources of emissions were the Glendale Nursing Home, one of the Schenectady County Correctional Facilities, and the County Airport T-Hangars (Figure 3).

Figure 3.
GHG Emissions by Buildings and Facilities (MTCDE) - Top 10



Although not the costliest despite being the highest emitter, the Glendale Nursing Home still is one of the top three costliest facilities in terms of energy costs in 2021. (Figure 4).

Figure 4.

Energy Costs by Buildings and Facilities – Top 10

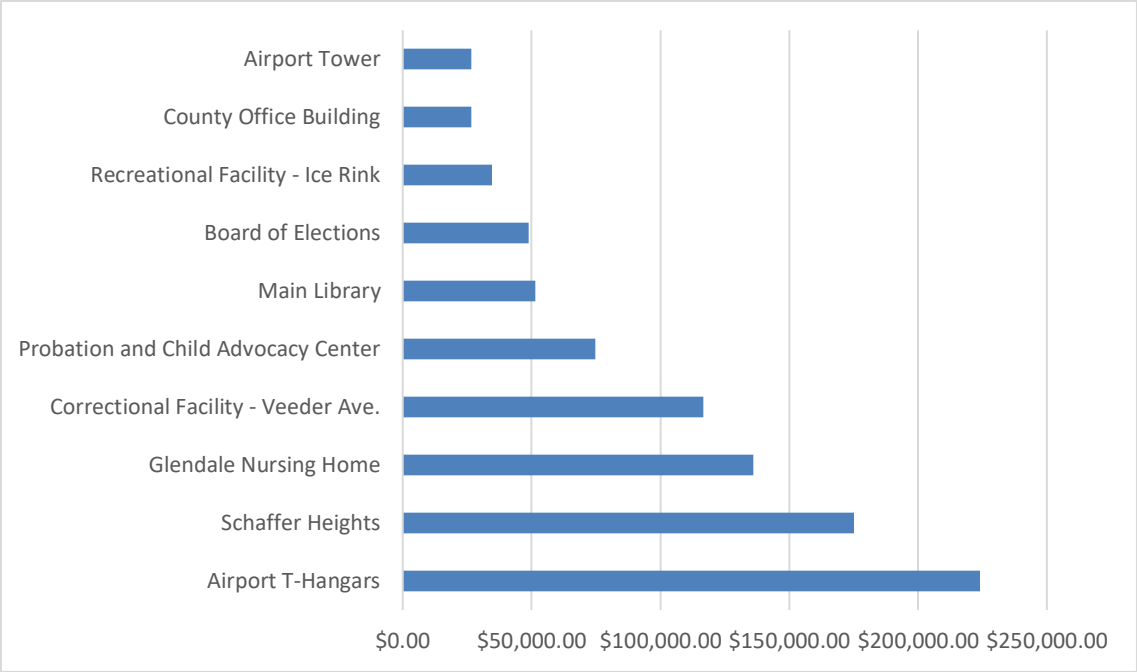


Table 3 lists all 35 County-owned buildings and facilities that were examined in this report, along with the associated emissions, energy use and energy costs. This table is sorted by total energy cost. Most of the facilities in this list are a single building. The data in the building and facility list may not include all the renewable (solar) energy used in various buildings and facilities owned and run by the County.

Table 3. Annual Energy Use, Cost and Emissions for 2021, by County Building or Facility

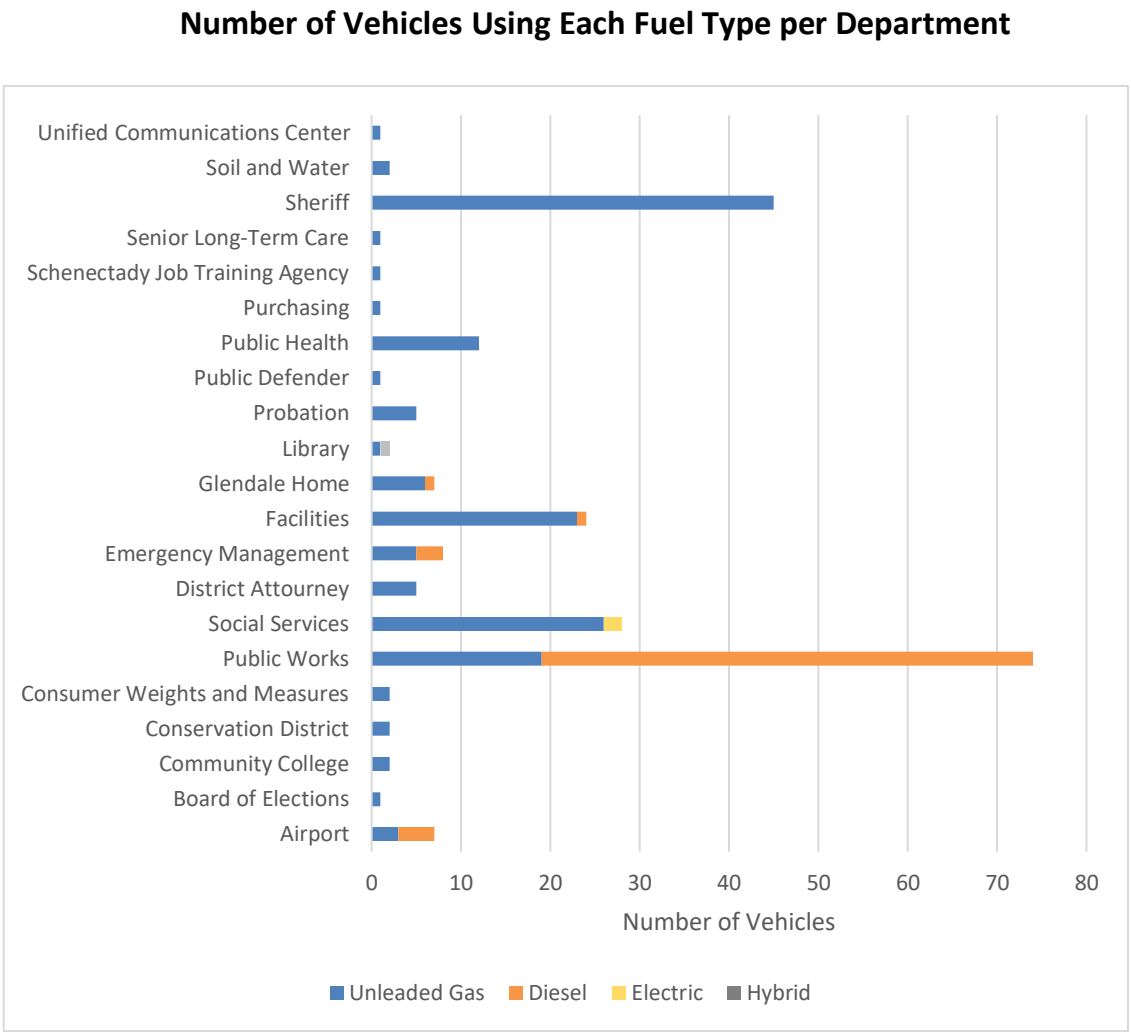
Building or Facility	Electricity (KWh)	Electricity Cost (USD)	Nat. Gas (therms)	Nat. Gas Cost (USD)	GHG Emissions (MTCDE)	Energy Use (MMBtu)	Total Energy Cost (USD)
Airport T-Hangars	1923537	$215,248.47	12672.4	8796.83	993.7	7830.4	$224,045.30
Schaffer Heights	1807518	$173,608.19	3204.7	1536.77	823.3	6487.7	$175,144.96
Glendale Nursing Home	2730387	$101,941.43	203539.2	34260.69	3765.1	29670.0	$136,202.12
Correctional Facility – Veeder Ave.	1589514	$105,134.69	64984.8	11438.55	1512.9	11921.9	$116,573.24
Probation and Child Advocacy Center	353997.8	$44,461.67	50762.2	30197.86	797.4	6284.1	$74,659.53
Main Library	520960	$33,214.69	33525.3	18254.61	651.0	5130.0	$51,469.30
Board of Elections	266411.1	$45,596.41	3250.1	3344.93	156.6	1234.0	$48,941.34
Recreational Facility - Ice Rink	452229.3	$26,539.82	33584.2	8047.83	622.0	4901.4	$34,587.65
County Office Building	1288771	$26,635.51	Not Available	Not Available	558.0	4397.3	$26,635.51
Airport Tower	160461.3	$22,227.91	6811.3	4291.26	155.9	1228.6	$26,519.17
Community Business Center	192291.83	$23,074.14	7988.6	1455	184.7	1455.2	$24,529.14
Highway Garages	286892.7	$18,470.48	21807.2	5125.88	401.0	3159.9	$23,596.36
Department of Social Services	391387.1	$20,298.24	6850.8	2013.58	256.4	2020.5	$22,311.82
County Storage	97870.6	$13,174.83	11350.7	9037.07	186.4	1469.0	$22,211.90
Unified Communications Center	182067.4	$20,317.41	1231.2	514.44	94.5	744.3	$20,831.85
DMV - Current	63221.6	$9,138.19	6031.4	4314.97	103.9	818.9	$13,453.16
Courthouse	Not Available	Not Available	64550.4	13330.23	819.1	6455.0	$13,330.23
Library - Niskayuna Branch	80066.1	$9,617.15	3735.2	2583.85	82.1	646.7	$12,201.00
Correctional Facility - Smith St	Not Available	Not Available	64984.8	11438.45	824.7	6498.5	$11,438.45
Sheriff Substation/EMO	55368.2	$7,131.75	1546.1	819.32	43.6	343.5	$7,951.07
Phyllis Bornt Branch Library & Literacy Center	25490.4	$4,616.07	3249.4	2602.5	52.3	411.9	$7,218.57
Library - Rotterdam Branch	17200.1	$4,576.85	2762.7	2024.89	42.5	335.0	$6,601.74
Library - Glenville Branch	21334.5	$4,127.23	2511.2	1898.37	41.1	323.9	$6,025.61
Mont Pleasant Branch Library	82801.3	$3,986.46	1764.1	871.71	58.2	458.9	$4,858.17
Public Defender's Building	36121.7	$2,819.81	2588	1083.6	48.5	382.0	$3,903.41
Conflict Defender	18658.6	$1,739.17	2863.3	2051.11	44.4	350.0	$3,790.28
Woodlawn Branch Library	13120.9	$2,291.57	2416	1067.94	36.3	286.4	$3,359.51
Soil and Water Office	26634.6	$3,201.92	Not Available	Not Available	11.5	90.9	$3,201.92
Scotia Branch Library	17349.4	$1,550.44	3020.1	1203	45.8	361.2	$2,753.44
Airport Storage	9774.7	$1,821.88	804.1	925.63	14.4	113.8	$2,747.51
Maintenance Shop	12571.4	$1,201.68	2679.4	1130.16	39.4	310.8	$2,331.84
Duanesburg Branch Library	14497.2	$2,051.83	Not Available	Not Available	6.3	49.5	$2,051.83
Public Defender	17457.9	$1,600.47	23	308.15	7.9	61.9	$1,908.62
Highway Offices and Maintenance Facility	9686.2	$954.97	Not Available	Not Available	4.2	33.0	$954.97
Consumer Affairs/Weights and Measures	57.2	$246.04	0	0	0.0	0.2	$246.04
Totals	**12765708.1**	**$952,617.37**	**627091.9**	**$185,969.18**	**13485.2**	**106266.3**	**$1,138,586.56**

Vehicle Fleet (16% of GHG Emissions)

This preliminary view of gasoline and diesel consumption by the County is derived from the County fleet list, particularly which fuel type each fleet vehicle uses and the department that owns and presumably uses the vehicle. This overview does not contain information about the emissions of these vehicles as information regarding fleet usage over the past year was not available at the time of the study.

Overall, most departments with fleets have minimal diesel-based vehicles, with exception being the Public Works Department with 55 diesel-based vehicles (Figure 5). Most of these diesel-based vehicles were heavy-class trucks and other vehicles intended for large transport. This could be an area of priority regarding fleet conversion to electric vehicles.

Figure 5.



Emissions and Energy Costs by Fuel Type

Across all facilities and fleet operations, Schenectady County utilizes four main fuel types: electricity, natural gas, gasoline, and diesel.

The use of electricity accounted for fifty-three percent of the GHG emissions produced by the County, with this taking up the largest portion of GHG emissions produced (Figure 6). This is followed by the usage of natural gas which accounts for thirty-one percent of County GHG emissions (Figure 6). Together the electricity usage and natural gas, which make up eighty-four percent of County emissions, mainly describe building energy usage with some additional energy usage for streetlights. Therefore, future building audits may be of use to identity areas in which County buildings can be improved to reduce energy usage and GHG emissions. The County fleet vehicles which use either gasoline or diesel comprise sixteen percent of County GHG emissions. This significant contribution to emissions from the County fleet may suggest needed fleet upgrades to phase out these vehicles for either electric or hybrid-based vehicles.

County energy costs are mainly tracked for metered electricity and natural gas costs utilized within County buildings and facilities. The County's costs derive primarily from electricity usage, comprising an estimated eighty-four percent of energy costs (Figure 7). Increasing the usage of renewable energy such as the number of solar panels that Schenectady County currently owns and improving building infrastructure to reduce reliance on natural gas could help to decrease these energy costs. Gasoline and diesel costs are not currently tracked by the County and would be beneficial to record to further understand fleet costs and GHG reduction prioritization.

Figure 6.

GHG Emissions by Fuel Type

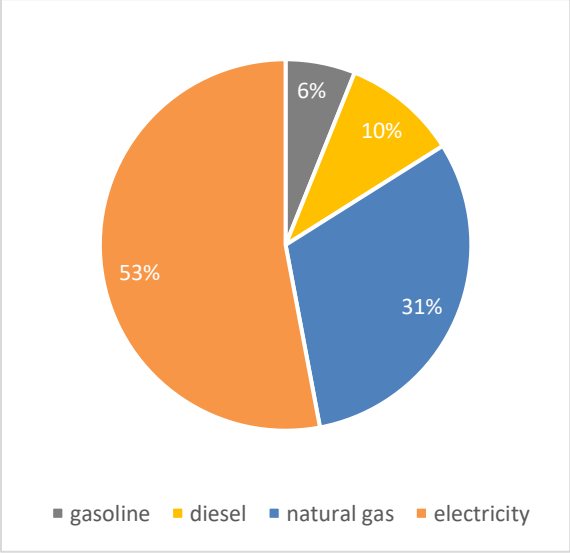
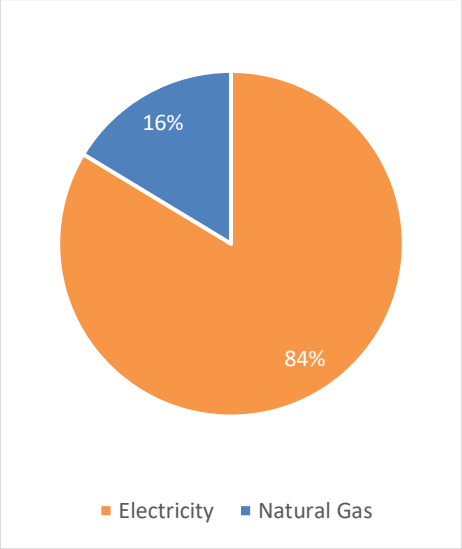


Figure 7.

Energy Cost by Fuel Type



More units of energy were consumed in the form of electricity **(roughly 106,993.3 MMBtu)** than in the form of natural gas **(62,694.2 MMBtu)** (Table 4). The County also spent far more on electricity costs **(over $950 thousand)** (Table 4), than on natural gas. The average cost per MMBtu for electricity in 2021 was **$9.15**, and for natural gas it was **$2.97**, making the cost of electricity roughly 3 times higher than natural gas. It is important to note that Schenectady County also uses solar energy deriving from its many solar panels installed throughout the County. The energy derived and costs from the solar panels were a part of these cost average calculations and may influence the average cost per MMBtu of electricity within the County.

Table 4. Annual Energy Use, Cost and Emissions for 2021, by Fuel Type

Fuel Type	GHG Emissions (MTCDE)	Energy Use (MMBtu)	Energy Cost (USD)
Electricity	5,672	106,993.3*	$952,617.37**
Natural Gas	3,318	62,694.2	$185,969.18
Diesel	1,068.9	20163.1	-
Gasoline	650	12,261.2	-
Totals	**10,708.9**	**202,111.8***	**$1,138,586.55*****

*Schenectady County also uses solar energy which is only partially accounted for in this number.
**Solar energy are only partially included in this estimated cost and streetlight costs are not included at all.
***Some solar energy, streetlight, and fleet fuel (gasoline and diesel) costs are not included in this count.

Next Steps and Recommendations

Schenectady County's CSC team should incorporate this data into its policy making for future sustainability measures and for enhancing other documents such as the County's Climate Action Plan. Other recommendations regarding improvement to the GHG inventory and future actions include:

- A detailed assessment of vehicles and their use in the County use is recommended to understand which vehicles are the highest GHG emitters and which are the costliest.
- Assign roles to regularly track fleet emissions and cost of fleet fueling per vehicle for ease of study and to assign priority to higher emitting and costly vehicles to be replaced with more sustainable and electric fleet vehicles.
- Conduct walkthroughs of municipal buildings to identify inefficiencies in energy usage that could be contributing to the emissions produced by the County. These identified inefficiencies will be used to set priorities in building renovations.
- Incorporate streetlight, solid waste, and solar energy costs into further studies to get better estimates on County functions and spending.
- Measure and track the usage of electricity generated by County solar panels to create a more wholistic dataset regarding the economic and ecological impacts of Schenectady County's gradual move towards renewable energy.
- Measure and track refrigerant use in County buildings and facilities to evaluate GHG emissions generated from this source.
- After 2021, Schenectady County changed its streetlights from being HID-based to LED-based. This change to LED would affect GHG emissions deriving from County streetlights. Future emissions inventories should take note of this lighting switch when comparing streetlight emissions to this 2021 baseline year to understand the benefit of the County's sustainability measures.
- Expand studies to include emissions caused by County-run events to evaluate waste generated from this programing.