Steven T. Noble
Mayor

2020 Government Operations Greenhouse Gas Emissions Inventory for the City of Kingston, New York

Introduction

A greenhouse gas (GHG) emissions inventory is one of the first and most important steps in the local climate action process. A local government operations GHG inventory is an accounting, analysis, and report of the GHG emissions resulting from the day-to-day operations of municipal government. It summarizes the GHG emissions from the consumption of energy and materials in government buildings, from wastewater and water treatment facilities, municipal vehicle fleets, government-owned outdoor lighting, and other sources. GHG inventories provide the data needed to set realistic goals and track progress toward reducing costs, use, and emissions. GHG inventory reports identify the largest energy users and sources of emissions (e.g., by building, sector, or department). As a result, GHG inventories help determine actions that offer a good return on investment to be highlighted in subsequent climate planning. As a government builds capacity to conduct GHG inventories on a regular basis, the process increases the ability to operate efficiently and use taxpayer resources effectively.

The City of Kingston recognizes that GHG emissions from human activity are catalyzing profound changes in climate and weather, the consequences of which pose substantial risks to the health, well-being, and prosperity of a community. The ultimate goal of this effort is to locally reduce GHG emissions. In addition, rising energy costs make it imperative that the City of Kingston takes a leadership role in advancing energy saving measures and other sustainability initiatives that will stabilize and potentially reduce energy related expenditures for City government, local businesses, and City residents.

The City of Kingston government has a strong role to play in reducing emissions. Through proactive measures around land use planning, transportation, energy efficiency, green building, waste reduction, and more, the City can greatly reduce energy use and GHG emissions. Such efforts improve public health and safety and create a cleaner and more sustainable Kingston. In order to reduce energy use and GHG emissions, an accounting of the current energy use and emissions was determined as necessary to establish a baseline and set reduction goals. In response, the City of Kingston regularly completes comprehensive energy assessments and GHG emissions inventories for government operations.

Kingston has completed a variety of adaptation and mitigation strategies, including appointing the Climate Smart Kingston Commission, conducting a Greenhouse Gas Inventory in 2010, creating the 2020 Climate Action Plan in 2012, and the developing the 2030 Climate Action Plan in 2021. The 2020 Climate Action Plan outlined strategies and actions for the City to take to reduce greenhouse gas emissions, and set a goal for energy use reduction of 20% by 2020. The City formally recognized and supported the original GHG Emissions Inventory and concurrent Climate Action Plan with Resolution #200 of 2012, Adopting the Climate Action Plan and GHG Emissions Inventory.

The City of Kingston achieved and surpassed its greenhouse gas emissions targets, with 2020 data exhibiting a 46.9% reduction in greenhouse gas emissions as compared to 2012 emission levels.

The 2030 Climate Action Plan will include more ambitious targets to be achieved for GHG emissions reductions, as well as strategies to reach those goals.

Climate Smart Communities

New York State Climate Smart Communities (CSC) Program is a network of New York communities engaged in reducing greenhouse gas emissions and improving climate resilience. Municipalities become involved with the CSC Program by adopting the CSC Pledge, which includes 10 elements that lead to a reduction of greenhouse gas emissions, and provides guidance on climate change adaptation. Municipalities can opt to participate in the Climate Smart Certification Program, which has three certification levels: Certified, Bronze, and Silver. Communities can access technical support and funding opportunities to reach their certification goals. The City of Kingston achieved Bronze Climate Smart Community certification in 2014, and Silver certification in 2018, both the highest levels achieved by any municipality in New York State.

In 2021, the Clean Energy Communities Leadership Round (CEC) was launched. CEC is an initiative of the New York State Energy Research and Development Authority (NYSERDA) that outlines High Impact Actions (HIAs) communities may complete for varying point values. Upon completing HIAs and earning points, municipalities become eligible for grant funding to expand clean energy infrastructure. Examples of HIAs include implementation of a Community Choice Aggregation Program, adoption of the NYStretch Energy Code, purchase of zero emission vehicles, and more. HIAs are actions a municipality may take to reduce their carbon footprint. At the time of this report, the City of Kingston has completed 15 Clean Energy Communities HIAs and has been awarded 5,200 points, establishing Kingston as one of the highest ranking of all cities in New York State.

Maintaining a municipal GHG Emissions Inventory is one of the priority actions of both the Climate Smart Communities Program and a necessary supplement to multiple Clean Energy Communities HIAs.

Purpose of the Annual GHG Inventory

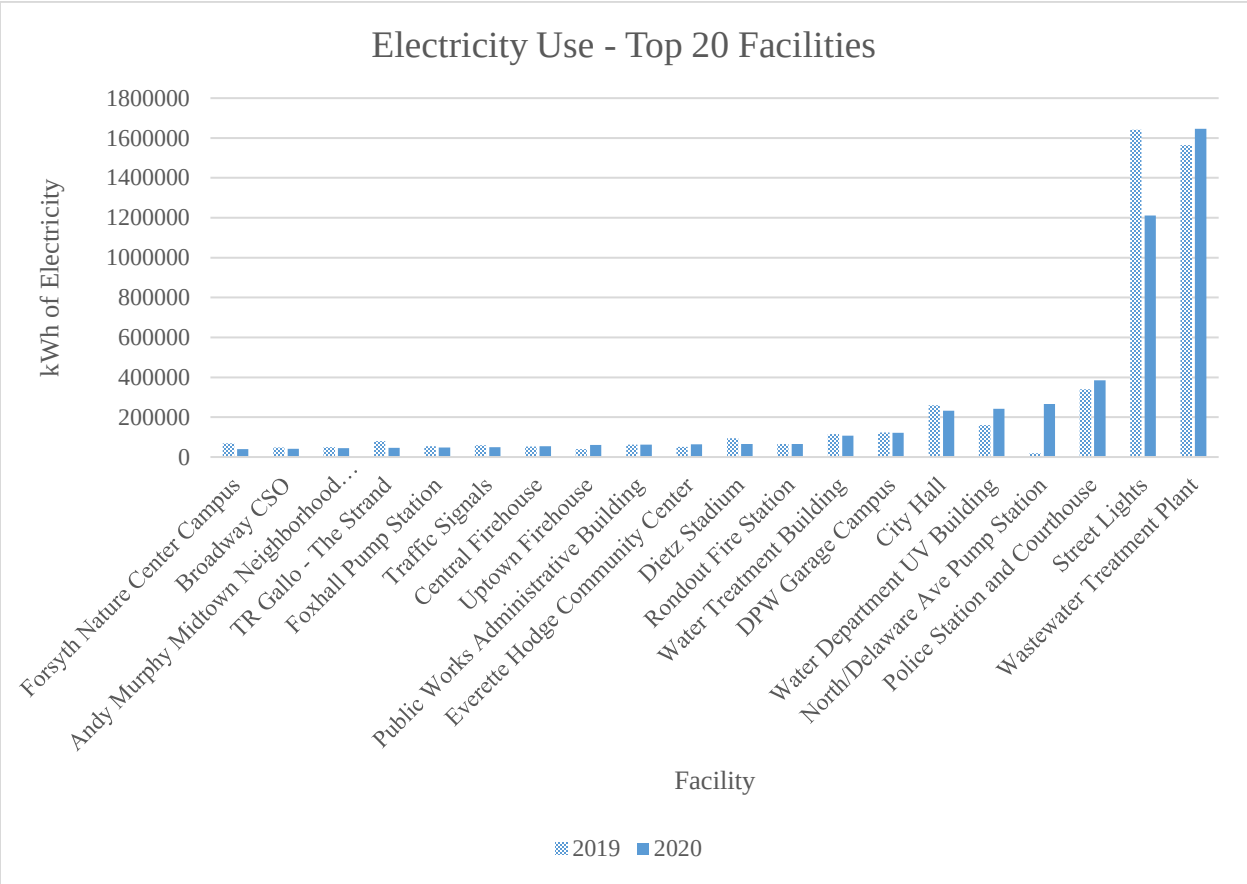
This report comprehensively examines the electricity, natural gas, and vehicle fuel used by City government operations for calendar year 2020. City government operations covered in this analysis include the activities and functions of all City departments including the Department of Public Works, the Kingston Police and Fire Departments, and Parks and Recreation. By identifying the facilities that use the largest amount of electricity or the types of fuel sources that contribute the largest amount of GHG emissions, the City can pinpoint areas to focus efficiency efforts in the future. In the past these projects have included LED lighting retrofits, HVAC upgrades, and the purchase of electric vehicles.

In 2010 the City of Kingston began monitoring the amount of energy used by each of its departments in order to establish a 2010 greenhouse gas (GHG) emissions baseline for City government operations. By measuring energy and greenhouse gas information and comparing it against an established baseline, the City can assess the efficacy of its strategies and measures developed in the Climate Action Plan. This inventory can also be used to determine if previous energy and GHG emissions reduction goals set by the City are being met.

Inventory Results – Municipal Energy Use

Electricity

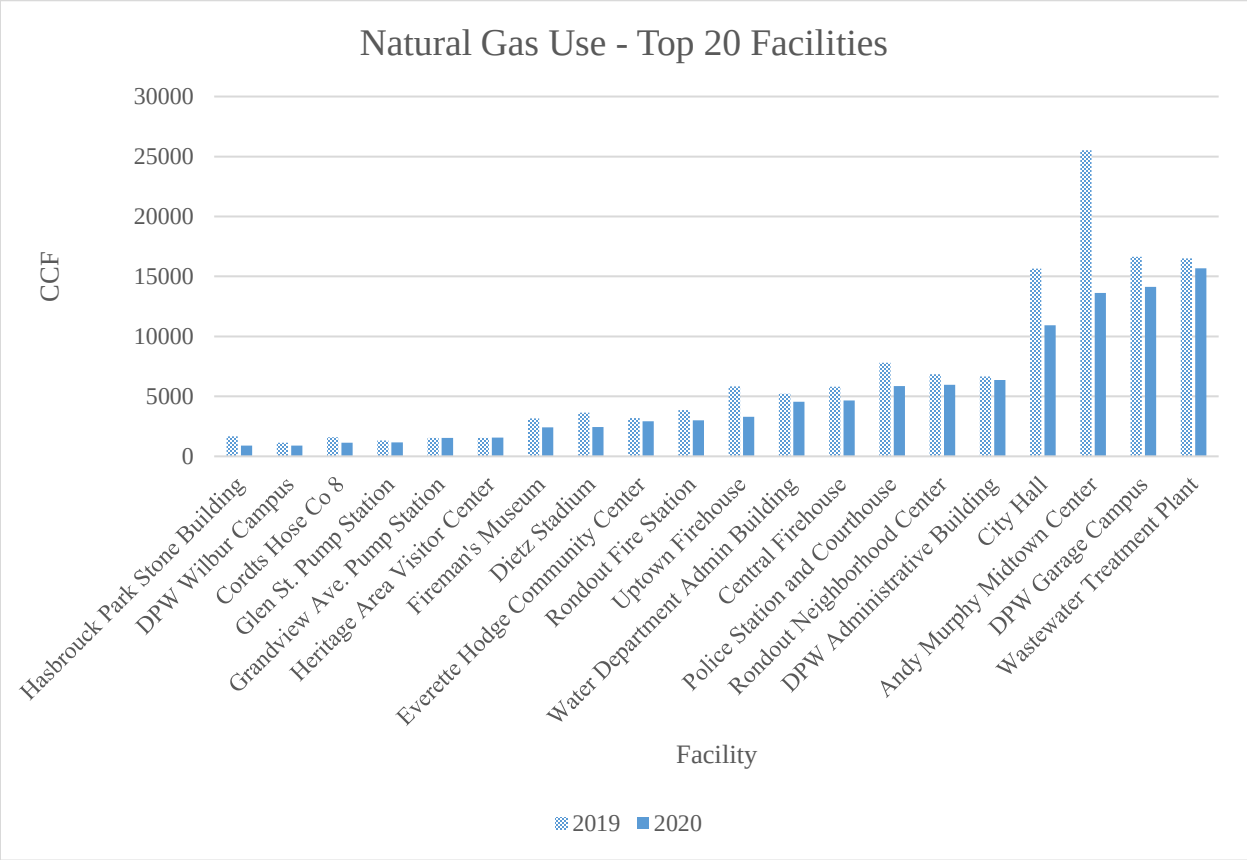
In 2020 the City of Kingston used 5,445,240 kilowatt-hours (kWh) of electricity to power the offices, parks, pumping stations, street lights, and other important aspects of municipal operations. The top two consumers of electricity were the Wastewater Treatment Plant (1,646,560 kWh), and the City's 2,427 streetlights (1,211,822 kWh).



Between 2019 and 2020 municipal electricity use decreased by 127,915 kWh (2.3%). The most significant decrease was seen in the City's Street Lights. Between 2019 and 2020 Citywide Street Light electricity use dropped by 353,441 kWh (22.5%). This can be attributed to LED lightbulb conversions. Between 2019 and 2020 over 2,000 streetlights were converted from incandescent to LED bulbs. LED lightbulbs have a lifespan 25x that of conventional bulbs, and will result in up to 90% overall energy savings throughout their lifetime.

Natural Gas

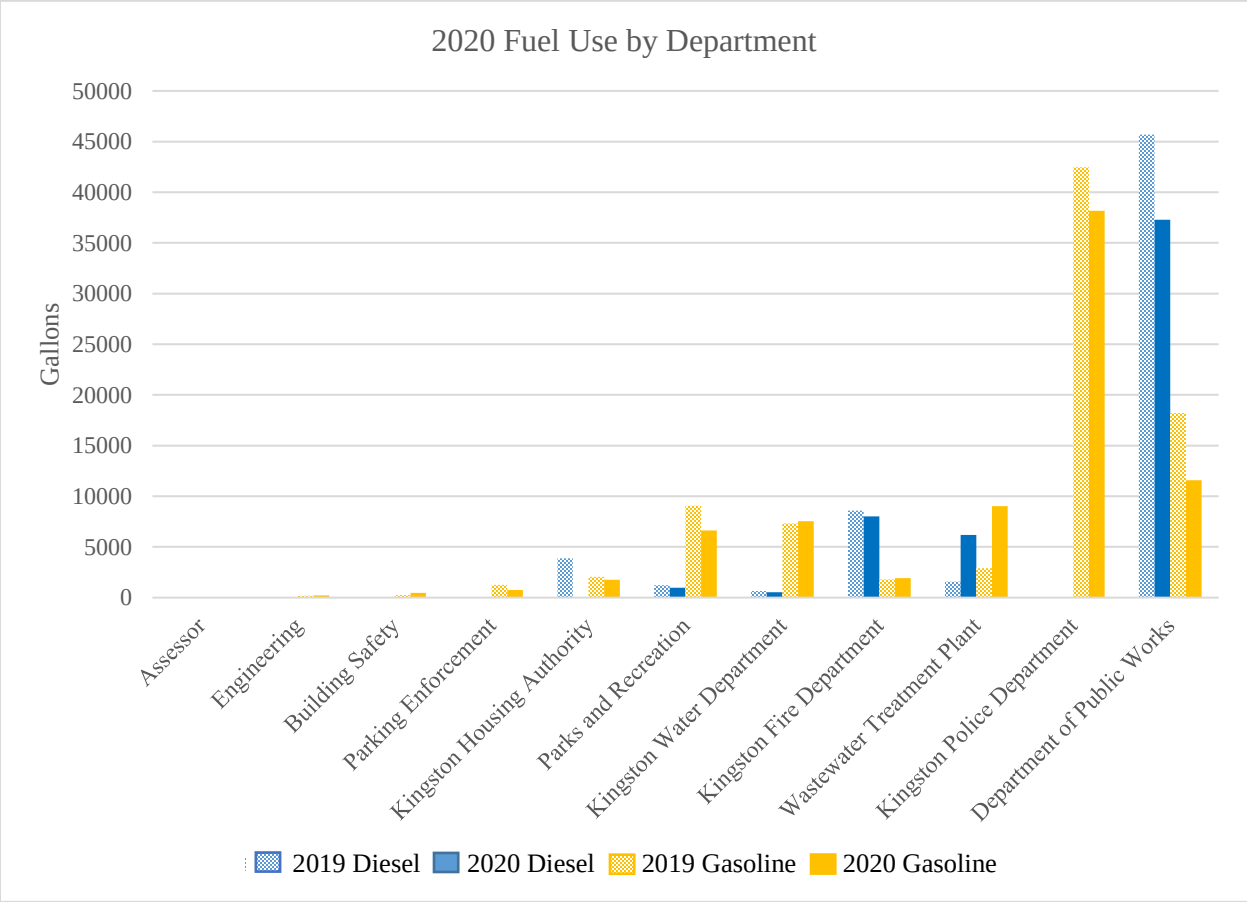
In 2020 the City of Kingston used 103,061 centum cubic feet (CCF) of natural gas to heat offices, community centers, the police station, and other municipal facilities. The top two consumers of natural gas were the Wastewater Treatment Plant (15,673 CCF) and the Department of Public Works Garage Campus Center (14,131 CCF).



Between 2019 and 2020 municipal natural gas use decreased by 31,975 CCF (23.7%). The most significant decrease was seen in the Andy Murphy Midtown Neighborhood Center. Between 2019 and 2020 natural gas use at the Andy Murphy Midtown Neighborhood Center fell by 11,915 CCF (46.7%). This can be attributed to decreased occupancy as a result of the COVID-19 pandemic. All community programming, sports, and events that in the past were held at the Andy Murphy Midtown Neighborhood Center were canceled following statewide shutdowns in March of 2020. As a result, natural gas use was significantly lower during the times at which these events would normally occur, generally nights and weekends.

Fuel

In 2020 the City used 78,058.78 gallons of gasoline and 53,056.9 gallons of diesel. These fuels powered police cars, dump trucks, fire engines, and other administrative vehicles that the City operates. The largest user of gasoline was the Police Department (38,158.39 gal.) and the largest user of diesel fuel was the Department of Public Works (37,290.04 gal.).

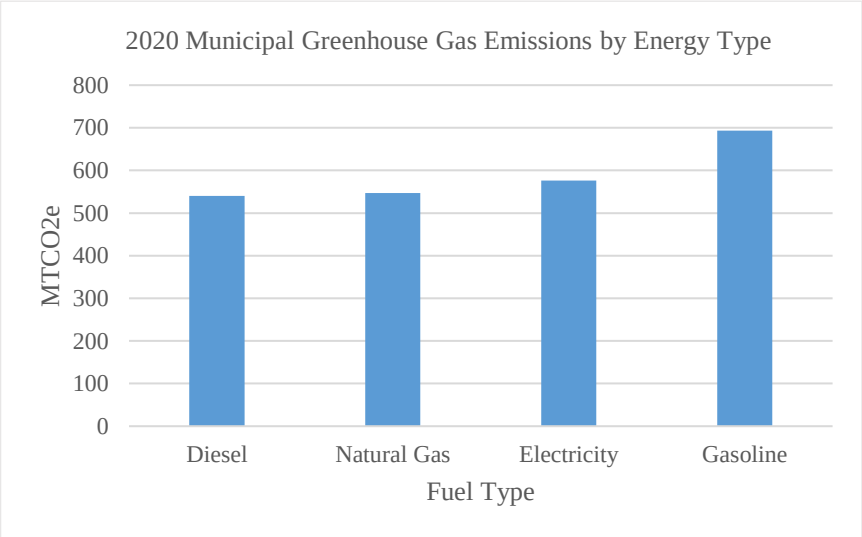


Between 2019 and 2020 municipal gasoline use decreased by 9,720.23 gallons (8.9%), and municipal diesel use decreased by 101,157.06 gallons (25.6%). Municipal vehicle use dropped significantly during the COVID-19 pandemic, and as a result fuel use also decreased. The largest decrease was seen in the Department of Public Works. Gasoline use by the Department of Public Works dropped by 6,650.63 gallons (36.5%), and diesel use dropped by 8,383.37 gallons (18.4%).

Additionally, in June 2019, the Citibus operation was sold by the City of Kingston to Ulster County Area Transit, resulting in the removal of all Citibus assets from the City's municipal fleet inventory. In 2019 the Citibus division utilized 2,187.91 gallons of gasoline and 13,567.83 gallons of diesel.

Inventory Results –2020 Municipal Greenhouse Gas Emissions

In 2020 the municipal operations of the City of Kingston resulted in the emission of 2357.4 Metric Tons of Carbon Dioxide Equivalent (MTCO2e). The following graph represents greenhouse gas emissions per energy type attributed to the 2020 municipal operations of the City of Kingston. All values are represented in MTCO2e.

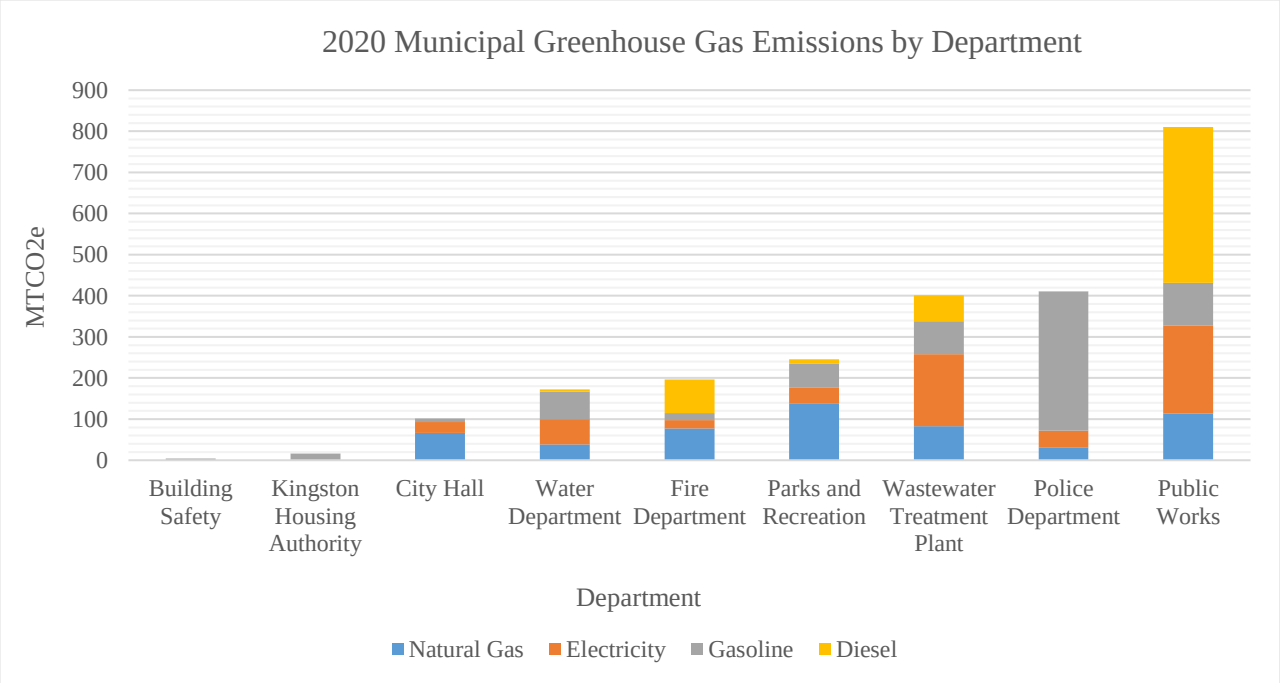


The largest quantity of greenhouse gas emissions were produced through gasoline use for operation of the City of Kingston's municipal fleet.

Departments

The Department responsible for the largest amount of greenhouse gas emissions in 2020 was the Department of Public Works (DPW). DPW was responsible for 810.3 MTCO2e, with almost half coming from diesel use. The City of Kingston Police Department was responsible for the second largest amount of GHG emissions at 410.8 MTCO2e, with more than 80% coming from gasoline use.

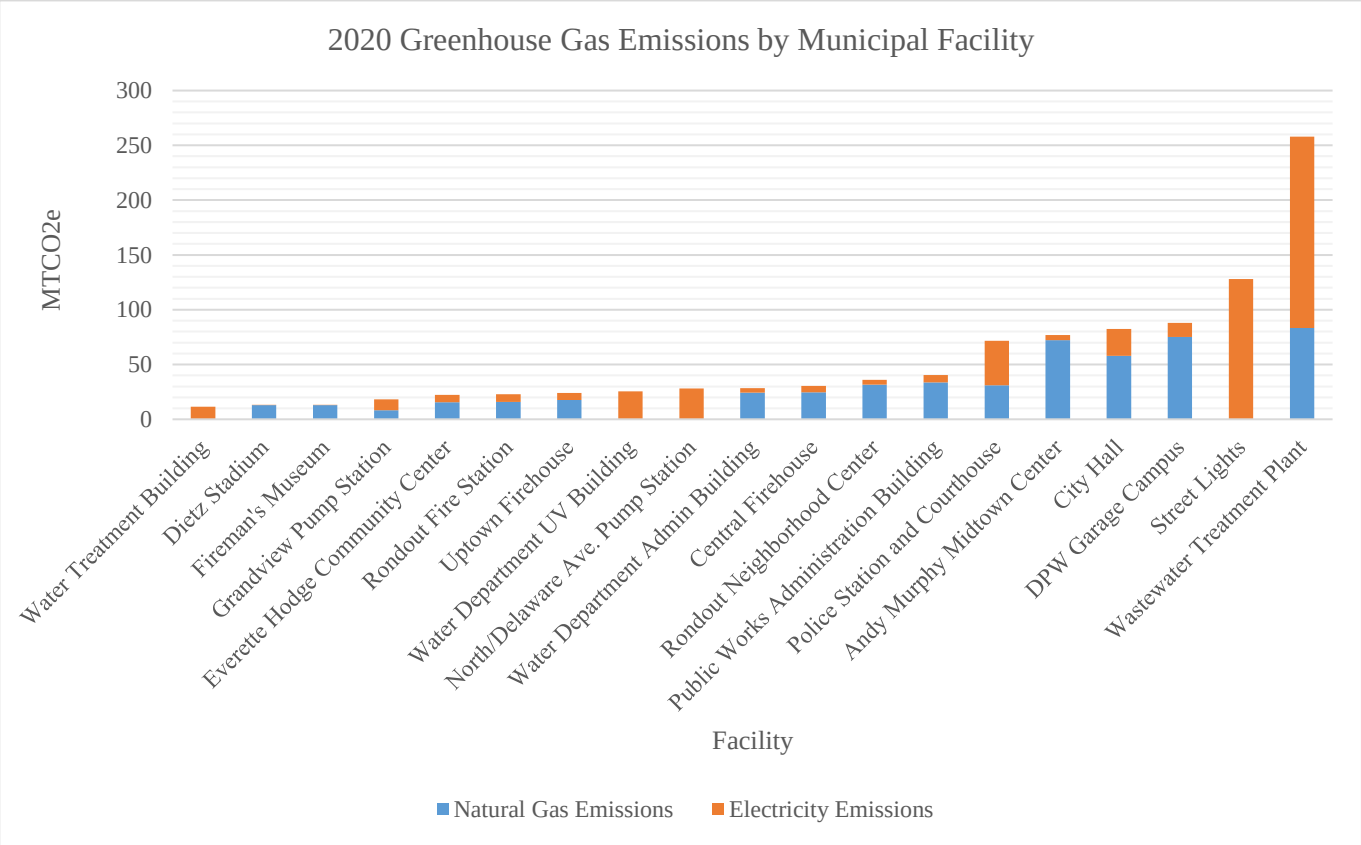
The following graph represents greenhouse gas emissions per City department, parsed out by energy type. All values are represented in MTCO2e.



Facilities

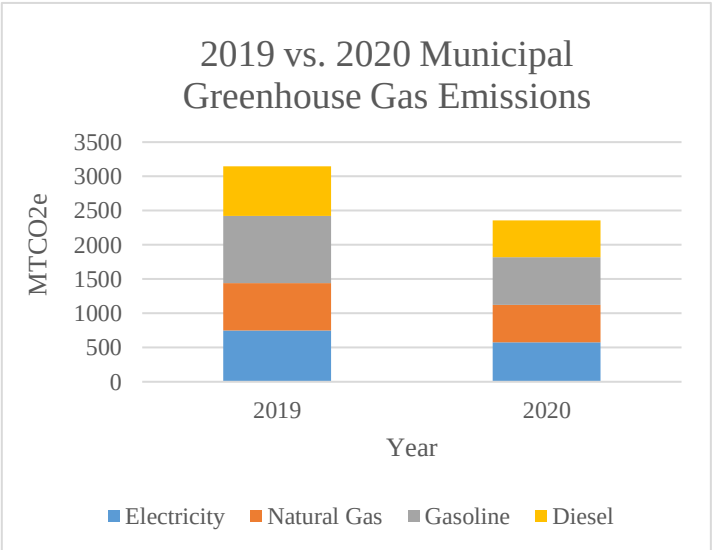
The Wastewater Treatment Plant was the City facility with the largest GHG emissions in 2020 at 259.01 MTCO2e. The facility with the second highest GHG emissions was the operation of the City's 2,472 streetlights at 128.09 MTCO2e.

The following graph represents greenhouse gas emissions per municipal facility. All values are represented in MTCO2e.



2019 vs. 2020

Between 2019 and 2020, municipal greenhouse gas emissions dropped by 802.58 MTCO2e, over 25%. This is largely due to cutbacks during the COVID-19 pandemic, including decreased building occupancy and vehicle use, as well as the sale of Citibus to Ulster County Area Transit. The largest decrease was seen in emissions from gasoline use, which fell from 983.02 $MTCO_2e$ to 693.7 $MTCO_2e$.



Methodology

Data Collection

The information presented in this inventory is limited to local government operations of Kingston's City government. City government can have a direct impact on its cumulative contribution of greenhouse gases through implementation of efficiency projects as well as policy development.

Since 2012 the City of Kingston has utilized the online tool Portfolio Manager to measure and track energy use by City owned facilities. Portfolio Manager is a free online tool managed by the US Environmental Protection Agency (EPA) that allows the City to benchmark electricity and natural gas consumption as well as GHG emissions for each facility (www.portfoliomanager.energystar.gov/).

Electricity and natural gas use data is collected through pulling information from the website operated by the City's energy provider, Central Hudson (www.cenhud.com/esco/usage/). The information collected represents the total kilowatt-hours (kWh) of electricity and centum cubic feet (CCF) of natural gas used by each City facility. By identifying the department that operates each building, as well as the operational category of the facility (Park, Wastewater, Administrative, etc.) the GHG emissions from each building can be attributed to the appropriate classifications.

In 2018 the City of Kingston installed new hardware at its municipal fueling station and new fleet management software – FuelMaster. These devices allow the City to track fuel use and mileage for each vehicle in the fleet. Data was pulled from the FuelMaster program for all City vehicles in 2020 so that the gallons of gasoline and diesel used can be attributed to each department within the City.

Conversion to Greenhouse Gas Emissions

After collecting the data for all energy usage attributed to municipal operations, the information is aggregated into an excel spreadsheet. By using the most up to date conversion factors for each energy source, the City can convert the annual energy use values to volumes of GHG emissions. For this inventory all conversion factors were sourced from EPA websites, details are listed below.

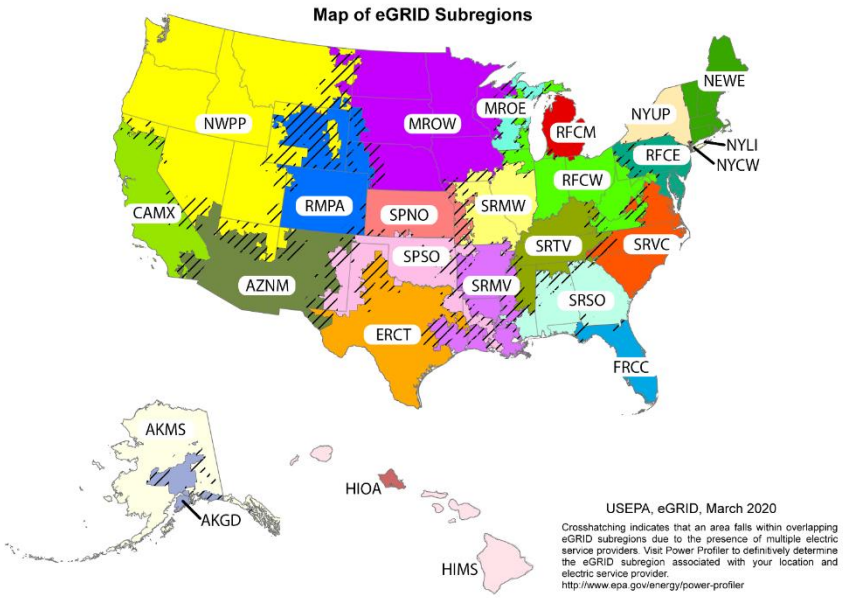
GHG Conversion by Energy Source	Value
GHG Emission Rate for New York State Electricity eGrid NYUP (kgCO2e)/MBtu)	30.98
GHG Emissions from Natural Gas Use (kgCO2e/Mbtu)	53.11
GHG Emissions from Gasoline Use (MTCO2e/Gal)	0.008887
GHG Emissions from Diesel Use (MTCO2e/Gal)	0.01018

GHG Conversion Sources:
https://portfoliomanager.energystar.gov/pdf/reference/Emissions.pdf
https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references

Conversion rates for natural gas, gasoline, and diesel fuel are based on the national footprint of those industries, and the emissions associated with combustion of each energy type. Alternatively, conversion rates for electricity are regional, owing to the fact that each power grid in the United States pulls its electricity from a varying percentage of fossil fuels and "clean" energy. Incidentally,

the regional grid in which the City of Kingston is located -- New York Upstate (NYUP), has the lowest greenhouse gas conversion value in the Country, making it the least impactful electrical grid in the United States with respect to greenhouse gas emissions. NYUP's conversion rate is 30.98 kgCO2e/MBtu, while the national average is 118.21 kgCO2e/Mbtu.

eGRID Regional Description	eGRID Acronym	$CO2_{eq}$ Emissions (kg/MBtu)
South/Central Alaska	AKGD	149.00
Most of Alaska	AKMS	73.28
Southwest US	AZNM	127.20
Southwest Coast	CAMX	60.52
Most of TX	ERCT	115.97
Most of Florida	FRCC	114.93
HI excluding Oahu	HIMS	158.94
Oahu Island	HIOA	227.00
Eastern WI	MROE	201.08
Upper Midwest	MROW	147.09
New England	NEWE	65.65
Northwest US	NWPP	95.70
New York City	NYCW	73.79
Long Island, NY	NYLI	162.04
Upstate NY	NYUP	30.98
Puerto Rico	PRMS	205.16
Mid Atlantic	RFCE	92.85
Most of Michigan	RFCM	159.12
Ohio Valley	RFCW	142.83
CO-Eastern WY	RMPA	166.24
KS-Western MO	SPNO	143.25
TX Panhandle-OK	SPSO	133.83
Lower Mississippi	SRMV	107.62
Middle Mississippi	SRMW	212.16
SE US, Gulf Coast	SRSO	129.48
Tennessee Valley	SRTV	127.03
Virginia/Carolina	SRVC	90.28
National Average		**118.21**



Conclusions

Comparisons and Reductions

In 2010 the City of Kingston set the municipal operations GHG emissions baseline at 5,022 MTCO2e. In 2020 the municipal operations of the City of Kingston resulted in the emission of 2,357.4 MTCO2e, a 46.9% reduction in overall GHG emissions since 2010. This reduction can be attributed to the many green efforts that the City has implemented such as purchasing electric vehicles, retrofitting buildings with LED lighting, and converting the City's street lights to LEDs. This reduction can also be attributed to the extensive transition of the New York State power grid to renewable energy sources such as wind, solar, and hydro-power.

In 2020, the impacts of the COVID-19 pandemic on municipal greenhouse gas emissions were evident. New York State went into emergency lockdown in March 2020, resulting in shutdown of the City of Kingston's non-essential government operations. As a result, community programming, building occupancy, and vehicle use all fell substantially. In the single year, between 2019 and 2020, municipal greenhouse gas emissions dropped by 802.58 MTCO2e, over 25%. This is largely due to cutbacks.

Additionally, EPA greenhouse gas equivalencies for the Upstate New York utility grid have been updated since the publication of the City's previous Greenhouse Gas Emissions Inventory. Between 2019 and

2020, greenhouse gas emissions associated with electricity use fell from 39.35 to 30.98 kgCO2e/MBtu due to expanding green energy infrastructure in the NYUP eGrid region.

The City of Kingston 2019 Greenhouse Gas Emissions report can be found online at www.kingston-ny.gov/sustainability.

Next Steps

By identifying the largest consumers of energy and leading emitters of greenhouse gas within the City of Kingston's municipal operations, the City can focus efforts to continue a downward trend in overall GHG emissions. With gasoline as the energy source with the largest attributable GHG emissions, and use of the City's fleet as the municipal operation with the largest associated emissions, the City should focus efforts on reducing the amount of fuel consumed through the continued purchase of electric vehicles, idling reduction policies, and other fleet management efforts. By identifying the Wastewater Treatment Plant, the DPW Garage Campus, and City Hall as the three buildings with the highest GHG emissions the City should continue to focus energy efficiency efforts on these buildings to continue to reduce their overall impact.

It is forecasted that the GHG emissions from the municipal operations of the City of Kingston could be higher in 2021. This is due to the reopening of City buildings and an uptick in municipal fleet use. However, current energy efficiency projects such as the installation of insulating interior window inserts in City Hall, the completion of the City's efforts to convert street lights to LEDs, and energy efficiency projects at other City owned facilities will continue to contribute to reductions in the City of Kingston's environmental impacts.