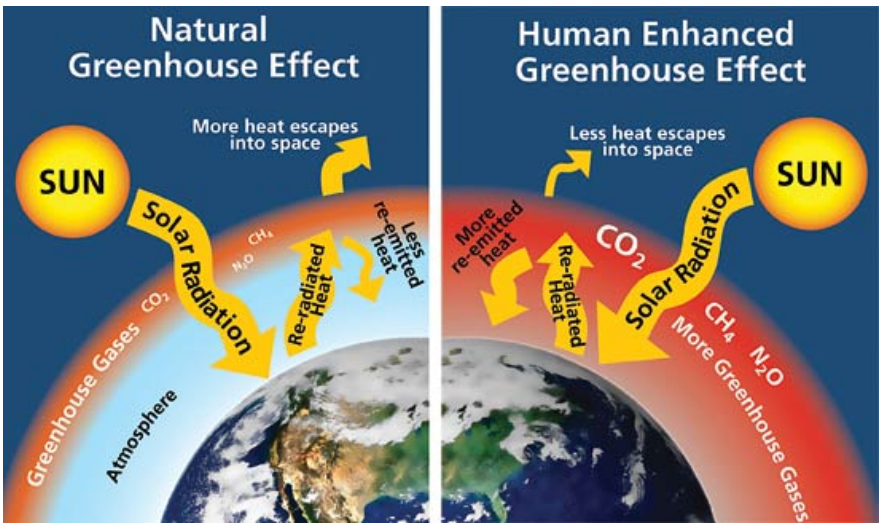
CLIMATE ACTON PLANNING & MITIGATION:
Base Year 2016 Greenhouse Gas Inventory Results

Taking Action on Climate Change

The City of St. Petersburg is taking bold action to reduce its contributions to global climate change, shift to clean energy sources, and enhance the overall sustainability and resiliency of the city. For the first time, the City is comprehensively developing an Integrated Sustainability Action Plan (ISAP) to guide this action. The purpose of the ISAP is to advance the city's sustainability & resiliency initiatives including 100% clean energy goals. A significant component of the ISAP is to assess the city's greenhouse gas (GHG) emissions and identify opportunities to reduce them. The ISAP will utilize the information gathered by the city's first-ever GHG inventory and focus on activities that can achieve the greatest emission reductions in the most cost-effective manner, while also promoting equity and resiliency throughout St. Pete.

What are Greenhouse Gases and How are Humans Contributing to Climate Change?

Greenhouse gases (GHGs) are gases generated by natural and man-made activities that trap heat in the atmosphere. Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), and fluorinated gases like hydroflourocarbons contribute to global warming. While some amount of GHGs are necessary to trap enough heat within our atmosphere to maintain life, there are now too many GHGs, which trap increasing amounts of solar heat, thus causing global warming.



Source: W. Elder, National Park Service

CO_2 is the primary greenhouse gas and driver of climate change. While other emissions have a higher global warming potential, it is common practice to report all GHGs as carbon dioxide equivalents.

Human activities are responsible for most of the increase in greenhouse gases in the atmosphere over the last 150 years[1]. Significant sources from human activity in the U.S. include the burning of fossil fuels for electricity, heat, and transportation, as well as process emissions from decomposition or incineration of solid waste.

Why do a Greenhouse Gas Inventory?

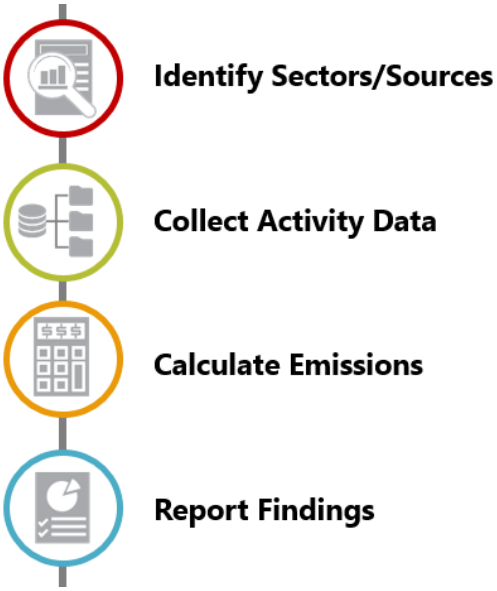
Conducting a greenhouse gas (GHG) inventory allows the city to understand its contribution to accelerated global climate change. It is essential to understand the largest sources of emissions in order to target them for reductions and to measure reduction progress over time. Because most emissions are related to energy and fuel use, a GHG inventory also helps the city to identify cost savings opportunities.

St. Pete is doing a GHG inventory with other leading communities in Florida and around the world to be a part of the solution in reducing emissions and the acceleration of climate change. St. Pete is also currently planning and constructing projects that will adapt to current and projected changes in climate like the extreme weather events experienced in recent years.

How Did St. Pete complete its GHG Inventory?

The City utilized nationally and internationally recognized methodologies for completing its GHG emissions inventories for both municipal operations as well as community-wide. The inventory was completed for the baseline year 2016. Data was collected from representatives within the City of St. Pete, Pinellas County, State agencies, as well as Duke Energy and TECO Energy.

The municipal operations inventory was prepared in accordance with the *Local Government Operations Protocol* (LGOP), which standardizes the quantification and reporting of GHG emissions associated with government



[1] IPCC (2007). Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis*.

operations.[2] The preparation of the community-scale inventory is consistent with the *Global Protocol for Community-Scale Greenhouse Gas Emission Inventories* (GPC),[3] a protocol that has the expressed purpose of establishing a consistent methodology of calculating and reporting city-wide GHG emissions. The following sections summarize the results of these two inventories.

Community-Scale Inventory

This community-wide greenhouse gas (GHG) emissions inventory attempts to capture all GHGs generated from activities that occurred within the City of St. Petersburg, Florida in 2016. These emissions include those resulting from municipal government operations, as well as from activities of the residents and businesses within the city.

The sources of community-wide emissions include: fuel combustion in buildings (and associated fugitive emissions); grid-supplied electricity consumption (and associated transmission and distribution losses); fuel burned in road vehicles, during waterborne navigation, and by aircraft; the decomposition and incineration of solid waste; process emissions from wastewater treatment; and from fertilizer applications in the City's parks and golf courses.

The GPC requires the measurement and disclosure of GHG emissions based on production and consumption activities that take place within the city boundary (i.e., city-induced framework). It also requires that the reporting of these emissions be based on where they are physically released (i.e.,

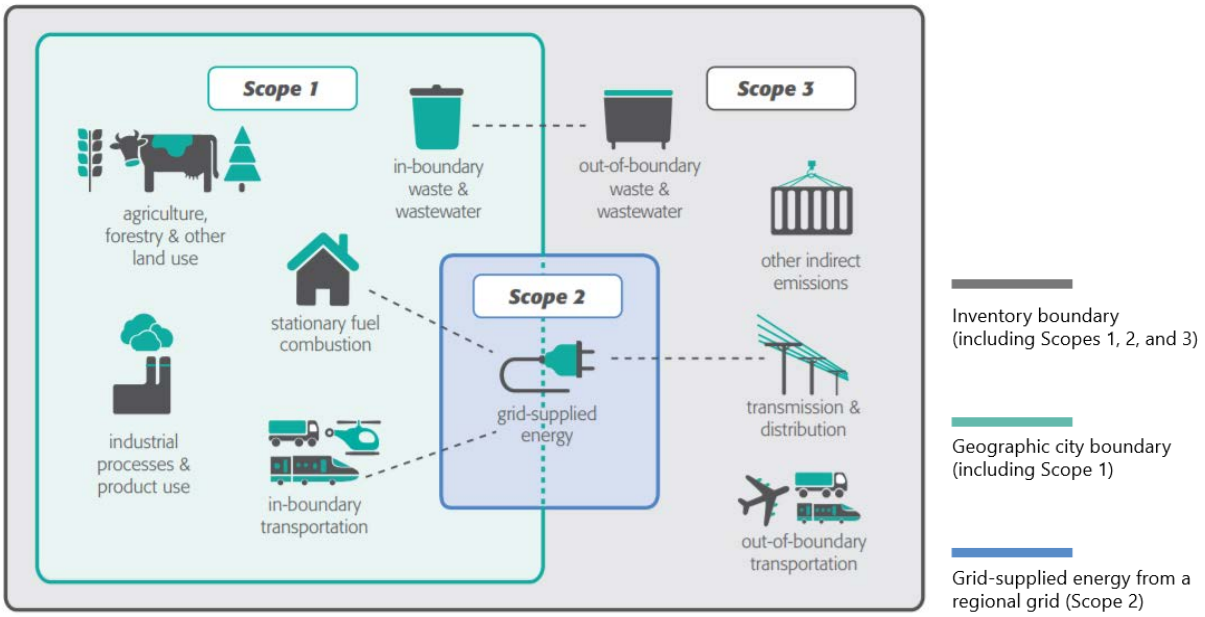
[2] California Air Resources Board, California Climate Action Registry, ICLEI – Local Governments for Sustainability, and The Climate Registry. (2010). *Local Government Operations Protocol*: *For the quantification and reporting of greenhouse gas emissions inventories.* Retrieved from https://www.arb.ca.gov/cc/protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf

[3] World Resources Institute, C40 Cities Climate Leadership Group, and ICLEI – Local Governments for Sustainability (ICLEI). (2014). *Global Protocol for Community-Scale Greenhouse Gas Emission Inventories*. Retrieved from http://www.ghgprotocol.org/sites/default/files/ghgp/standards/GHGP_GPC_0.pdf

scopes framework). For categorizing emissions by the location of their release, the GPC provides the following scope definitions:

- Scope 1 – GHG emissions from sources located within the city boundary;
- Scope 2 – GHG emissions occurring as a result of the use of grid-supplied electricity, heat, steam, and/or cooling within the city boundary; and
- Scope 3 – All other GHG emissions that occur outside the city boundary as a result of activities taking place within the city boundary.

Figure 1: Global Protocol for Community - Scopes Framework



Total community-wide emissions in St. Petersburg in calendar year (CY) 2016 were approximately 2.7 million metric tons of CO_2e. Figures 3 and 4 provide the results by Scope and Sector respectively. It would require new forest one and a half times the size of Yellowstone National Park to sequester this amount of annual community-wide emissions.

Figure 2: Community GHG Emissions by Scope

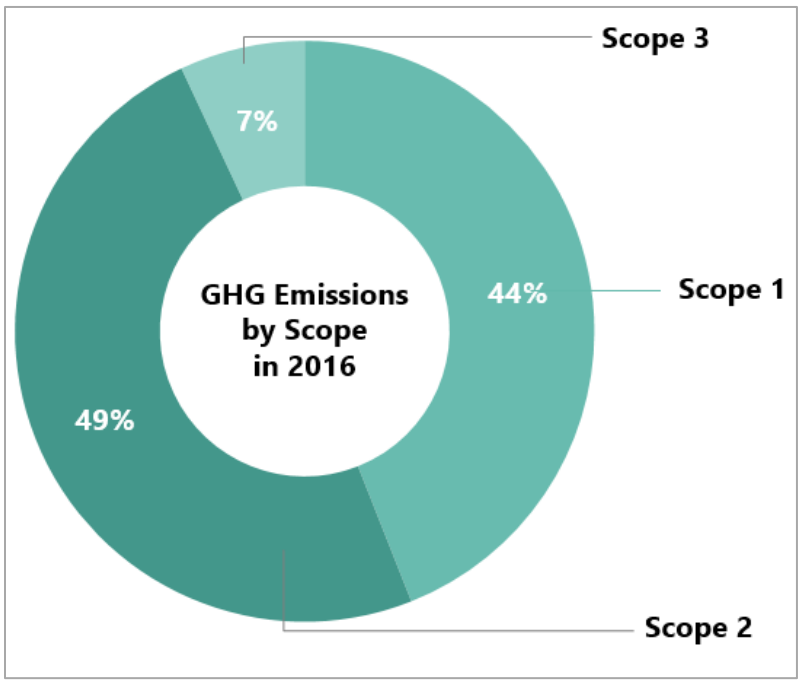
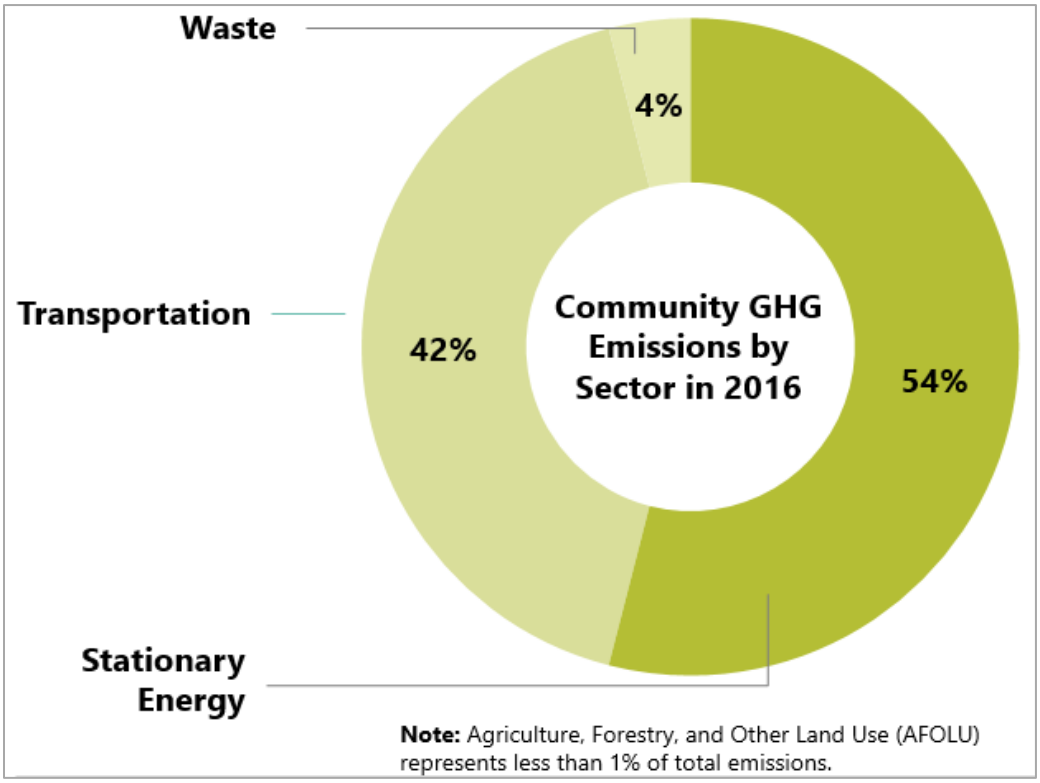
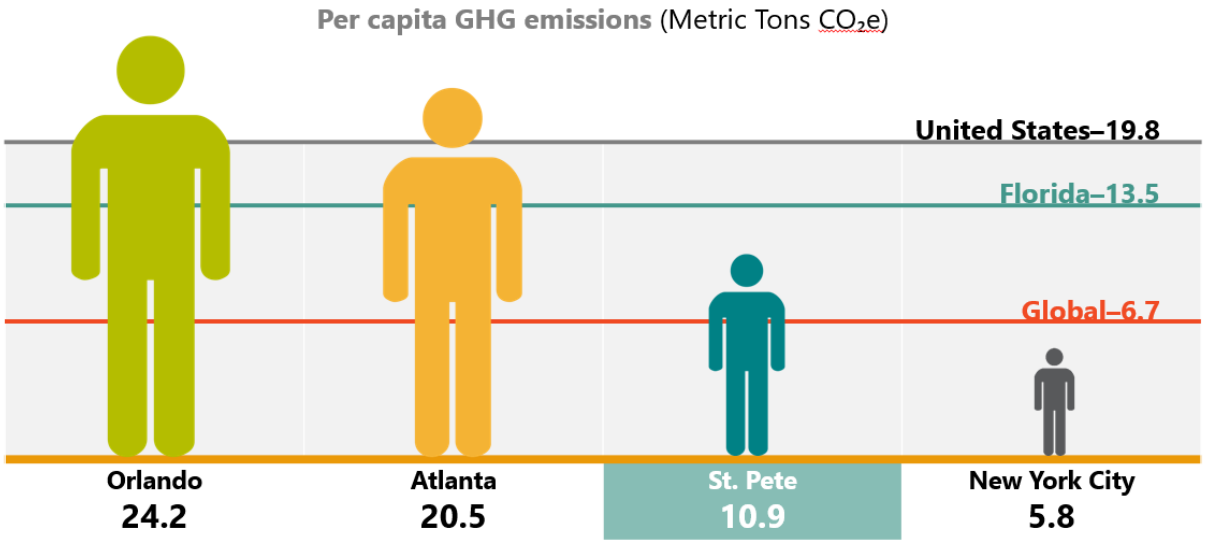


Figure 3: Community GHG Emissions by Sector



St. Pete's GHG emissions are 10.9 metric tons of CO_2e per capita based on the population of the city in 2016 (253,585).[4] As seen below, St. Pete's per capita GHG emissions are lower than national and state averages, but still greater than the global average and that of denser and more transit-oriented cities like New York.

Figure 4: Emissions Per Capita Comparison



[5]

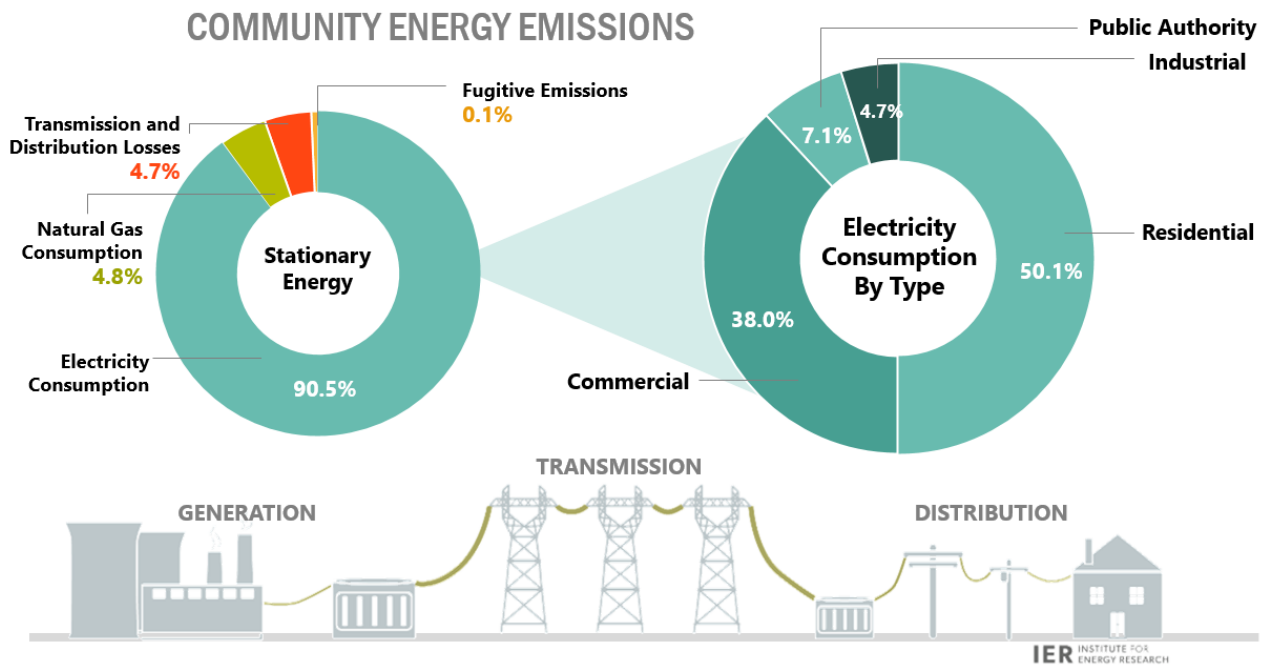
As shown in Figure 3, stationary energy consumption is responsible for the largest portion of community-wide GHG emissions in St. Pete. A more detailed breakdown of this significant source of emissions can be seen in Figure 5 below.

As the Stationary Energy and Transportation sectors are the largest contributors to St. Petersburg's community-wide GHG emissions, they represent the greatest opportunities for overall emissions reduction. Reductions in the Stationary Energy sector could be achieved through significant energy efficiency programs and a large-scale shift to cleaner sources of fuel used to condition homes, businesses, institutions, and industries; such strategies will be highlighted in the Clean Energy Roadmap being developed as part of the ISAP.

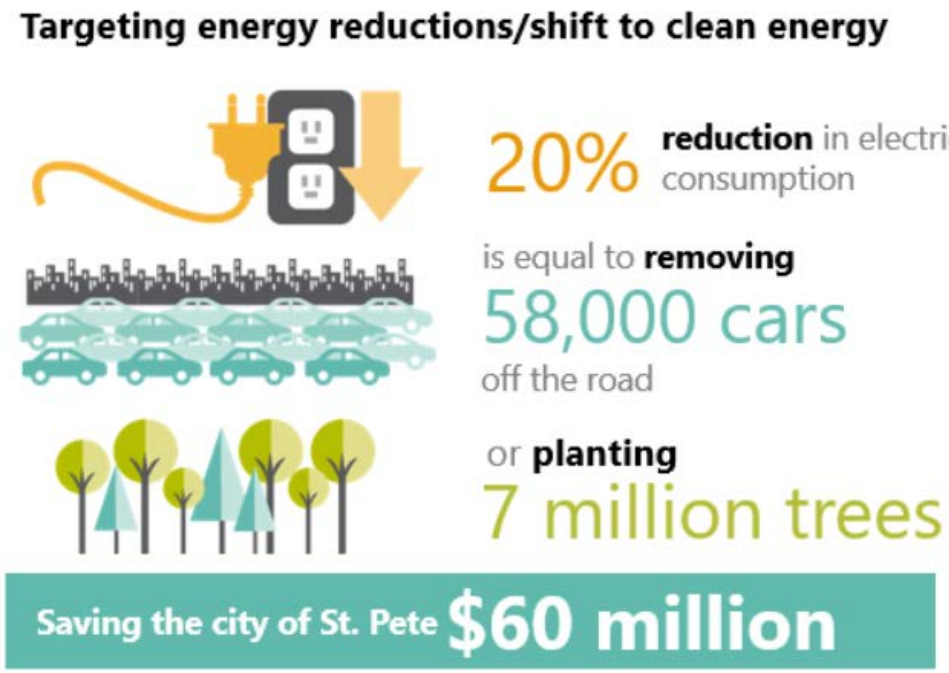
[4] United States Census Bureau. (2016). *2012-2016 American Community Survey 5-Year Estimates*. Retrieved from https://factfinder.census.gov/

[5] *Sources:* United States, Florida, Global: WRI, CAIT Climate Data Explorer; Orlando: 2010 data, http://www.cityoforlando.net/greenworks/energy-and-green-buildings/ ; Atlanta: 2016 data, https://data.cdp.net/Cities/2016-Citywide-Emissions-Map/iqbu-zjaj/data NYC: 2016 data, https://data.cdp.net/Cities/2016-Citywide-Emissions-Map/iqbu-zjaj/data

Figure 5: Breakdown of Stationary Energy Emissions



The benefits of just a 20 percent reduction in electricity consumption would be significant for reducing GHG emissions, enhancing grid resilience, and saving residents and business-owners money.



Regarding the Transportation sector, emissions reduction could similarly be achieved by transitioning to cleaner sources of fuel used to power vehicles traveling within and across the City's boundaries. This could be achieved by advancing the adoption of electric and other alternative fuel vehicles and the provision of related infrastructure, as well as through improved efficiency of on-road vehicles through transportation system management (i.e., managing flow and speed through synchronized and adaptive traffic controls). Importantly, reduction in this sector will also need to be achieved by reducing single occupancy vehicle miles traveled and shifting people into different transportation modes. This will require investments in bike, pedestrian, and transit infrastructure, as well as smart transit-oriented land use development decisions to ensure residents have efficient access between home, employment, and services. Doing so will also meet an important need in attracting and retaining the workforce needed to support a growing local economy.

TABLE 1: Community Scale GHG Emissions Summary (2016)		
Sector	**Scope**	**CO2e (metric tons)**
Stationary Energy		
Natural gas consumption	1	71,314
Fossil fuels extraction and processing	1	1,027
Electric grid-supplied energy	2	1,356,551
Transmission/distribution losses from electric grid	3	70,541
Transportation		
On-road transportation	1	1,119,824
Waterborne transportation	1	24,480
Aviation	1 and 3	2,501
Waste		
Solid Waste Disposal (landfills)	3	20,171
Incineration and Open Burning	3	92,316
Wastewater treatment and discharge		
Generated and treated within the city boundary	1	6,124
Generated outside the city boundary but treated within the city boundary	1	1,405

Municipal Government Operations Inventory

The municipal GHG inventory for the City of St. Petersburg, Florida categorizes the government's emissions by what the municipality owns and controls, identifying emissions as either direct or indirect, and reported by scope. For the purposes of reporting, the LGOP provides the following scope definitions:

Scope 1 – All direct GHG emissions from sources owned by city.

Scope 2 – Indirect GHG emissions associated with the consumption of purchased or acquired electricity, steam, heating, or cooling.

Scope 3 – All GHG emissions from sources not owned or directly controlled by city such as emissions from the extraction and production of purchased materials, transport-related activities (employee commuting, outsourced activities such as waste disposal).

In CY 2016, the City of St. Petersburg's municipal operations were responsible for the emission of 87,364 metric tons of carbon dioxide equivalent (CO_2e). The breakdown of emissions by scope, sector, and source is listed in **Table 2.**

TABLE 2: Municipal Operations GHG Emissions Summary (2016)

Sector	Source	2016 CO_2e (metric tons)
SCOPE ONE		
Buildings and Other Facilities	Non-electric energy consumption	815
Vehicle Fleet	Mobile and Stationary combustion of fuel	12,044
Waste Water Facilities	Process and Fugitive Emissions	7,529
		SCOPE ONE TOTAL | 20,388
SCOPE TWO		
Buildings and Other Facilities	Purchased Electricity	42,330
		SCOPE TWO TOTAL | 42,330
SCOPE THREE		
Solid Waste	Emissions from landfill and combustion of MSW	17,769
Employee Commute	Mobile combustion of vehicle fuel	6,877
		SCOPE THREE TOTAL | 24,647
		TOTAL | 87,364 metric tons

Typical of municipal governments, the largest source of emissions is from Buildings and Facilities. The majority of this is from electricity use in buildings, outdoor lighting, and water/wastewater pumping equipment.

Figure 6: Municipal Operations GHG Emissions by Sector

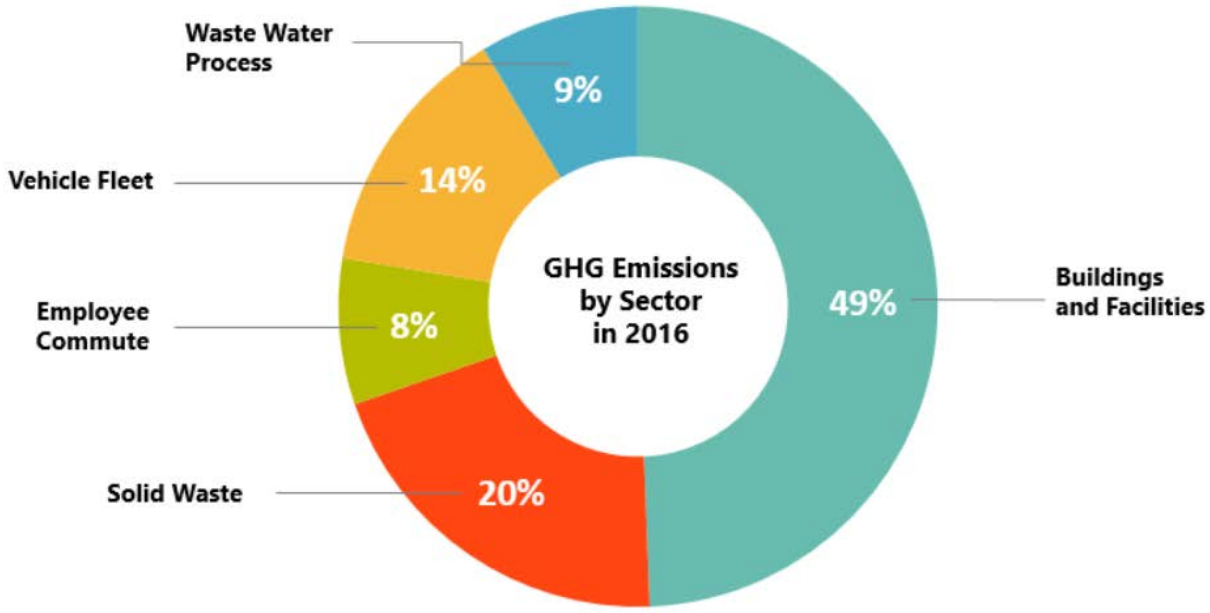


Table 3: Municipal Energy Consumption and Emissions, by End Use Type		
Facility Type	**Energy Consumption (MMBtu)**	**Metric Tons CO_2e**
Buildings	228,696	29,640
Outdoor Lighting	87,109	11,772
Pumps	10,709	1,447
Marine Power Source	1,287	174
Outdoor Power Source	790	107
Security Equipment	33	4
TOTAL	**328,624**	**43,145**

As Buildings and Other Facilities are the largest contributor to the City's overall emissions, it represents the greatest opportunity for significant emissions reduction. The City completed a series of energy audits for its facilities, but the majority of these were completed nearly a decade ago, and the City should consider re-commissioning energy audits at its portfolio of facilities and incorporate any resulting recommendations into its capital improvement program. Significant reductions will also be achieved as the City continues the process of converting streetlights and outdoor lighting to more efficient LEDs. The City has already begun such conversions and should see significant energy savings, associated cost savings, and emissions reductions after this baseline year of 2016. The City may also consider leading by example in St. Pete's clean energy commitments by pursuing renewable energy opportunities for its facilities and operations, which will also reduce GHG emissions.

The second largest source of emissions within municipal operations comes from the solid waste, which generates emissions through decomposition in a landfill as well as through incineration. Reductions in this sector could be achieved by conducting waste audits at the City's facilities, reducing overall waste produced by reviewing purchasing policies and procedures, and/or increasing the diversion rate through enhanced signage and recycling and composting opportunities. Any efforts to improve the City's diversion rate should be accompanied by a robust educational campaign to ensure human behavior supports these coordinated efforts.

Other opportunities to reduce the City's municipal GHG emissions can be achieved by continued replacements within the vehicle fleet with more efficient and alternative fueled vehicles, as well as through efforts that attempt to shift employees to different modes of transportation for their daily commutes (i.e., away from single-occupancy vehicles). This may include a carpool program, the provision of more enhanced public transportation incentives, or incentives to encourage walking or biking to work.

Municipal Operations

In CY 2016, the City of St. Petersburg's municipal operations were responsible for 87,364 $mtCO_2e$.

Approximately 49% of this was from buildings and operations.

Reducing Overall Waste

The second largest contributor of emissions within municipal operations is from the generation of solid waste (17,769 mtCO2e).

Solid waste sector reductions could be achieved through an increased diversion rate.

Daily Commuting Habits

Additional opportunities for reduction can be achieved by shifting employee commutes to different modes (i.e., away from driving alone).

Employee commutes were responsible for 6,877 mtCO2e.