Town of Bethlehem Greenhouse Gas Inventory for Government Operations
2022-2023 Summary Report

Prepared in partnership with the Capital District Regional Planning Commission

February, 2025

BACKGROUND

The Town of Bethlehem Board approved Resolution No. 20 on April 22, 2009 to become a Climate Smart Community (CSC). An action item in the CSC Certification process is *PE2 Action: Government Operations GHG Inventory.*

This GHG Inventory for Government Operations Report summarizes the GHG emissions from the Town of Bethlehem's consumption of energy and materials within town-owned buildings, vehicle fleets, and outdoor lighting.   Developing this GHG Inventory is the first step towards tangible climate action, the development of a Climate Action Plan (CAP), and enabling the Town to identify realistic goals and track progress towards reducing operation costs, energy use and GHG emissions.

DATA GATHERING AND METHODOLOGY

The town gathered their energy use data for 2022 and 2023 and compiled data input with the help of the Capital District Regional Planning Commission. The GHG Inventory spreadsheet used was developed by Climate Action Associates, LLC.

The inventory includes Scope 1 and Scope 2 GHG emissions from government operations, as defined below. The CSC optional Scope 3 Other Indirect GHG emissions (such as town employee commuting) are not included because they are introduce a minimal amount of emissions relative to other Town of Bethlehem GHG sources, so they don't justify the work required to obtain this data. Scope 3 is optional in the NYS Department of Environmental Conservation's Climate Smart Communities Program.

LIST OF ACRONYMS
CAP = Climate Action Plan
CSC = Climate Smart Community
EIA = Environmental Investigation Agency
EPA = Environmental Protection Agency
GHG = Greenhouse Gas
MTCO2e= Metric Tons of Carbon Dioxide Equivalent

- **Scope 1**: Direct GHG emissions from government-owned vehicles and onsite fuel combustion (natural gas, propane, and fuel oil) for town buildings and fleet. Additionally, wastewater treatment processes including methane and nitrous oxide released during biological breakdown of organic matter in the sewage.

- **Scope 2**: Indirect GHG emissions from purchased electricity for town buildings, electric vehicles, and streetlights.

Baseline Year

The inventory process requires the selection of a baseline year. Local governments examine the range of data they have over time and select a year that has the most accurate and complete data for all key emission sources. It is also preferable to establish a base year several years in the past to be able to account for the emissions benefits of recent actions. A local government's emissions inventory should comprise all greenhouse gas emissions occurring during the selected baseline year. The data collected for this inventory represents years 2022-2023, using the average of the two years as a baseline.

<u>Quantification Methods</u>

Greenhouse gas emissions in this inventory are quantified using calculation-based methodologies. Calculation-based methodologies calculate emissions using activity data and emissions factors. To calculate emissions accordingly, the basic equation is used:

Activity Data x Emissions Factor$_{(Fuel, GHG)}$ = GHG Emissions$_{(Fuel, GHG)}$

Activity data refer to the relevant measurement of energy use or other greenhouse has-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. To obtain this data, the town gathered and reviewed all **electricity, natural gas, and fuel oil** bills for the town's accounts, as well as fuel records for gasoline and diesel used to power the town's vehicle fleet. The wastewater treatment plant's nitrous oxide emissions were also calculated based on the Town's overall sewer district population; the Town does not collect specific data on nitrous oxide as this is not a requirement of their New York State Pollution Discharge Elimination System permit.

Calculations for this inventory were made using Climate Action Associates' GHG Inventory Tool. Data was first measured in kWh for grid electricity, therms for natural gas, and gallons for gasoline, fuel oil, and diesel. Using the Climate Action Associates tool, this data was multiplied by emission factors published by the federal Environmental Protection Agency (EPA) and the nonprofit Environmental Investigation Agency (EIA) to convert the energy usage, or other activity data in quantified emissions.

<u>Emissions Factors</u>

Each GHG has an emission factor unique to each fuel. The electricity emission factor is based on the EPA eGRID subregion, which in this case is NY Upstate. The natural gas, heating oil/diesel, and gasoline emissions factors are taken from the EIA database on carbon dioxide emissions coefficients. The GHG emissions in this inventory are measured in metric tons of CO2 equivalents (MTCO2e).

<u>Facilities Master List</u>

A key step in creating the GHG inventory is to compile a facility master list that includes the **town's buildings** (including streetlights) that use at least one form of energy. Each was assigned to a category to indicate the type of infrastructure and then similar facilities along with their energy use.

The table below shows the Town buildings and energy providers included in the Bethlehem GHG Inventory:
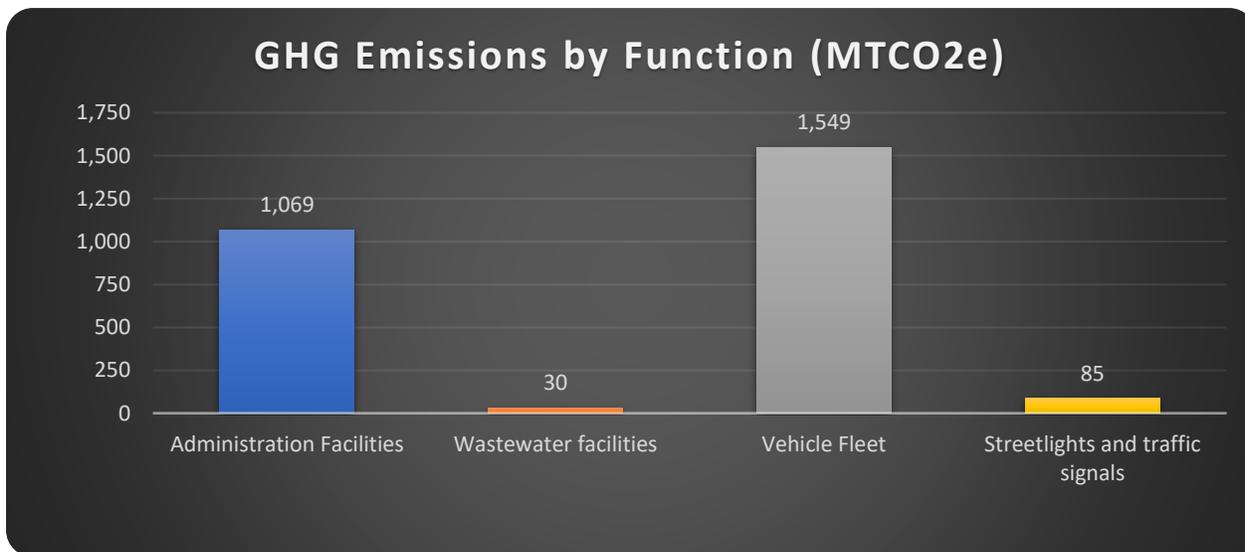
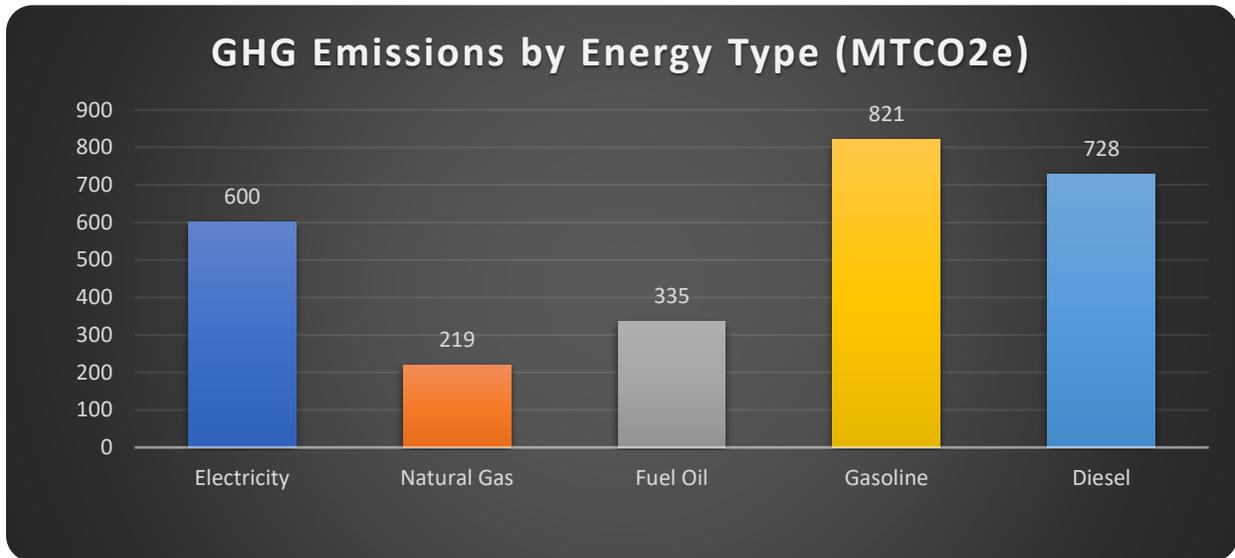| Town Building	Energy Providers	Town Building	Energy Providers
Ambulance Building	National Grid (electricity)	Parks Admin Building	National Grid (electricity)
Clapper Rd Water Treatment Plant	National Grid (electricity) Global Montello (fuel oil)	Parks Pool Complex	National Grid (electricity)
Highway Garage	National Grid (electricity) Global Fuels (fuel oil)	Public Works Field Operations	National Grid (electricity)
Highway Satellite Building	National Grid (electricity)	Town Hall	National Grid (electricity)
Historic Cedar Hill Schoolhouse	National Grid (electricity)	Wastewater Treatment Plant	National Grid (electricity) Global Montello (fuel oil)
New Salem Water Treatment Plant	National Grid (electricity) Global Montello (fuel oil)	Streetlights	National Grid (electricity)

KEY FINDINGS

The average GHG emissions produced by the Town of Bethlehem's municipal operations from 2022-2023 was 2733 MTCO2e. The largest energy user and source of GHG emissions in Bethlehem is the Vehicle Fleet, which produces an average of 1,549 MTCO2e of GHG emissions annually and contributes to 57% of the Town's total GHG emissions. As shown in the graph below, the highest administrative facility use is by town Buildings with 1,069 tons on average.

Facility GHG Emissions (MTCO2e)

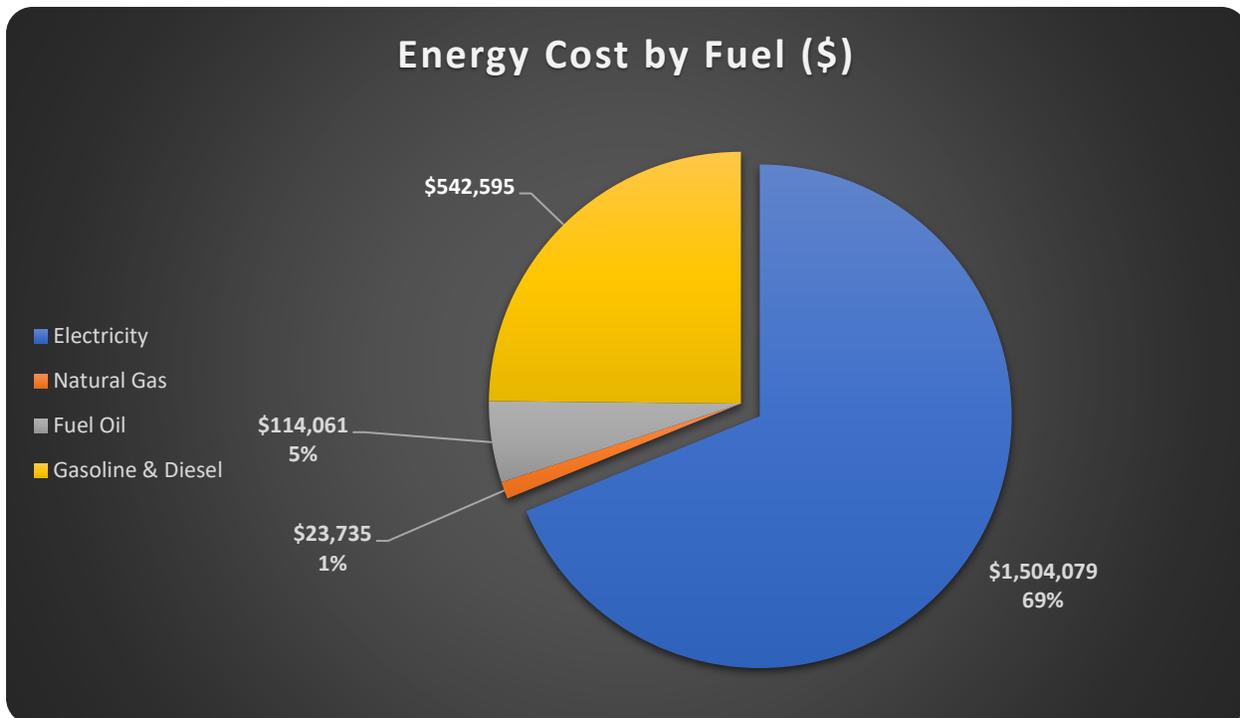Buildings: 1,069
Streetlights: 85
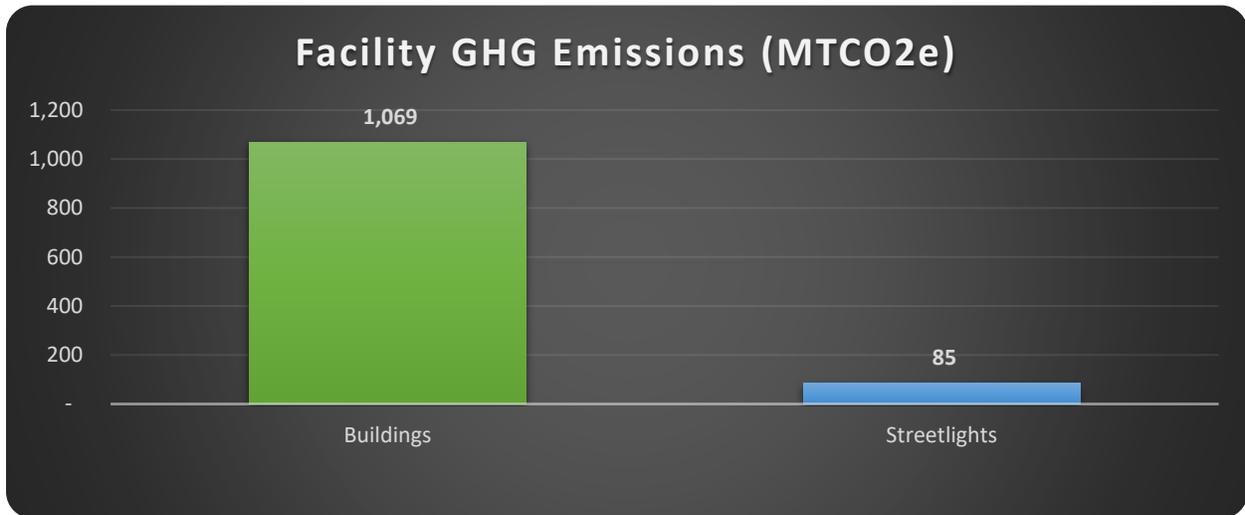
As noted below, energy used by their Vehicle Fleet averaged 1,549 tons of GHG emissions – 821 tons for gasoline and 728 tons for diesel. The chart below illustrates how Vehicle Fleet emissions compare to other facilities by function.

GHG Emissions by Function (MTCO2e)

Administration Facilities: 1,069
Wastewater facilities: 30
Vehicle Fleet: 1,549
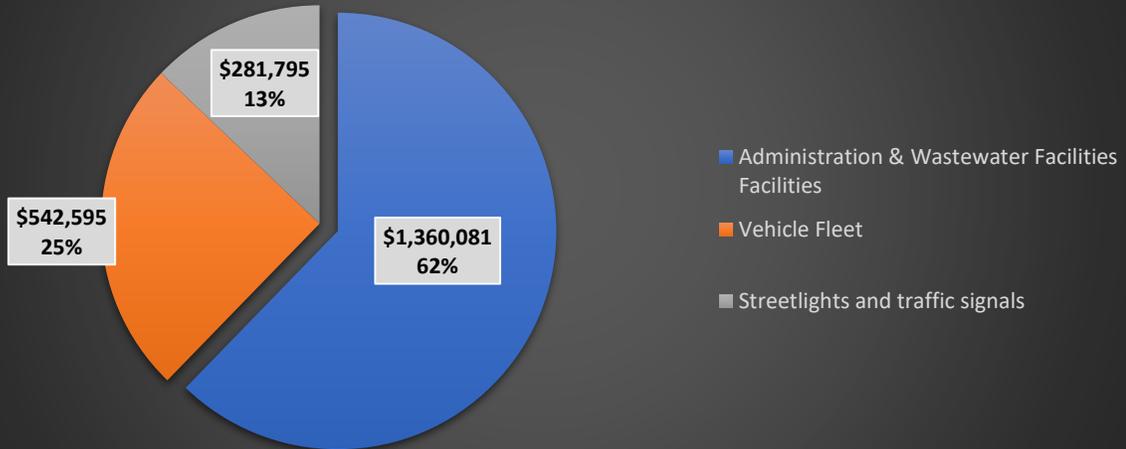Streetlights and traffic signals: 85

Gasoline outweighs all other energy types as far as GHG emissions tons are concerned, at about 30% of the town's GHG emissions by energy type. The chart below shows the breakdown of emissions by energy type.

GHG Emissions by Energy Type (MTCO2e)

Energy Type	Emissions
Electricity	600
Natural Gas	219
Fuel Oil	335
Gasoline	821
Diesel	728

The Town spends an average of $2,184,470 annually on energy for facilities and operations. The annual costs for fuel type and administrative function are broken down in the charts below.

Energy Cost by Fuel ($)

- Electricity: $1,504,079 — 69%
- Natural Gas: $23,735 — 1%
- Fuel Oil: $114,061 — 5%
- Gasoline & Diesel: $542,595

Energy Cost by Administrative Function ($)

- Administration & Wastewater Facilities Facilities: $1,360,081 (62%)
- Vehicle Fleet: $542,595 (25%)
- Streetlights and traffic signals: $281,795 (13%)

GHG emissions were 2,749 tons in 2022 and 2,717 tons in 2023 – a difference of 32 tons. Streetlights and traffic signals in particular decreased from 90 tons to 80 tons during this time frame. The reason for this decrease is unclear, as streetlights in Bethlehem are owned and maintained by National Grid, but likely is due to a combination of conversion of older bulbs to LEDs and lights being out of service. Overall, Buildings and Vehicle Fleet usage remained the same.

Annual GHG emissions (MTCO2e)

| Year	MTCO2e
2022	2,749
2023	2,717
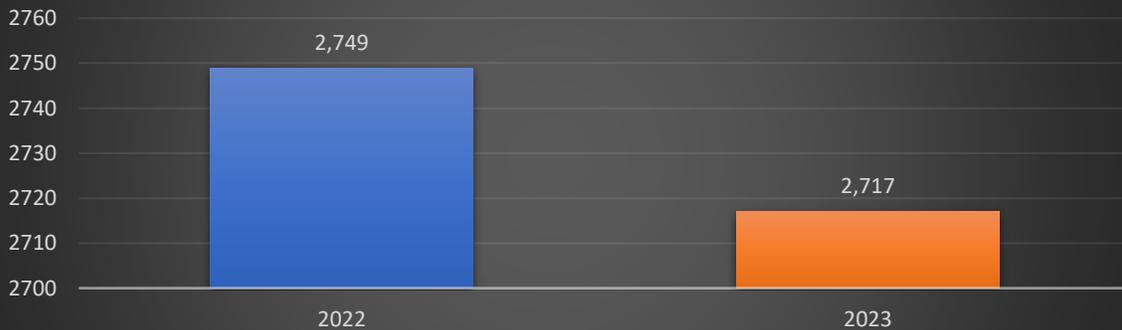
Offsetting these emissions is the Town of Bethlehem's 3.75 solar array on the Town's vacant clay mine property. This solar array generated 3,077,810 kW in 2022 and 2,788,520 kW in 2023. This clean electricity was fed into the broader electric system, with the clean energy credits offsetting portions of the Town's electric bill.

ANNUAL RENEWABLE ENERGY GENERATED (MTCO2E)

Year	Value
2022	383
2023	305

Taking this solar generation into consideration when analyzing the town emissions, we are able to see that the solar array offsets an average of 12.5% of the town's emissions each year. The chart below demonstrates emissions pre and post solar array credits.

GHG Emissions by Year with Renewable Energy Included (MTCO2e)

Year	Emissions Pre-Solar Generation	Emissions Post-Solar Generation
2022	2,749	2,366
2023	2,717	2,412
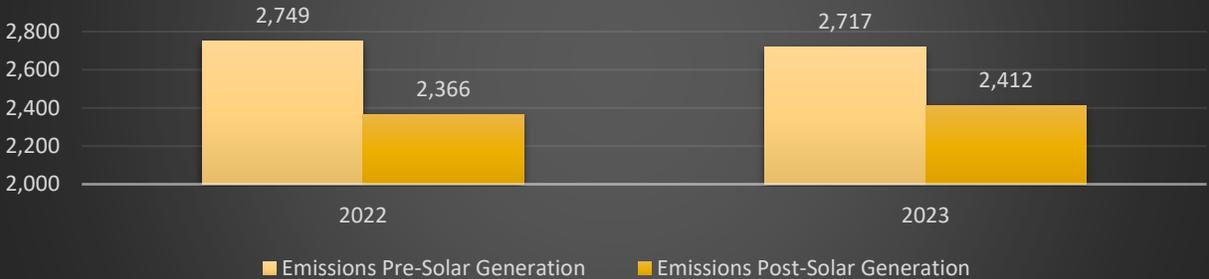
SELECTED ACCOMPLISHMENTS AND FURTHER OPPORTUNITIES TO REDUCE GREENHOUSE GAS EMISSIONS

Developing a GHG emissions baseline enables the Town to set goals and targets for future reduction of GHG emissions.

The Town has been proactive in reducing GHG emissions and energy costs. Lighting in their Town Hall has been retrofitted with LEDs (reducing their electricity usage by 111 MW hours annually). Upgrades to their wastewater treatment plant reduced its electricity consumption by 460 MW hours annually.

The Town has already purchased a number of electric vehicles in order to begin fleet conversion. The majority of Town GHG emissions come from diesel and gasoline in the Vehicle Fleet, so converting the fleet to electric vehicles will significantly advance emissions reductions.

In addition to the 3.75 MW solar array, the town has also begun installing solar energy on Town buildings, including a 30kW system at the Elm Avenue Parks & Recreation Facility. Further conversion to electrified sources of energy or moving these emissions to "Scope 2" will allow the Town to offset GHGs with additional renewable energy.

Bethlehem operates one of the most sophisticated municipal composting operations in the State of New York. Each year, the facility turns more than 2 million cubic feet of yard waste into high

quality compost and mulch, and more than 10,000 cubic feet of food scraps into high quality compost. Composting reduces greenhouse gas emissions by helping microorganisms break down the waste through aerobic decomposition, which releases far fewer greenhouse gases than the anaerobic decomposition that tends to occur in landfills.

Climate Action Planning is a potential next step for the Town to identify specific reduction targets and strategies/funding to achieve them.