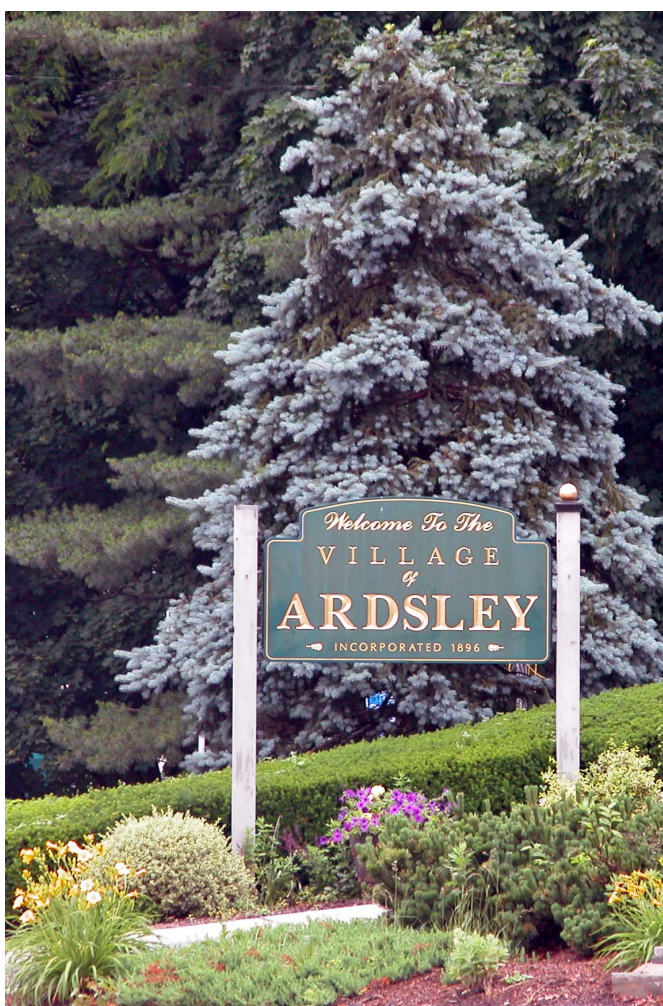




# Village of Ardsley

## 2019 Inventory of Government Operations Greenhouse Gas Emissions

June 2021



**Produced by the Village of Ardsley's Climate Smart Communities Task Force**  
With Assistance from ICLEI – Local Governments for Sustainability USA

# Credits and Acknowledgements

## **Village of Ardsley**

This report was prepared by Asha Bencosme, Ardsley's Climate Smart Communities Coordinator. The author would like to thank the Village of Ardsley Staff, specifically, Charles Hessler and Theresa Del Grosso for providing the local information necessary for the completion of this report, and would like to make the following additional acknowledgements:

## **Village of Ardsley**

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# Executive Summary

The Village of Ardsley recognizes that 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. Furthermore, the Village of Ardsley has multiple opportunities to benefit by acting quickly to reduce community GHG emissions. These benefits include reducing energy and transportation costs for residents and businesses, improving the health of residents and making our community a more attractive place to live and do business.

To demonstrate its commitment to addressing the growing threat of climate change, in February of 2010 the Village of Ardsley became a registered Climate Smart Community by formally adopting the New York State Climate Smart Communities (CSC) pledge comprised of the following ten elements:

1. Build a climate-smart community;
2. Inventory emissions, set goals, and plan for climate action;
3. Decrease energy use;
4. Shift to clean, renewable energy;
5. Use climate-smart materials management;
6. Implement climate-smart land use;
7. Enhance community resilience to climate change;
8. Support a green innovation economy;
9. Inform and inspire the public;
10. Engage in an evolving process of climate action;

The CSC program, administered by the New York State Department of Environmental Conservation (DEC), is a certification program that provides a robust framework to guide the actions local governments can take to reduce GHG emissions and adapt to the effects of climate change. The first step in this process is to perform a GHG inventory for all buildings, vehicles, and operations controlled by the local government. Using data from 2019, this GHG inventory provides a baseline from which the Village can set emissions reduction goals, determine ways in which those goals can be reached, and track progress.

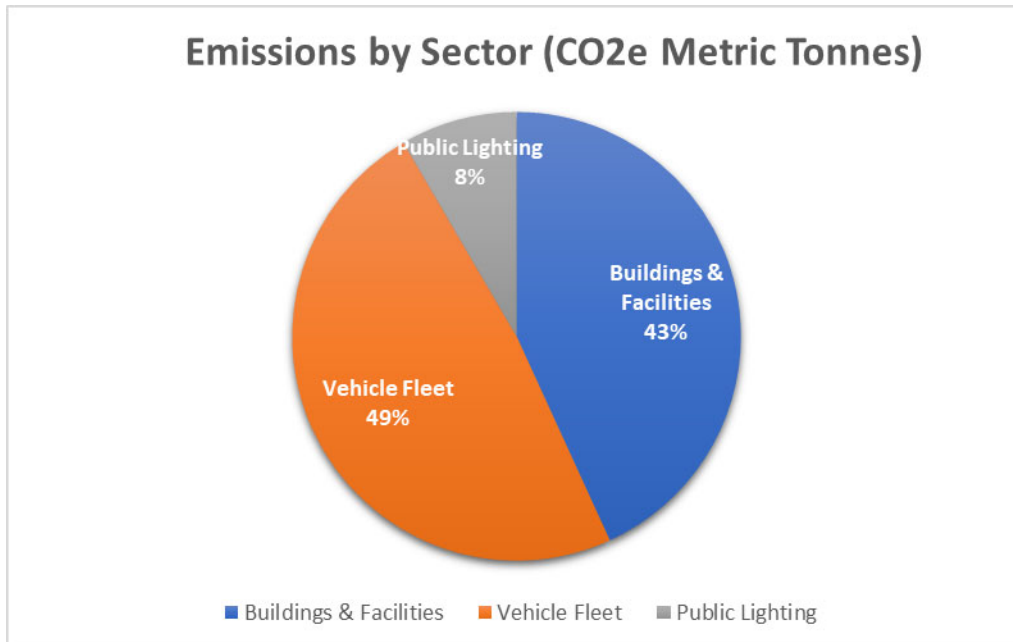
This report provides estimates of greenhouse gas emissions specifically from Ardsley's 2019 government operations. To create this inventory, data for the Village's fuel and electricity use was collected and reviewed. The data was generated from electric and natural gas bills for all Village-owned buildings and operations, as well as fuel records for the Village's vehicle fleet. The GHG emissions for all local government operations are measured in metric tons of CO<sub>2</sub> equivalents (CO<sub>2</sub>e) and were calculated using emission factors published by the U.S. Environmental Protection Agency (EPA) and ICLEI's ClearPath software platform.

# Key Findings

In 2019, GHG emissions from Ardsley's government operations totaled 535 metric tonnes (MT) CO<sub>2</sub>e. Figure 1 shows the emissions for government operations broken down by sector. The Village's vehicle fleet sector accounted for the largest percentage of GHG emissions at 49%. The second largest contributor is the Village's buildings and facilities with 43% of emissions. It is recommended that actions to reduce emissions in both of these areas should be a key part of the Village's climate action plan. Streetlights and traffic signals were responsible for the remainder of local government operation emissions at 8% of emissions.

The Inventory Results section of this report provides a detailed profile of emissions sources within the Village of Ardsley. This information will be key to guiding local reduction efforts. This data will also provide a baseline from which the Village will be able to compare future performance and demonstrate progress in reducing emissions.

**Figure 1: Village of Ardsley's Government Operations Emissions by Sector (MT CO<sub>2</sub>e)**



# Climate Change Background

Naturally occurring gases dispersed in the atmosphere determine the Earth's climate by trapping solar radiation. This phenomenon is known as the greenhouse effect. Overwhelming evidence shows that human activities are increasing the concentration of greenhouse gases and changing the global climate. The most significant contributor is the burning of fossil fuels for transportation, electricity generation and other purposes, which introduces large amounts of carbon dioxide and other greenhouse gases into the atmosphere. Collectively, these gases intensify the natural greenhouse effect, causing global average surface and lower atmospheric temperatures to rise.

The Village of Ardsley could be impacted by increased frequency of extreme weather events including heat waves, droughts, powerful storms and flooding from the Saw Mill River in the future. Other expected impacts in New York include frequent and damaging storms accompanied by flooding and landslides, summer water shortages as a result of reduced snowpack, increased wildfires, and the disruption of ecosystems, habitats, and agricultural activities.

Reducing fossil fuel use in the community can have many benefits in addition to reducing greenhouse gas emissions. More efficient use of energy decreases utility and transportation costs for residents and businesses. Retrofitting homes and businesses to be more efficient creates local jobs. In addition, money not spent on energy is more likely to be spent at local businesses and add to the local economy. Reducing fossil fuel use improves air quality and increases opportunities for walking and bicycling improves residents' health.

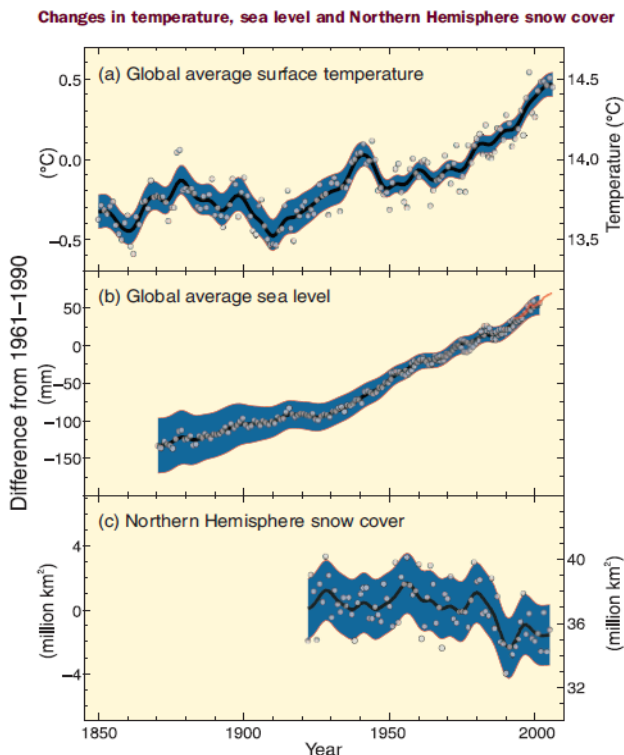
## Evidence of Human-Caused Climate Change

There is overwhelming scientific consensus that the global climate is changing, and that human actions, primarily the burning of fossil fuels, are the main cause of those changes. The Intergovernmental Panel on Climate Change (IPCC) is the scientific body charged with bringing together the work of thousands of climate scientists. The IPCC's Fourth Assessment Report states that "warming of the climate system is unequivocal."<sup>1</sup> Furthermore, the report finds that "most of the observed increase in global average temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic GHG concentrations."

2020 was the hottest year on record for the continental United States. The steady uptick in average temperatures is significant and expected to continue if action is not taken to greatly reduce greenhouse gas emissions.

### ICLEI Climate Mitigation Program

In response to the problem of climate change, many communities in the United States are taking responsibility for addressing emissions at the local level. Since many of the major sources of greenhouse gas emissions are directly or indirectly controlled through local policies, local governments have a strong role to play in reducing greenhouse gas emissions within their boundaries. Through proactive measures around land use patterns, transportation demand management, energy efficiency, green building, waste diversion, and more, local governments can dramatically reduce emissions in their communities. In addition, local governments are primarily responsible for the provision of emergency services and the mitigation of natural disaster impacts.



**Figure 2: Observed changes in global temperature, sea level and snow cover**

<sup>1</sup> IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.



ICLEI provides a framework and methodology for local governments to identify and reduce greenhouse gas emissions, organized along Five Milestones:

1. Conduct an inventory and forecast of local greenhouse gas emissions;
2. Establish a greenhouse gas emissions reduction target;
3. Develop a climate action plan for achieving the emissions reduction target;
4. Implement the climate action plan; and,
5. Monitor and report on progress.



**Figure 3: ICLEI Climate Mitigation Milestones**

This report represents the completion of ICLEI's Climate Mitigation Milestone One for government operations and provides a foundation for future work to reduce greenhouse gas emissions in the Village of Ardsley.

### **Sustainability & Climate Change Mitigation Activities in the Village of Ardsley**

The Village of Ardsley has already implemented programs that have or will lead to ancillary benefits in the form of energy conservation and greenhouse gas mitigation.

Local initiatives by the Village government include:

- Converted all streetlights to LED lights by November 2018
- Joined Community Choice Aggregation from 2019, with an opt-in to 100% renewable energy
- Installed solar panels with annual generation capacity of 25kW on the Ardsley Fire House
- Committed to educating residents on how to reduce emissions by 50% by 2030



# Inventory Methodology

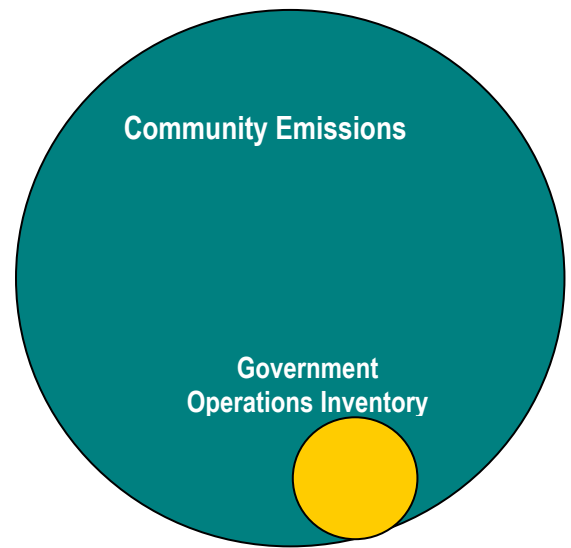
## Understanding a Greenhouse Gas Emissions Inventory

The first step toward achieving tangible greenhouse gas emission reductions requires identifying baseline emissions levels and sources and activities generating emissions in the community. This report presents emissions from operations of the Village of Ardsley government. The Village of Ardsley is focusing first on government operations emissions in order to lead by example and may inventory community-wide emissions in a future report. The government operations inventory is mostly a subset of the community inventory, as shown in figure 4. For example, data on commercial energy use by the community includes energy consumed by municipal buildings, and community vehicle-miles-traveled estimates include miles driven by municipal fleet vehicles.

As local governments have continued to join the climate protection movement, the need for a standardized approach to quantify GHG emissions has proven essential. This inventory uses the approach and methods provided by the Local Government Operations Protocol (LGO Protocol), which is described below.

### Approach

This inventory was developed using the approach and methods provided by the Local Government Operations Protocol (LGO Protocol) developed by ICLEI, the California Air Resources Board (CARB), the California Climate Action Registry, and The Climate Registry. The LGO Protocol serves as the national standard for measuring and reporting GHG emissions associated with local government operations. It provides the principles, approach, methodology, and procedures necessary to develop a complete, transparent, and accurate reporting of a local government's GHG emissions.



**Figure 4: Relationship of Community and Government Operations Inventories**

## Emissions Scopes

For the government operations inventory, emissions are categorized by scope. Using the scopes framework helps prevent double counting. There are three emissions scopes for government operations emissions:

- **Scope 1:** All direct emissions from a facility or piece of equipment operated by the local government. Examples include tailpipe emissions from local government, and emissions from a furnace in a local government building.
- **Scope 2:** Indirect emissions associated with the consumption of purchased or acquired electricity, steam, heating, and cooling.
- **Scope 3:** All other indirect or embodied emissions not covered in Scope 2. Examples include contracted services, embodied emissions in good purchased by the local government, and emissions associated with disposal of government generated waste.

Scope 1 and Scope 2 emissions are the most essential components of a government operations greenhouse gas analysis as they are the most easily affected by local policy making. Under the DEC's CSC program, tracking Scope 3 emissions is encouraged, but optional. Scope 3 emissions data was not available for this inventory, however, the Village hopes to ensure that the necessary data is available for government operations GHG inventories moving forward. Some examples of Scope 3 data that the Village could track include solid waste generated by the Village, as well as accounting for the number of miles travelled by Village employees as part of their daily commute.

## Base Year

The inventory process requires the selection of a base year with which to compare current emissions. The Village of Ardsley's community greenhouse gas emissions inventory utilizes **2019** as its base year. The Village felt that this was the most recent year under which the Village was operating under more typical circumstances. During 2020, the world was affected by the coronavirus pandemic which affected all government operations, with limited staff in the office for a number of months resulting in lower electricity and gas use as well as vehicle miles traveled. This was highly unusual and using 2020 as a base year would not include emissions produced during the normal course of operations.

## Quantification Methods

Greenhouse gas emissions can be quantified in two ways:

- Measurement-based methodologies refer to the direct measurement of greenhouse gas emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility.
- Calculation-based methodologies calculate emissions using activity data and emission factors. To calculate emissions accordingly, the basic equation below is used: *Activity Data x Emission Factor = Emissions*

All emissions sources in this inventory are quantified using calculation-based methodologies. Activity data refer to the relevant measurement of energy use or other greenhouse gas-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. To obtain this data, the Village gathered and reviewed all electricity and natural gas bills for the Village's Con Edison and Power Authority of the State of New York (PASN) accounts, as well as fuel records for gasoline and diesel used to power the Village's vehicle fleet.

Calculations for this inventory were made using ICLEI's ClearPath software platform. Data was first measured in kWh for grid electricity, therms for natural gas, and gallons for gasoline and diesel used for vehicles. Using the ClearPath tool, this data was multiplied by emission factors published by the EPA in order to convert the energy usage, or other activity data, into quantified emissions. Different emission factors were used based on the fuel type, vehicle class, and eGRID subregion, which in this case is the NYCW (NPCC NYC/Westchester) subregion.

The GHG emissions in this inventory are measured in metric tons of CO<sub>2</sub> equivalents (CO<sub>2</sub>e). In order to measure all greenhouse gases, especially non-CO<sub>2</sub> gases, in a common term that indicates their relative strength of the greenhouse effect they have in the atmosphere, the ClearPath tool applies multipliers, referred to as Global Warming Potentials (GWP), to all greenhouse gases emitted. This ensures results are presented in consistent and uniform terms. The GWP values used in this inventory are those published in the IPCC's 5th Assessment Report.

# Government Operations Emissions Inventory Results

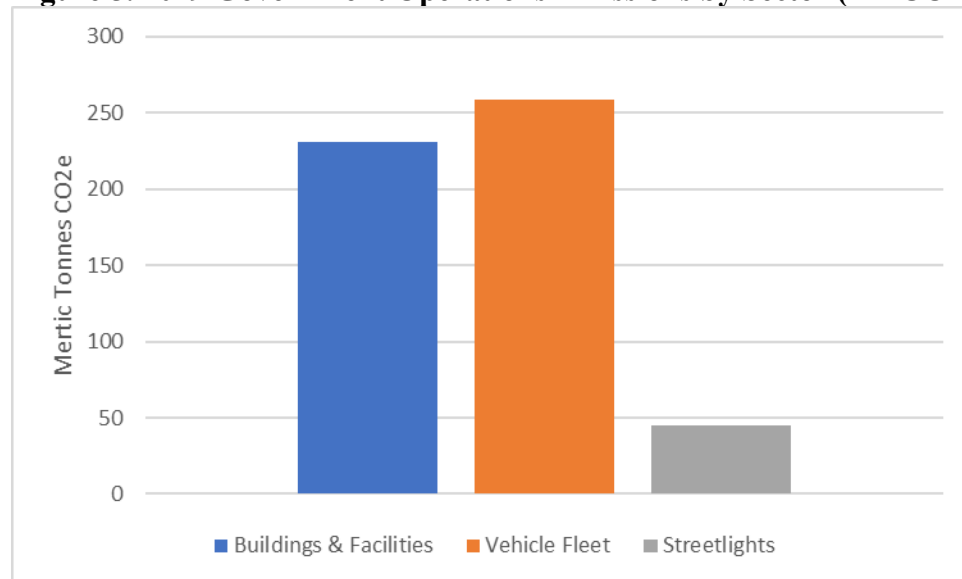
## Emissions by Sector

For developing emissions reduction policies, it is often most useful to look at emissions broken down by sector, as each sector will have a particular set of strategies to reduce emissions. Table 1 and Figure 5 show the Village of Ardsley's government operations emissions broken down by sector, while the remainder of this section breaks down these emissions in further detail within each sectors.

**Table 1: Government Operations Emissions by Sector**

Sector	metric tons CO <sub>2</sub> e
Buildings and Facilities	231
Vehicle Fleet	259
Public Lighting	45
<b>Totals</b>	<b>535</b>

**Figure 5. 2019 Government Operations Emissions by Sector (MTCO<sub>2</sub>e)**



## Vehicle Fleet

Vehicles were the largest source of government operations emissions, with a total of 259 Metric Tonnes of CO<sub>2</sub>e. In 2019, the Village of Ardsley operated a vehicle fleet with 35 vehicles. Table 2 shows vehicle emissions and fuel cost by fuel type.

The Village of Ardsley spent \$92,304 on vehicle fuel in 2019. There may be opportunities to reduce costs through fuel efficiency and trip reduction measures.

**Table 2: Local Government Vehicle Fleet Emissions by Fuel Type**

Source	metric tons CO <sub>2</sub> e	Consumption (gal)	Cost (\$)
Gasoline	109	12,434	40,642
Diesel	150	14,663	51,662
<b>Totals</b>	<b>259</b>	<b>27,097</b>	<b>\$92,304</b>

Table 3 shows vehicle emissions and fuel cost by department. This information will be helpful in engaging department directors to identify strategies to reduce vehicle fuel use.

**Table 3: Vehicle Emissions and Fuel Cost by Department**

Department	metric tons CO <sub>2</sub> e	Fuel Cost
Public Works	162	\$25,253
Fire	29	\$10,750
Police	68	\$56,301
<b>Total</b>	<b>259</b>	<b>\$92,304</b>

## Buildings & Facilities

After Vehicles, Buildings and facilities were the next largest sector of government operations emissions. Table 4 shows building emissions by Village department building. Table 4 does not include an additional 5 metric tonnes of CO<sub>2</sub>e from grid transmission and distribution losses. With these emissions included, the total buildings related emissions totaled to 236 MT of CO<sub>2</sub>e.

Table 4 shows building emissions by department. This information will be helpful in engaging department leaders to identify strategies to reduce energy use. Table 4 also shows building energy cost by department. The Village of Ardsley spent \$89,235 on building energy use in 2019. There may be opportunities to reduce costs through building energy conservation measures.

**Table 4: Building Emissions and Energy Cost by Building**

Department	metric tons CO <sub>2</sub> e	Energy Cost
Village Hall	46	\$19,752
Highway Garage	40	\$12,448
Firehouse	86	\$30,978
Public Library	34	\$15,881
Community Center	25	\$10,176
<b>Totals</b>	<b>231</b>	<b>\$89,235</b>

Table 5 shows buildings sector emissions by source. Electricity use is the largest source of buildings emissions, followed by natural gas use.

**Table 5: Buildings Emissions by Source**

Source	metric tons CO <sub>2</sub> e
Electricity	107
Natural Gas	124
<b>Totals</b>	<b>231</b>

Table 6 shows the five individual buildings with the highest emissions. These buildings may present particularly cost-effective energy reduction opportunities.

**Table 6: Five Largest Contributors to Emissions from Buildings Sector**

Facility	Metric Tons CO <sub>2</sub> e	% of Building Sector Emissions	Energy Cost
Fire house	86	37%	\$30,978
Village Hall	46	20%	\$19,752
Highway Garage	40	17%	\$12,448
Public Library	34	15%	\$15,881
Community Center	25	11%	\$10,176
<b>Totals</b>	<b>231</b>	<b>100%</b>	<b>\$89,235</b>

## Public Lighting

Like most local governments, Ardsley operates a range of public lighting including street lighting, parking lot lighting, and holiday lighting. The Village tracks lighting owned by the Village, as opposed to those owned by the County. In order to improve accuracy and provide a better representation of CO<sub>2</sub> in future inventories, the Village should isolate data for each type of lighting to better account for the consumption of each specific type of use. Table 7 shows emissions from Ardsley's public lighting totaled 43 MT CO<sub>2</sub>e. Table 7 does not include an additional 2 metric tons of CO<sub>2</sub>e from grid transmission and distribution losses. With these emissions included, the total lighting related emissions are 45 MT CO<sub>2</sub>e. Streetlights were the largest contributor to public lighting emissions, although, as of 2019, the Village has converted all of Ardsley's streetlights to Light Emitting Diodes or LEDs. As a result, the current GHG inventory is reflecting a significant reduction in energy use and emissions from the public lighting sector than there would have been had this conversion not taken place.

Table 7 shows public lighting emissions and energy cost by location. Street lighting was the largest contributor to lighting sector emissions. New technologies, in particular Light Emitting Diodes or LEDs were installed on all streetlights and have provided a very good payback on investment.

**Table 7: 2019 Public Lighting Emissions by Location (MT CO<sub>2</sub>e)**

Street Lighting Location	Metric Tons CO <sub>2</sub> e	% of Sector Emissions	Cost (\$)
2019 NYPA Streetlights Meter ***056*****	28	68%	\$29,241
19 American Legion Drive	5	11%	\$4,610
2019 Bridge Street Lights	3	7%	\$4,476
1 Heatherdell Road	3	6%	\$2,609
2019 NYPA Street Lights Meter ***156*****	2	4%	\$1,761
Ashford Ave & Park	1	3%	\$1,660
2019 Festive Lights	1	1%	\$898
<b>Totals</b>	<b>43</b>	<b>100%</b>	<b>\$45,255</b>



# Conclusion

This inventory marks completion of Milestone One for government operations (i.e. “Conduct an inventory and forecast of local greenhouse gas emissions”) of the Five Milestones for Climate Mitigation that are part of the ICLEI Framework. The next steps are to set an emissions reduction target, and to develop a climate action plan that identifies specific quantified strategies that can cumulatively meet that target. In the meantime, the Village of Ardsley will continue to track key energy use and emissions indicators on an on-going basis. ICLEI recommends conducting a new inventory at least every five years to measure emissions reduction progress.

Future, emissions reduction strategies for the Village of Ardsley to consider for its climate action plan include increasing energy efficiency and renewable energy investments and infrastructure, as well as vehicle fuel efficiency. Other key data points to collect and track might include: waste and wastewater emissions, water delivery rates, government employee vehicle trips and employee commuter miles, as well as solid waste collection rates. This will capture both direct and indirect emissions related to operations. Many local government operations generate solid waste, much of which is eventually sent to a landfill. Typical sources of waste in local government operations include paper and food waste from offices and facilities, construction waste from public works, and plant debris from parks departments.

This inventory shows that it will be particularly important to focus on energy efficiency in Village facilities and buildings and fuel use. The Village should also incorporate the suggestions mentioned throughout this report for tracking additional information into departmental protocols to ensure future GHG inventories are as complete and accurate as possible. Both ICLEI and the Ardsley Climate Smart Communities Task Force recommend conducting a new inventory at least every five years to measure emissions reduction progress. Through these efforts and others, the Village of Ardsley can achieve additional benefits beyond reducing emissions, including saving money and improving the economic vitality and quality of life in the Village.