



Village of Kinderhook Greenhouse Gas Inventory for Government Operations 2020-2021 Summary Report

BACKGROUND

The Village of Kinderhook Board approved a Resolution on May 11, 2016 to become a Climate Smart Community (CSC), including creation of a Climate Smart Task Force to undertake this effort on June 8, 2016. 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 Village of Kinderhook's consumption of energy and materials within village-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 Village to identify realistic goals and track progress towards reducing operation costs, energy use and GHG emissions.

DATA GATHERING AND METHODOLOGY

The Village's CSC Task Force appointed William Mancini to lead the GHG Inventory data collection effort, with the help of Capital District Regional Planning Commission (CDRPC) Sustainability Planner Tara Donadio. The GHG Inventory spreadsheet used was developed by Climate Action Associates, LLC (CAA).

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 Village employee commuting] is not included because the minimal amount of emissions generated (perhaps a fraction of a percent) by the small community of Kinderhook in this scope doesn't justify the work required to obtain this data. This scope is an option in the DEC's Climate Smart Communities Program.

- **Scope 1:** Direct GHG emissions from government-owned vehicles and onsite fuel combustion (natural gas, propane and fuel oil) for Village Hall, DPW Garage, Firehouse and Pump House.
- **Scope 2:** Indirect GHG emissions from purchased electricity.

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 2020-2021, using the average of the two years as a baseline. It is important to note that some Village facilities were closed or operated at a lower capacity during 2020 due to the Covid-19 pandemic, therefore using that year solely as a baseline would misrepresent the energy used by the Village.

Quantification Methods

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:

$$\text{Activity Data} \times \text{Emissions Factor}_{(\text{Fuel, GHG})} = \text{GHG Emissions}_{(\text{Fuel, GHG})}$$

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, propane, and fuel oil** bills for the **Village's** 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 CAA's GHG Inventory Tool. Data was first measured in kWh for grid electricity and gallons for gasoline, fuel oil, diesel, and propane. Using the CAA tool, this data was multiplied by emission factors published by the EPA and EIA to convert the energy usage, or other activity data in quantified emissions.

Emissions Factors

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 **NYUP (Upstate)**. The propane, 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 (CO₂e).

Facilities Master List

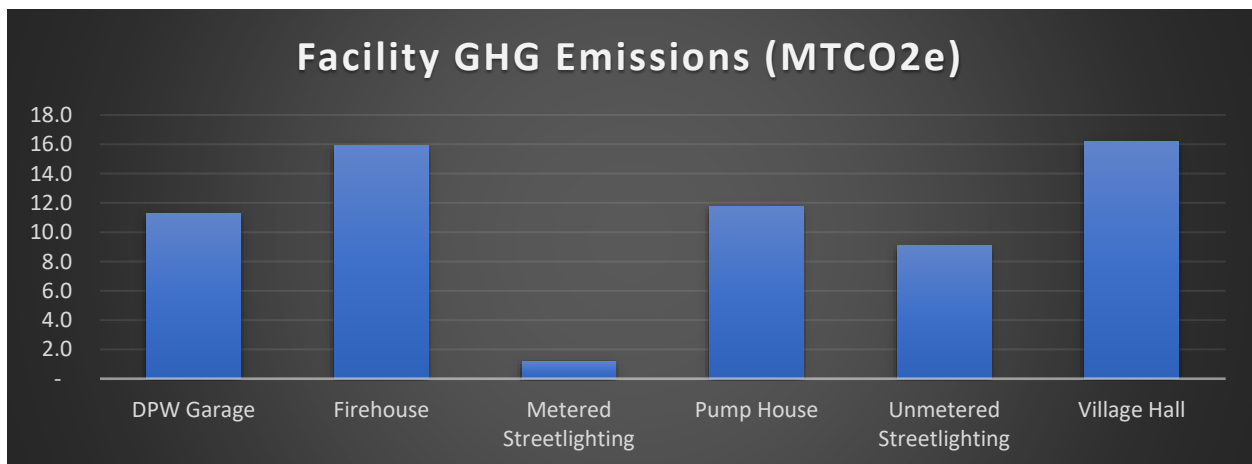
A key step in creating the GHG inventory is to compile a facility master list that includes the **Village's buildings** (including streetlights) that use at least one form of energy. Each was assigned to a category to indicate the type of infrastructure and then similar facilities along with their energy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

This table shows the Village buildings and energy providers included in the Kinderhook GHG Inventory:

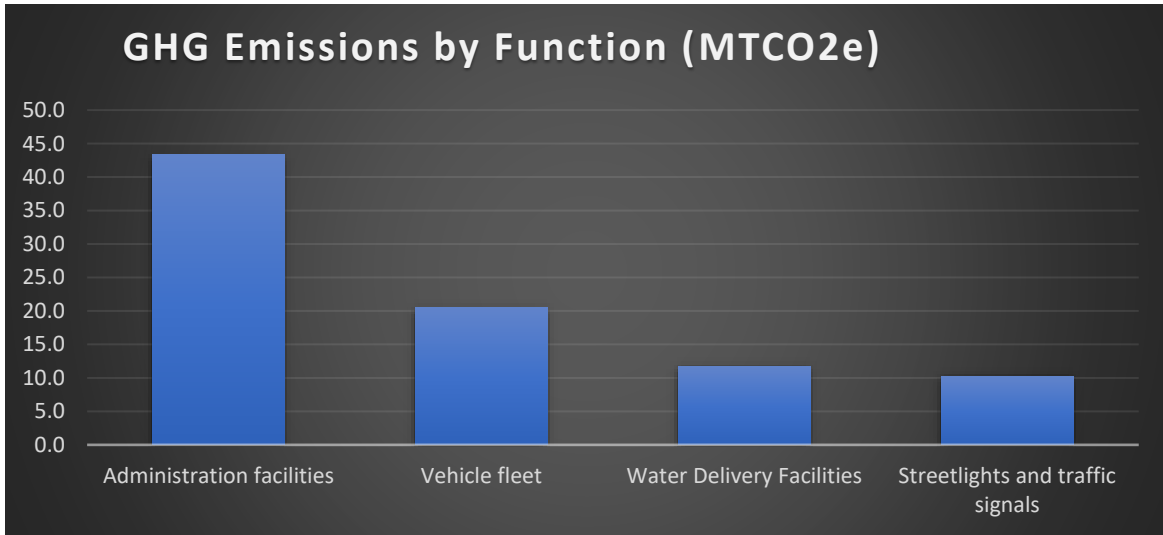
Village Building	Energy Providers
DPW Garage	NATIONAL GRID, Main Care
KinderhookVillage Hall	NATIONAL GRID, Main Care
Pump House	NATIONAL GRID, Main Care
Streetlights (metered + unmetered)	NATIONAL GRID
Firehouse	NATIONAL GRID, Main Care

KEY FINDINGS

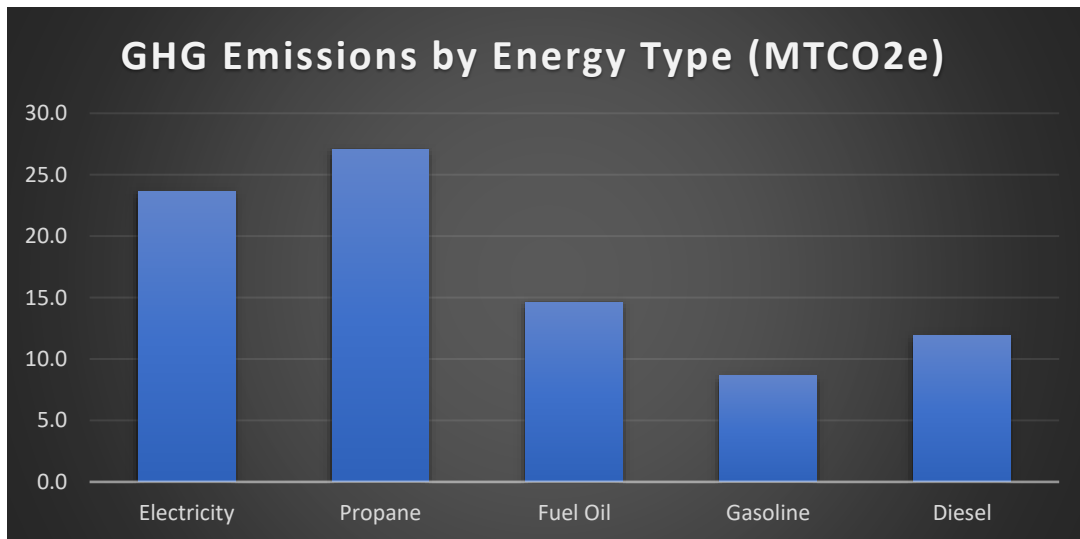
The average GHG emissions produced by the Village of Kinderhook’s municipal operations from 2020-2021 was 85.9 tons. The largest energy user and source of GHG emissions in Kinderhook is the vehicle fleet, which produces an average of 20.6 tons of GHG emissions annually and contributes to 28% of the Village’s total GHG emissions. The highest administrative facility use is by the Village Hall with 16.2 tons on average.



As noted above, energy used by vehicle fleets averaged 20.6 tons of GHG emissions – 8.6 tons for gasoline and 11.9 tons for diesel. The chart below illustrates how vehicle fleet emissions compare to other facilities by function.

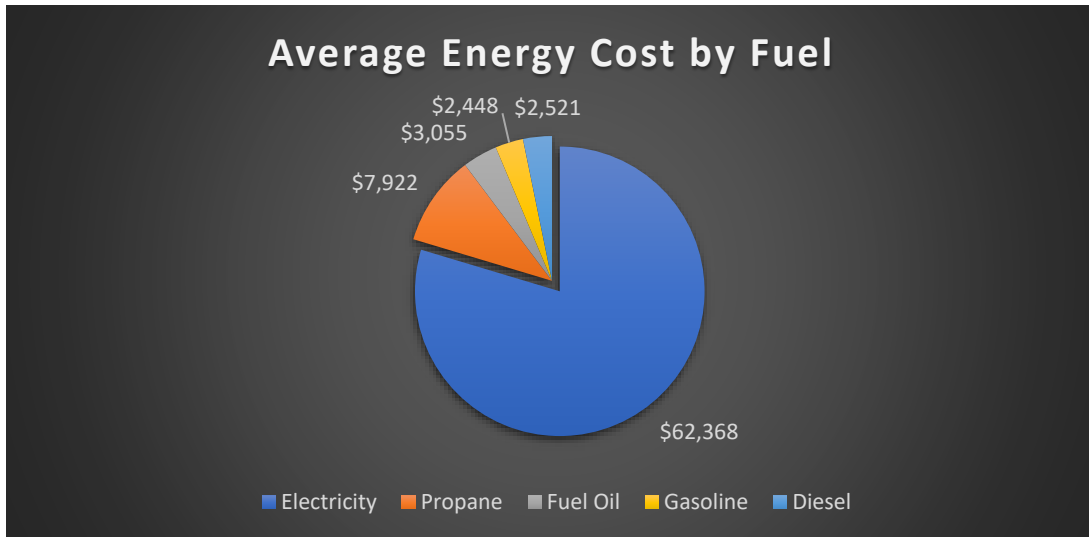


Propane outweighs all other energy types as far as GHG emissions tons are concerned, at about 31.5% of the Village’s GHG emissions. The chart below shows the breakdown of emissions by energy type.

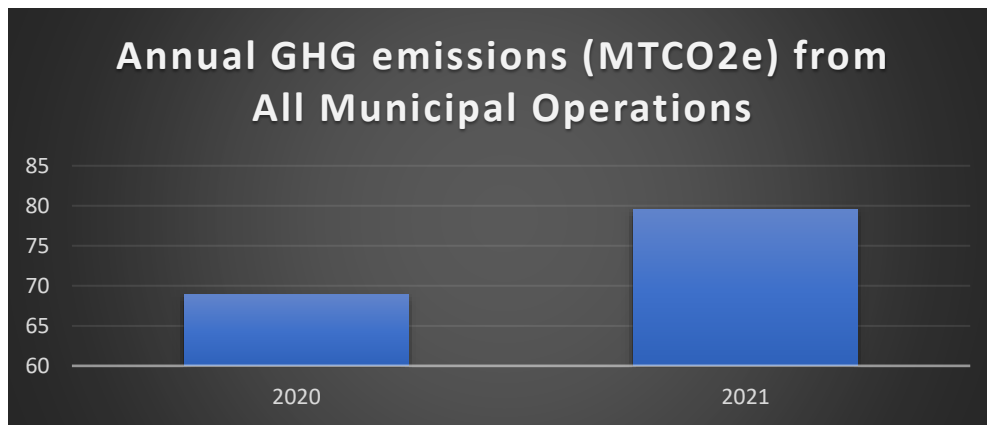


The Village spends an average of \$78,314 annually on energy for facilities and operations. When assessing cost of energy, electricity contributes to 80% of the Village’s energy cost -

outweighing natural gas, fuel oil, propane, gasoline and diesel. The average annual costs for each are broken down in the charts below.



GHG emissions were 80 tons in 2020 and 91.9 tons in 2021 – a difference of 12 tons. Administrative Facilities increased from 40.1 to 46.6 during this time frame, which may have been due to the COVID-19 pandemic which closed most buildings in 2020.



ACCOMPLISHMENTS AND FURTHER OPPORTUNITIES TO REDUCE GREENHOUSE GASES

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

The Village has been proactive in reducing GHG emissions and energy costs. Lighting in all interior buildings has been retrofitted with LED lighting. Two more efficient propane boilers were installed in the Village Hall in 2019. The DPW Building and Firehouse installed solar

panels, owned by the village, in 2022, which will significantly offset future inventories. For the remaining buildings not receiving credits from the above mentioned panels, the village has signed up for a community solar subscription with NexAmp which will begin credits in 2023.

The majority of Village GHG emissions come from propane, so converting the DPW Building, Pump House and Village Hall to heat pumps will significantly reduce GHGs.

Village street lighting retrofit can reduce energy use by as much as 65%, per NYSERDA's LED Street Light High-Impact Action¹ guidance. The opportunity to convert these streetlights to LED with National Grid, or purchase and convert, is being explored by the Village.

Further conversion to electrified sources of energy or moving these emissions to "Scope 2" will allow the Village to offset GHGs with renewable energy, such as more on-site solar arrays.

Climate Action Planning is a next step for the Village to identify reduction targets and strategies/funding to achieve these targets.

¹LED Street Lights: A High-Impact Action for the Clean Energy Communities Program. NYSERDA. <https://www.nyserda.ny.gov/-/media/Files/Programs/Clean-Energy-Communities/LED-Street-Lights/CEC-LED-Street-Lights-Step-by-Step-Guidance.pdf>. Page 3.