



Cohoes Local Government Operations Greenhouse Gas Inventory

A Preliminary Report for Baseline Year 2012

A report developed for the CSC Service
Strategy for the City of Cohoes
Draft May 2014



Key Findings

The City of Cohoes, with support from Climate Action Associates and the Capital District Regional Planning Commission, began a 2012 municipal operations greenhouse gas (GHG) inventory as part of Climate Smart Communities Regional Coordinators Pilot Program. The goal was to assess Cohoes energy use, costs, and related GHG emissions in order to identify priority areas for savings. Some of key findings include:

- Cohoes spent approximately \$938,000 on energy in 2012, including \$197,000 for electricity and gas used in physical buildings and facilities, \$390,000 for street lighting, and \$203,000 to fuel gasoline and diesel vehicles.
- Energy consumed by Cohoes government operations produced 2,235 metric tons of GHG emissions in 2012. City buildings and facilities produced the most at 39 percent, followed by the vehicle fleet, which produced 26 percent of emissions.
- The largest facility energy consumers were the wastewater pump stations, the Department of Public Works facility, City Hall, the Water Filtration Plant, and the Music Hall. Together, these facilities produced 74% of all facility emissions and are good targets for energy conservation.
- The City's fuel bill for vehicle fleet fuel at \$203,000 is significant, and on par with energy bills for buildings. Therefore, the City should consider include fleet efficiency and fuel management measures as part of an energy and costs savings plan.
- Streetlights and traffic signals were the highest energy cost, by sector, at \$390,000, but this sector was only the third largest source of energy use and GHG emissions (13%). The general lighting district operated by National Grid is the vast majority of the cost. The reason the energy bill is disproportionately higher than electricity use and emissions is that the lighting tariff includes a loaded cost for pole servicing in addition to simple power delivery. In lighting owned and operated by the City such as metered park lights, signs, and traffic signals, the City could consider LED lighting as a way to reduce costs and GHG emissions. Until utilities provide an LED option for the general lighting districts, the City would have to take back responsibility for the lighting districts and then install and maintain the LED lights.
- Cohoes now has a baseline to measure the impact of recent and future upgrades. For example, the City can now calculate the exact amount of energy savings and emissions reductions caused by the new storm windows in the Music Hall and by the new high-efficiency boiler for the Public Library, after it is installed. In the future, the information in this report can be used to add depth and precision to funding applications for energy efficiency projects and renewable energy installations, such as solar panels at the Water Filtration Plant.

GHG Accounting Overview and Sources Included

Municipal GHG inventories are a crucial starting point for climate action by providing a baseline for setting realistic emissions reduction targets and measuring the impact of future actions. The information in this report will help Cohoes reduce energy use, save taxpayer dollars, and cut GHG emissions. The inventory is being performed in accordance with the Local Government Operations Protocol (LGOP), a protocol developed by The Climate Registry and ICLEI – Local Governments for Sustainability.

Cohoes selected 2012 as the baseline year for this GHG inventory from which can track progress and measure the impact of actions taken to reduce energy use and GHG emissions.

GHG Sources

This preliminary assessment considers most major GHG sources with a few exceptions noted below. The data reported will likely represent greater than 90-95 percent of GHG emissions from City operations:

- Electricity consumption. Electricity creates indirect emissions because the actual emissions occur at power plants, but the LGOP requires them to be included in the analysis due to the fact that municipalities can lessen these emissions by reducing their use of electricity. All metered use was considered in this study.
- Stationary fossil fuels. These include natural gas, propane, and fuel oil. Natural gas usage was taken from National Grid bills. The City reported that small amounts of propane were used as backup power for seven pump stations. No fuel oil use was reported by Cohoes.
- Transportation fossil fuels. Transportation fuels can include gasoline, diesel, natural gas, and electricity (for plug in vehicles), used in both on road fleet vehicles and off road equipment. The City reported gasoline and diesel usage in its combined fleet, and it is presumed this includes fuel used in both off-road and on-road vehicles.
- Water Delivery and Wastewater Treatment. Emissions are produced when energy is used to pump water to deliver it through a filtration plant (prior to consumption) or to a wastewater treatment plant (after use). Additional GHG emissions such as methane are produced during wastewater treatment but Cohoes does not operate a wastewater plant. Therefore, emissions from these sectors are primarily from electricity used in Cohoes pump stations and at the City's Water Filtration Plant.
- Solid waste emissions from landfills. The City does not own or operate a landfill and so it has no direct emissions. The LGOP provides communities the option of estimating a small indirect footprint from waste generated by government facilities but the City elected not to do it during this preliminary assessment. This sector is usually not included because it is difficult to measure waste volume generated by government operations and this source is usually less than 1-2 percent of a typical inventory.
- Refrigerant usage. Most refrigerants such as those used in building- and vehicle-cooling systems are GHGs in themselves. For most conventional facility applications they can be excluded in simple GHG assessment since they are difficult to estimate and amount to less than 2% of a typical GHG inventory. Cohoes does not operate any facilities, such as an ice rink, that use significant quantities of refrigerants. However if any HVAC upgrade is ever done, the City can request vendors to use GHG-friendly refrigerants and quantify the benefit in a climate plan.
- Employee commute. This is an optional source in the LGOP for indirect emissions associated with employees traveling to work. These were not included in Cohoes's preliminary inventory. This source is usually only included when a local government wishes to set goals and create commute incentives to try to reduce these types of emissions. Giving preferential parking and free charging for employees driving plug-in electric vehicles are examples of incentives to reduce employee commute emissions.

Data Organization

Emissions were analyzed in three different ways: by government sector, by individual facility, and by fuel type. Fuel and electricity usage across sectors is converted to a standard energy unit (million British thermal units (MMBtu)) to enable comparison. All GHG emissions are reported in standard units called “metric tons of carbon dioxide equivalent” or MTCDE. This unit allows separate GHGs like methane, refrigerants (HFCs), and others to be converted to carbon dioxide-equivalents and added together as a single GHG footprint.

Cohoes worked with Climate Action Associates LLC to identify ways to categorize the energy data into useful groups. The five local government sectors used in the LGOP proved to be a suitable method of organizing the information for Cohoes (Table 1.). Climate Action Associates LLC designed a consolidated spreadsheet that included sectors and subcategories, relevant City categories, and embedded formulas for calculating energy usage, energy costs, and emissions. Cohoes entered the needed data into the consolidated spreadsheet and then Climate Action Associates tabulated and analyzed the data, producing the charts in this report.

All raw data, calculations, tables, and figures are contained in the workbook entitled “GHG_Inventory_Supporting_Data_Cohoes2012.xlsx.”

Table 1. Sectors, Subcategories, and Fuel Types Included in this Report

Sectors	Sector Subcategories	Fuel Types Reported*
Buildings and Facilities	• Administration Bldgs.	Propane, Natural Gas and Electricity
	• Miscellaneous Bldgs. (Music Hall, Senior Center, Public Library)	Natural Gas and Electricity
	• Firehouses	Natural Gas and Electricity
	• Recreation Facilities	Natural Gas and Electricity
Streetlights and Traffic Signals	• Lighting Districts	Electricity
	• Traffic Signals	Electricity
	• Streetlights (Other)	Electricity
Wastewater Treatment	• Pump Stations	Propane, Natural Gas and Electricity
Water Delivery	• Pump Stations	Natural Gas and Electricity
	• Water Delivery Other	Natural Gas and Electricity
	• Water Supply Treatment	Propane, Natural Gas and Electricity
Vehicle Fleet	• N/A	Gasoline and Diesel

* The City did not report any fuel oil usage.

Emissions and Energy Costs by Sector

In 2012, Cohoes’s operations produced a total of 2,235 metric tons of GHG emissions (measured as metric tons of carbon dioxide equivalent, or MTCDE). The City consumed 32,238 MMBtu of energy and spent nearly a million dollars on energy costs (\$937,927). Shaving just 10 percent off this cost through energy conservation and efficient vehicle procurement would save the City almost \$94,000 annually.

The LGOP identifies five main sectors for use in categorizing the GHG emissions from City operations: Buildings and Other Facilities, Wastewater Treatment Facilities, Water Delivery Facilities, Vehicle Fleet, and Streetlights and Traffic Signals (Table 1). This section of the report analyzes emissions, energy usage and cost by these five sectors and then examines the top three sectors in more detail.

The top three sectors in terms of GHG emissions were buildings and facilities, vehicle fleet, and streetlights and traffic signals. The buildings and facilities sector ranked first as the largest emitter (869 MTCDE) and the largest user of energy (14,295 MMBtu) on an annual basis (Table 2).

Table 2. Annual Energy Use, Cost, and Emissions by Sector

Sector	GHG Emissions (MTCDE)	Energy Use (MMBtu)	Energy Cost (USD)
Buildings and Facilities	869	14,295	\$197,264
Vehicle Fleet	595	8,182	\$202,687
Streetlights and Traffic Signals	299	3,575	\$390,180
Wastewater Treatment	259	3,096	\$88,134
Water Delivery	215	3,090	\$59,660
Total Government	2,235	32,238	\$937,925

Emissions from buildings and facilities combined with those from the vehicle fleet account for 65 percent of the total emissions produced by Cohoes’s operations (Figure 1). Despite its large contribution to emissions, buildings and facilities comprised only 21 percent of energy costs (Figure 2). The total costs for streetlights and traffic signals are higher than the vehicle fleet and buildings costs partly due to the fact that the energy bills for some streetlights are loaded with added expenses by National Grid to cover their maintenance costs.

Figure 1.
GHG Emissions by Sector

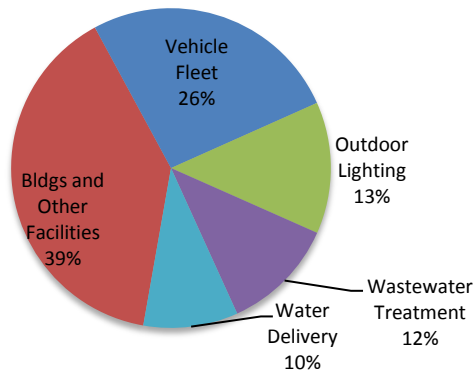
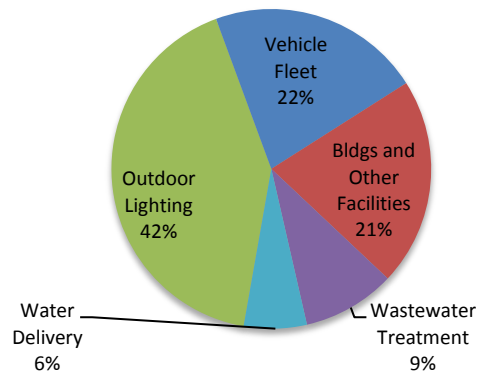


Figure 2.
Energy Costs by Sector



Buildings & Facilities Sector (39% of GHG Emissions, 21% of Energy Costs)

Buildings and facilities made up the largest share (39%) of annual GHG emissions. Using the LGOP model, this sector was divided into four subcategories (Table 3). Note that water-related facilities (such as pump stations) are not included in this buildings and facilities category. A full energy analysis of City facilities, including water-related facilities, is located in the next section of this report.

Table 3. Annual Energy Use, Cost, and Emissions within the Buildings and Facilities Sector

Buildings and Facilities Subcategories	GHG Emissions (MTCDE)	Energy Use (MMBtu)	Energy Cost (USD)
Administration Bldgs.	412	6,990	\$80,748
Misc. Bldgs. (Music Hall, Senior Center, Public Library)	321	5,099	\$79,660
Firehouses	118	2,004	\$26,930
Recreation Facilities	17	203	\$9,926
Total Buildings and Facilities	869	14,295	\$197,264

The administration buildings subcategory amounted to nearly half (47%) of the emissions from this sector (Figure 3). For Cohoes, this administration subcategory includes the DPW facility and the City Hall. The Code Department is located within City Hall and the Police Department is in a building connected to City Hall so these emissions sources are also included in the administration subcategory. The miscellaneous subcategory, which was 37 percent of the emissions, includes the Music Hall, the Public Library, and the Senior Center. The three firehouses operated by the Fire Department produced 14 percent of the emissions from City buildings. The recreation subcategory (5% of emissions) includes energy consumption for City parks such as Lansing Pool, Silliman Park, and the bike trail. Grouped together, the administration and miscellaneous subcategories (City Hall, the DPW facility, the Music Hall, the Public Library, and the Senior Center) comprised 81 percent of the energy costs in the buildings sector (Figure 4).

Figure 3.
GHG Emissions from Buildings and Facilities

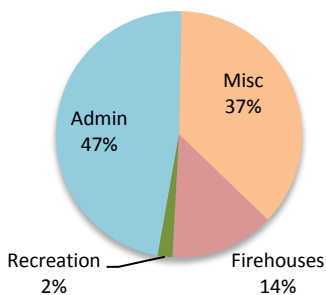
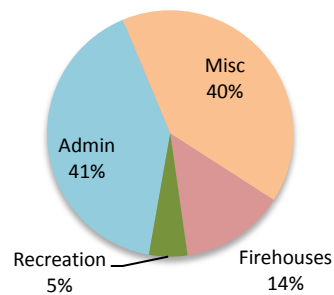


Figure 4.
Energy Costs of Buildings and Facilities



Vehicle Fleet Sector (26% of GHG Emissions, 22% of Energy Costs)

The vehicle fleet sector includes all on-road and off-road use of gasoline and diesel supplied at the City’s fuel distribution facility. An example of off-road use of these fuels would be for maintenance equipment such as a lawn mower. On-road usage for vehicles is typically a much larger portion of energy consumption than off-road. The City maintains a detailed record of gasoline and diesel usage so an analysis by department was possible. The Department of Public Works (DPW) consumed the most diesel fuel, while the Police Department consumed the most gasoline (Table 4). A breakdown of the cost distribution between diesel and gasoline was not available, however; only the total cost of the two fuel types combined was reported for 2012.

Table 4. Annual Energy Use, Cost, and Emissions from Vehicles by Department

City Department (Vehicles only)	GHG Emissions from Vehicles (MTCDE)	Gasoline Usage (gal)	Diesel Usage (gal)	Gasoline and Diesel Usage (MMBtu)	Cost of Gasoline and Diesel (USD)
Public Works	352	10,882	24,689	4,799	\$125,724
Police	176	19,838	0	2,465	\$54,065
Fire	57	1,603	4,130	776	\$19,094
Code	10	1,144	0	142	\$3,803
Total Vehicle Fleet	595	33,467	28,818	8,182	\$202,687

Within the vehicle fleet, DPW was the largest emitter of GHGs (Figure 5) and the department that spent the most on gasoline and diesel (Figure 6). Overall, the distribution of vehicle fuel costs across City departments is similar to that for GHG emissions, with DPW vehicles being most expensive in 2012.

Figure 5.
GHG Emissions from Vehicles by Department

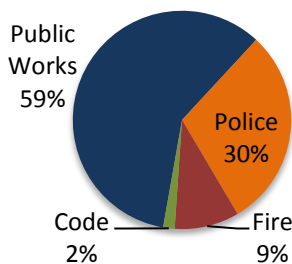
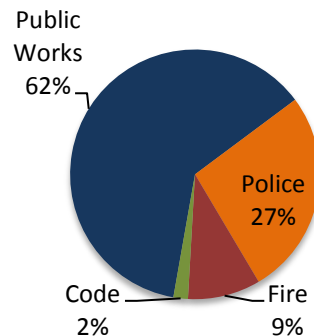


Figure 6.
Vehicle Fuel Costs by Department



Streetlights and Traffic Signals Sector (13% of GHG emissions, 42% of Energy Costs)

The emissions from the streetlights and traffic signals sector are the third largest source of GHG emissions for the City; this sector was broken down into three subgroups (Table 5). The lighting districts accounted for 92 percent of the emissions and 96 percent of the costs. The streetlights (other) subgroup was created to distinguish the streetlights that were not part of the lighting districts, in order to isolate the high cost of the lighting districts. Note that this streetlights and traffic signals sector does not include outdoor lighting associated with city-owned parks and recreational facilities, such as Sunset Park and Lansing Pool; these area lighting costs for parks are included in the buildings and facilities sector under the recreation subcategory. As a result, the energy data reported for the streetlights and traffic signals sector only includes traffic signals and “non-park” outdoor area lighting.

Table 5. Annual Energy Use, Cost, and Emissions within the Streetlights and Traffic Signals Sector

Streetlights and Traffic Signals Subgroups	GHG Emissions (MTCDE)	Electricity (KWH)	Energy Use (MMBtu)	Energy Cost (USD)
Lighting Districts	276	968,346	3,304	\$373,914
Traffic Signals	17	59,509	203	\$13,063
Streetlights (Other)	6	19,896	68	\$3,204
Total Streetlights and Traffic Signals	299	1,047,751	3,575	\$390,180

The lighting districts were, by far, the highest source of emissions and energy costs within the lighting sector (Figures 7 and 8). A single National Grid account for one of the three City lighting districts comprised the bulk of the costs; it was about \$342,000 in 2012. Portions of these costs are not “true” energy costs because the utility tariff is loaded to include the service charges for National Grid’s maintenance of these lights.

Figure 7.
GHG Emissions from Outdoor Lighting

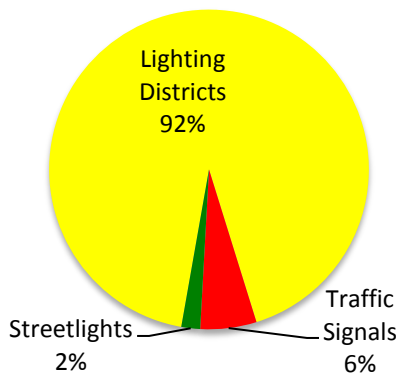
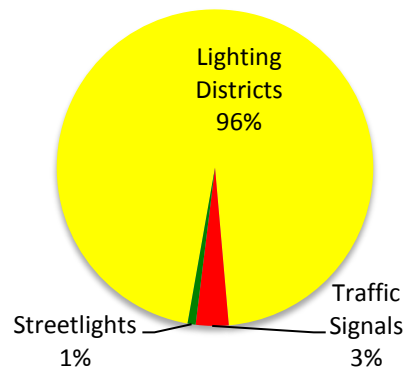


Figure 8.
Costs of Outdoor Lighting



Energy Analysis by Individual Facility

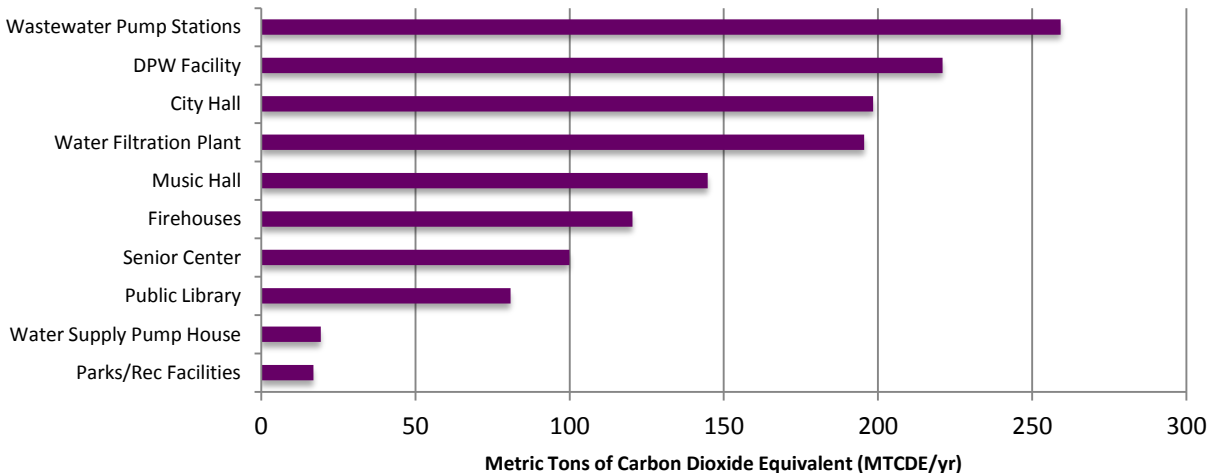
Cohoes operates a variety of physical facilities that consume natural gas, propane, and electricity. Analyzing energy use and costs by facility can reveal which facilities might be prioritized for upgrades that would save the most in costs and emissions.

For this analysis, Climate Action Associates worked with Cohoes to identify individual facilities, such as City Hall, or groups of facilities that were considered useful because administratively they are managed together. This process resulted in 10 facilities/facility groups. For example, all of the wastewater pump stations (there appear to be about 13 of them) were grouped together. There were several different utility accounts associated with the City's water filtration plant on Vliet Boulevard, including one for the smaller Simmons Avenue facility that is linked to the filtration plant, so these were grouped together. In addition, the various city-owned parks and recreational facilities, such as Lansing Pool, Silliman Park, Sunset Park, and the bike trail were lumped together as one parks/recreation group.

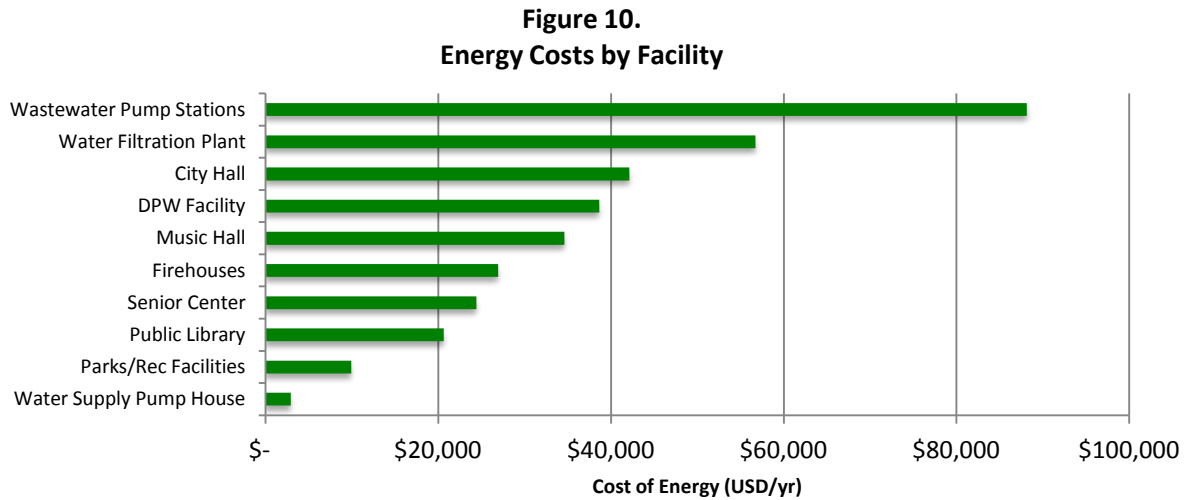
Note that all streetlights not associated with a park were excluded from this analysis. As a result, this facility analysis is not comprehensive of all the emissions or energy costs for the City; only those emissions associated with a physical facility of some kind (either a building, a park, or water infrastructure) are included in this analysis. Forty percent of the City's emissions in 2012 were not associated with a facility; these were emissions from vehicles, non-park streetlights and traffic signals. In other words, this analysis by facility covers only 60 percent of the City's total emissions.

When facilities were analyzed for GHG emissions, the top three emitters were the wastewater pump stations group, the DPW Facility, and City Hall (Figure 9).

Figure 9.
GHG Emissions from Facilities



When the energy costs were tallied by facility, the top three most expensive facilities were the wastewater pump stations group, the Water Filtration Plant, and City Hall (Figure 10).



The full list of all the individual facilities and facility groups, along with the associated emissions, energy use, and energy costs is below as Table 6, sorted by energy costs.

Table 6. Annual Energy Use, Cost, and Emissions associated with Individual Facilities and Facility Groups

Individual Facility or Facility Group	GHG Emissions (MTCDE)	Electricity (KWH)	Nat. Gas (therms)	Propane (gal)	Energy Usage (MMBtu)	Electricity Cost (\$)	Nat. Gas Cost (\$)	Propane Cost (\$)	Total Cost (\$)
Wastewater Pump Stations	259	906,643	10	18	3,096	\$87,841	\$263	\$30	\$88,134
Water Filtration Plant	196	468,164	11,377	4	2,735	\$48,446	\$8,278	\$6	\$56,729
City Hall	198	266,240	22,523	0	3,161	\$26,335	\$15,789	--	\$42,124
DPW Facility	221	126,020	33,991	4	3,829	\$14,555	\$24,062	\$6	\$38,623
Music Hall	145	209,800	15,615	0	2,277	\$23,496	\$11,113	--	\$34,609
Firehouses	120	114,419	16,134	0	2,004	\$14,323	\$12,607	--	\$26,930
Senior Center	100	156,400	10,168	0	1,550	\$16,909	\$7,515	--	\$24,424
Public Library	81	117,063	8,716	0	1,271	\$14,162	\$6,466	--	\$20,627
Parks/Rec Facilities	17	59,426	0	0	203	\$9,926	--	--	\$9,926
Water Supply Pump House	19	0	3,548	0	355	--	\$2,931	--	\$2,931

Emissions and Energy Costs by Fuel Type

Across facilities and fleet operations, Cohoes utilized four main types of fuel in 2012: electricity, natural gas, gasoline, and diesel. A small amount of propane (about 25 gallons) was also consumed as backup power for seven pump stations. Although the largest amount of energy consumption was in the form of natural gas, more GHG emissions were produced from electricity than from natural gas (Table 7). The majority of electricity was used for pumping water and drinking water filtration.

Table 7. Annual Energy Use, Cost, and Emissions by Fuel Type

Fuel Type	GHG Emissions (MTCDE)	Energy Use (MMBtu)	Energy Cost (USD)
Electricity	991	11,846	\$646,173
Natural Gas	649	12,208	\$89,023
Gasoline & Diesel	595	8,182	\$202,687
Propane	0.1	2	\$42
Total Government	2,235	32,238	\$937,925

Of the five fuel types, electricity consumption produced the most GHG emissions (44%), followed by natural gas (30%) (Figure 11). The City spent the most on electricity (69%), followed by gasoline (22%) (Figure 12).

Figure 11.
GHG Emissions by Fuel Type

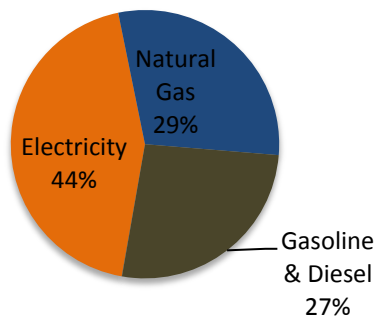
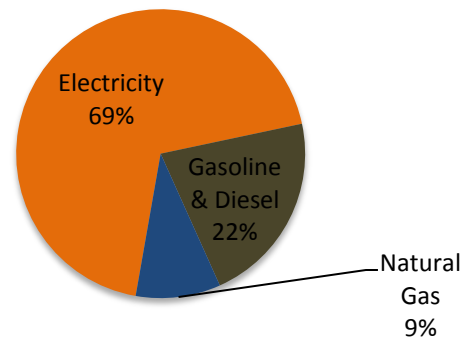


Figure 12.
Energy Cost by Fuel Type



Next Steps and Recommendations

We recommend the City review this report and then meet with the CSC team to discuss options to reduce costs and GHG emissions. In terms of finalizing this GHG inventory, suggestions include:

- If desired, facilities could be analyzed in more detail, by individual pump stations, for example, or by isolating each of the three firehouses. Such an analysis would reveal more information on which individual facilities cost the most and consume the most energy.
- Further information should be gathered regarding the account labeled “pump station - water lease”, which had about \$51,000 in electricity costs in 2012. Is this energy bill the responsibility of the City or is it charged back to a third party?
- Are there any other utility accounts that are charged back to third parties? If so, these should be removed from the inventory.
- At the time of this report, because the Police Department building is connected to City Hall, it was unclear if the Police Department had any electricity and natural gas usage of its own. Can any of the utility accounts be tagged to the Police Department? Or are Police Department costs included in the utility bills for City Hall?
- There are two DPW National Grid accounts (numbers 73698-76109 and 52532-78013) that included charges for electricity use in 2012 (a total of \$255.08), but no kilowatt-hours were reported. When kilowatt-hours are not reported, GHG emissions cannot be calculated. Is the City being charged a flat rate for these two accounts? Or perhaps there was an error in reporting?
- In the future, the City could take advantage of its ability to track each individual vehicle’s usage of diesel and gasoline as a way to highlight inefficient vehicles for replacement.
- The City might also consider expanding its vehicle fleet tracking system by adding a record of the cost of diesel and gasoline as separate line items. The vehicle fleet cost analysis in this report was somewhat limited by the fact that this data was not available; only the total cost of diesel and gasoline as a lump sum was reported.

