Wilkins Township

Greenhouse Gas Emissions Inventory Report

April 2010

DUQUESNE UNIVERSITY

Prepared by
Center for Environmental Research and Education
Duquesne University

Wilkins Township, Pa.

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Executive Summary

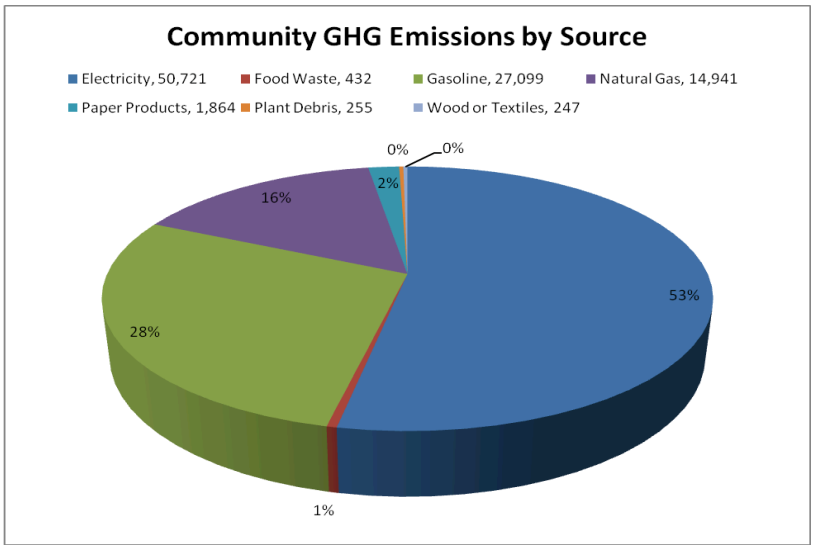
Due to increasing energy demands and the rising cost of fossil fuels, as well as concern over climate change, many municipalities have begun to look for ways to reduce their emissions of greenhouse gases and related energy consumption. Recognizing that significant action on this issue can take place at the local level, Wilkins Township has engaged in the task of preparing a greenhouse gas (GHG) emissions inventory and climate action plan.

This GHG Inventory is made up of the 2008 greenhouse emissions data recorded for the Township and community of Wilkins. Funded by the Pennsylvania Department of Environmental Protection (PADEP) Local Government Greenhouse Gas Pilot Grant Program, this project provides Wilkins with a foundation on which to build a program which could reduce township and community GHG emissions. It was prepared by graduate students of the Center for Environmental Research and Education (CERE) at Duquesne University under the direction of Dr. Stanley Kabala, Associate Director of CERE.

The CERE team used the ICLEI Clean Air/Climate Protection (CACP) municipal GHG emissions inventory software tool to translate Wilkins data into a measure of GHG emissions measured in terms of carbon dioxide equivalent (CO_2e). The CACP calculator looks separately at community-level and government-level sources of GHG emissions, and divides the community-level analysis into six categories and the government-level analysis into 13 categories. Each applicable category for the community and government analysis is described in the GHG Inventory.

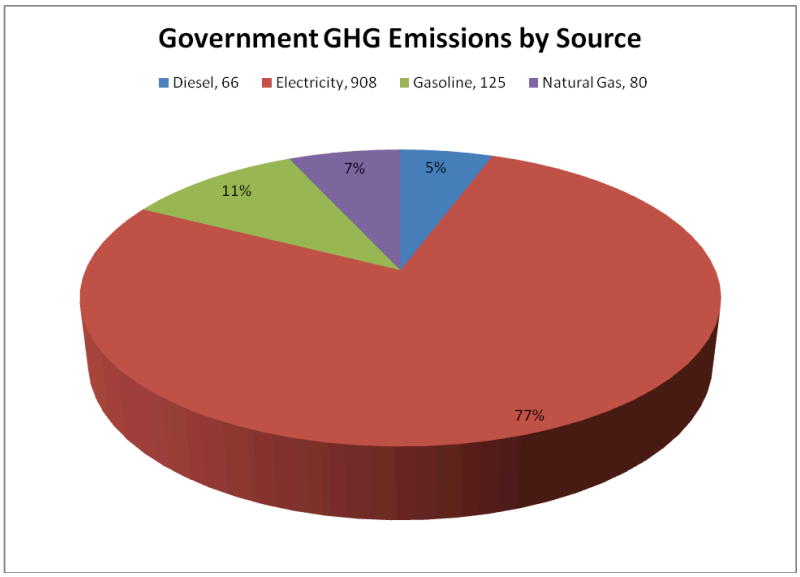
In 2008, Wilkins Township was responsible for GHG emissions of approximately 96,737 tons of CO_2e. Of this, 95,558 tons were derived from the community sector, while 1,179 tons came from the government sector. The following charts present community and government emissions according to the sources of energy that produced them.

Within the community sector electricity was accountable for 53% of the GHG emissions followed by gasoline, natural gas, paper products, and food waste with 28%, 16%, 2%, and 1% respectively.



Wilkins Community Emissions by Source

Within the government sector electricity was accountable for 77% of the GHG emissions, followed by gasoline, natural gas, and diesel with 11%, 7%, and 5% respectively.



Wilkins Government Emissions by Source

While the primary focus of this document is to report on the quantity and sources of GHG emissions in Wilkins Township, the information it contains also forms the basis for a Climate Action Plan that will provide Wilkins with a tool to reach CO_2 emissions reduction goals.

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Background

Climate Change Science: An Introduction

Greenhouse gases (GHG)—sometimes referred to as or heat-trapping gases—include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and chlorofluorocarbons (CFC). GHG essentially trap heat in the atmosphere by absorbing it as it radiates from the earth. As the sun beams solar radiation onto the earth's surface, a share of that light energy is absorbed by the earth and re-radiated into the atmosphere as heat. Of the energy that is re-radiated, some is trapped by GHG in the atmosphere. As concentrations of GHG in the atmosphere rise, more heat is trapped. While some level of GHG is essential for maintaining livable temperatures on the planet, excess levels lead to warming, that is predicted to have dramatic effects on the earth's climate, including impact on human health, damage to agriculture, extreme weather conditions like droughts, flooding and more intense hurricanes, and shrinking coastlines due to rising sea levels. As GHG concentrations increase, other factors come into play. For example, the oceans, which absorb large quantities of CO_2, can become, with the effect that more CO_2 will remain in the atmosphere.

Evidence for climate change has accumulated from many sources. The most definitive, that from the United Nations Intergovernmental Panel on Climate Change (IPCC), has lead to the resounding conclusion that "Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level." (IPCC 4th Assessment Report, Summary for Policymakers, 2007)

Wilkins Township

Wilkins Township is a hilly and heavily wooded municipality 2.75 square miles in size located 11 miles east of Pittsburgh. According to the 2000 Census, its population is 6,917. Wilkins became a political subdivision of the Commonwealth of Pennsylvania in 1821. Coal mining began in the areas in the latter part of the 1800s, and by the early 20th century the township had begun its manufacturing history with the construction of the Westinghouse Foundry in Linhart.[1]

Allegheny County's largest sources of income as of 2002, in ranking order are: management of companies and enterprises, mining, and utilities. Within the county, the industries which employ the most workers are: General Medical and Surgical Hospitals; Colleges, Universities, and Professional Schools; Management of Companies and Enterprises; and full-service restaurants.[2]

[1] ***http://www.wilkinstownship.com/wilkinshistory.htm***

[2] ***http://smpbff2.dsd.census.gov/TheDataWeb_HotReport/servlet/HotReportEngineServlet?reportid=4ae38211e32c8caaf1bebe33a8ee7d36&emailname=whazard@census.gov&filename=ed_econ_gen_v2.hrml***

The total number of Wilkins residents working as of 2008 was 8,420, with[3] 17.6% in Administration & Support, Waste Management and Remediation; 17.6% in Information; 15.3% in Professional, Scientific, and Technical Services; 14.7% in Retail Trade; 10.7% in Construction, and 6.8% in Accommodation and Food Services. Of the Wilkins Township's working residents, 10.5% work in the City of Pittsburgh, 6.5% in Penn Hills CDP, and 3.9% work in Monroeville. The remaining 79.1% of residents commute to various other locations. [3]

Local Action

In 2008 Pittsburgh City Council adopted the Pittsburgh Climate Initiative (PCI), which seeks to raise awareness and engage Pittsburgh's residents, businesses, government agencies, and institutions of higher learning in reducing GHG the city. The PCI aims to reduce the City's GHG emissions by 20% by 2023. The PCI is supported through grants from the Roy A. Hunt Foundation, The Heinz Endowments, and the Surdna Foundation.[4]

In late 2009, the Pennsylvania Environmental Council initiated a GHG emissions inventory for Allegheny County's municipal operations.[5]

[3] ***Schwartz, Bob, Southwestern Pennsylvania Commission, Pittsburgh PA, Email Correspondence, 2010***
[4] ***http://www.pittsburghclimate.org/aboutUs.htm***
[5] ***http://www.pecpa.org/about_us***

A. Reasoning, Methodology & Model

Wilkins Township's GHG emissions inventory was conducted by graduate students from Duquesne University's Center for Environmental Research and Education in partnership with municipal staff. Wilkins joined ICLEI-Local Governments for Sustainability to gain user access ICLEI's Clean Air and Climate Protection (CACP) software. The purpose of the baseline emissions inventory is to determine the levels of the municipality's GHG emissions in the base year, 2008. This inventory project was funded by the PADEP Local Government Greenhouse Gas Pilot Grant Program for municipalities throughout the state.

ICLEI's Cities for Climate Protection inventory methodology allows local governments to systematically calculate and track GHG emissions from energy use, air conditioning and waste management and disposal in both municipal functions and at the community scale. As of February 2009 550 cities, towns, and counties across the U.S. have joined ICLEI, which has approximately 1000 members worldwide.[6]

Once completed, such an inventory provides the basis for creating emissions forecast and reduction target, as well as enabling the quantification of emissions reductions associated with implemented and proposed measures.

1. ICLEI's Emissions Analysis Software

As noted, there are over 1000 registered users of the CACP emissions calculator, including cities, counties, townships, regional planning districts, air quality authorities, universities, consulting firms, numerous state government agencies, and the U.S. Environmental Protection Agency (EPA). [23] This software tool estimates emissions derived from energy consumption, air conditioning, and waste generation within a community. The CACP calculator uses up-to-date conversion factors to translate readily available data like electricity and natural gas usage into tons of carbon dioxide equivalent (CO_2e) emissions. CO_2e is a representation of total emissions of various GHG in which each GHG is weighted according to its global warming potential relative to carbon dioxide. For example, methane is twenty-one times more powerful than carbon dioxide in its capacity to trap heat, so the model converts one ton of methane emissions to 21 tons of CO_2e. This conversion allows for an accessible comparison of GHG.

In most cases, the data inputs for the CACP calculator are obtained simply by surveying utility bills and purchase receipts for the appropriate usage units (kWh, MCF, gallons, etc.). The following section summarizes the data needed for each emissions category, the source from of the data, and any assumptions that were incorporated. The model depends upon numerous assumptions, and it is limited by the quantity and quality of available data. With this in mind, it is useful to think of any specific number generated by the model as an approximation rather than an exact value.

[6] ***http://www.icleiusa.org/about-iclei/faqs/general-information-faq***

2. Local Government Operations Protocol (LGOP)

In the process of developing the GHG emissions inventory, the CERE team relied on the Local Government Operations Protocol, a format developed by the California Air Resources Board, California Climate Action Registry, and ICLEI to serve as a standardized guideline for use by local governments in quantifying and reporting GHG emissions related to government operations.

3. Sources of Data for the Inventory

Beginning with municipal operations, and then expanding to industrial and community sectors, the CERE team gathered data from a variety of sectors and sources. Data on community electricity and natural gas consumption were received from Equitable Gas, Dominion Peoples, and Duquesne Light. Utility bills were used to estimate usage of natural gas consumption, electricity, gasoline, and diesel fuel in municipal functions.

Community-Level Analysis

Electricity

Duquesne Light Company provided the utility information in kWh for 2008 residential, commercial, and industrial sectors.

Natural Gas

Equitable Gas and Dominion Peoples provided 2008 annual gas consumption for commercial, residential, and industrial sectors.

Commuting habits

The Environmental Protection Agency (EPA) lists the average miles driven per car in the United States as 12,000 and calculates an average fuel economy for passenger vehicles to be 20.3 miles per gallon (mpg), weighted by vehicle miles traveled (VMT) for passenger cars and light trucks.[7]

Relying on census data for 2000, an estimate of the number of cars in Wilkins was determined using the "Housing Characteristics" link.[8] These numbers were multiplied by the average miles driven per year and divided by the average mpg, resulting in a total of 2,670,739 gallons of gas used in a year. Since this is data from the 2000 census, these numbers should be updated again once the 2010 census is complete. Another option for gathering this information could be in the form of a survey, which could be sent via mail or accessed on the municipal website.

[7] ***http://www.epa.gov/oms/climate/420f05004.htm#step3***
[8] ***http://factfinder.census.gov/home/saff/main.html?_lang=en***

Waste

EPA methodology was used to determine Wilkins Township's total tonnage of waste for entry into the software. For 2008, the EPA estimates divided total waste into 31% paper products, 12.7% food waste, 14.5% wood/textiles, and 28.6% other (plastic, metal, glass, etc).[9]

Town Meetings and Input

At a town meeting held in spring 2010, preliminary results of the GHG inventory were presented. Participants requested information on how to reduce GHG. Questions about the inventory were invited. Topics of discussion included energy efficiency of products, LED lighting fixture reflectors, and programs providing funding for implementation of climate action recommendations.

Municipal-Level Analysis

The CACP calculator divides government-level analysis into 13 categories. Certain of these were omitted as not applicable: port facilities, airport facilities, water delivery facilities, wastewater facilities, solid waste facilities, transit fleet, electricity generation, and fugitive emissions. The five categories used for this emissions inventory are described here.

Office Buildings and Other Structures

The main sources of GHG emissions from office buildings are electricity usage and natural gas usage. The CACP calculator requires the kilowatt hours of electricity and thousand s of cubic feet of natural gas used by each building. Figures on both were available in municipal utility bills, which were summed to reach the yearly total for 2008 then entered into the calculator.

Vehicle Fleet

Emissions for vehicle fleet came exclusively from the use of gasoline or diesel fuel. This data was available in purchase receipts. The gasoline/diesel conversion factor differed subtly depending on the type and model year of the vehicle; however the resulting change in emissions is so small as to be undetectable in the CACP calculator. Wilkins was able to provide a list of all the vehicle types and model years used by all departments.

Streetlights and Traffic Signals

The CACP calculator requires kilowatt hours (kWh) consumed by streetlights and traffic signals. This information was obtained from municipal utility bills.

Problems Encountered and Assumptions Made

Data on refrigerant use and employee commute were not received.

[9] ***http://www.epa.gov/osw/nonhaz/municipal/pubs/msw2008rpt.pdf***

4. The Process of Creating the Inventory

These data were entered into the software to create inventories of community-level emissions inventory and municipal operations emissions. The community inventory represents all the energy used and waste produced within Wilkins and its contribution to GHG emissions. The municipal inventory is a subset of the community inventory, and includes emissions derived from internal government operations.

There are two main reasons for completing separate emissions inventories for community and municipal operations. First, the Township is concerned over climate change, and has a higher degree of control to achieve reductions in its own emissions than those created by the community at large. Second, by proactively reducing emissions generated by its own activities, the Township takes a visible leadership role in the effort to address climate change. This is important for inspiring local action in Wilkins, as well as for inspiring other communities.

The Wilkins Township inventory is based on the year 2008. When calculating the emissions inventory, all energy consumed was included. This means that, even though the electricity used by Wilkins residents is produced elsewhere, this energy and the emissions associated with it appears in the inventory. The decision to calculate emissions in this manner reflects the general philosophy that a community should take full ownership of the impacts associated with its energy consumption, regardless of whether the generation occurs within the geographical limits of the community.

B. Inventory

The results below represent Wilkins' completion of the first milestone of ICLEI's CCP campaign.

1. Community-Scale Emissions Inventory

Results of the Wilkins community-level GHG emissions inventory are shown in Table 1 and Figure 1, which show total greenhouse gas emissions from all community sector sources for the year 2008. Energy for commercial use made up the largest share of GHG (34%). Other major sources are transportation (28%) and residential (19%).

GHG Emissions Community Inventory Wilkins	***Total CO_2e tons/year***
	Baseline year[1]
Residential	***18,204***
Commercial	***32,554***
Industrial	***14,904***
Transportation	***2,798***
Waste	***27,099***
TOTAL	***95,559***

Table 1: Wilkins Township Community GHG Emission: Baseline Year 2008

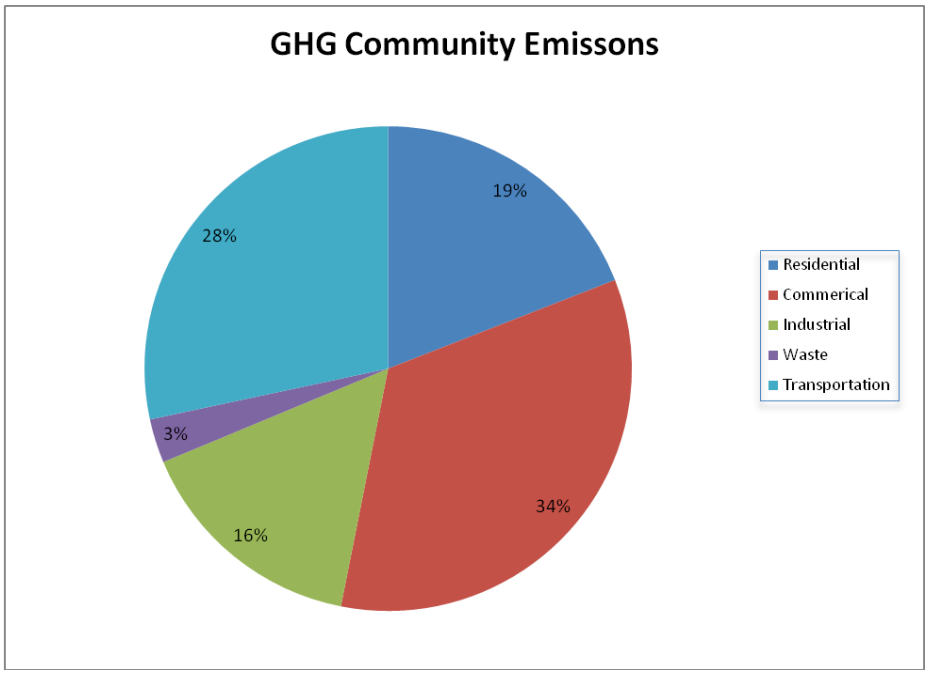

Figure 1: Community GHG Emissions by sector

Source: CACP Output

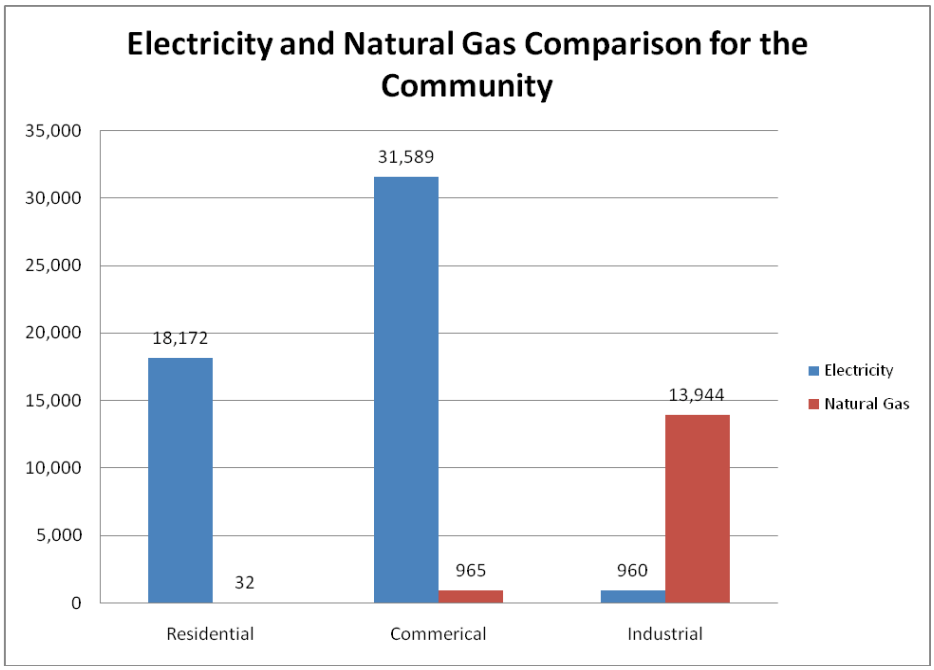

Figure 2: Community GHG Emissions for Electricity and Natural Gas

Source: CACP Output

2. *Municipal-Level Emissions Inventory*

Results of the Wilkins municipal operations GHG emissions inventory are shown in Table 2 and Figure 3, which show total GHG gas emissions from all municipal sector sources for the year 2008. Energy for street lights made up the largest share of GHG gases (68%), derived from electricity and natural gas usage. Other major sources are fleet vehicles (16%) and buildings and facilities (12%).

GHG Emissions Municipal Inventory Municipality of Wilkins	***Total CO_2e tons/year***
	Baseline year[1]
Buildings and Facilities	***146***
Streetlights	***794***
Fleet Vehicles	***190***
Traffic Signals	***48***
TOTAL	***1,178***

Table 2: Municipal GHG Emissions in Wilkins: Baseline Year 2008

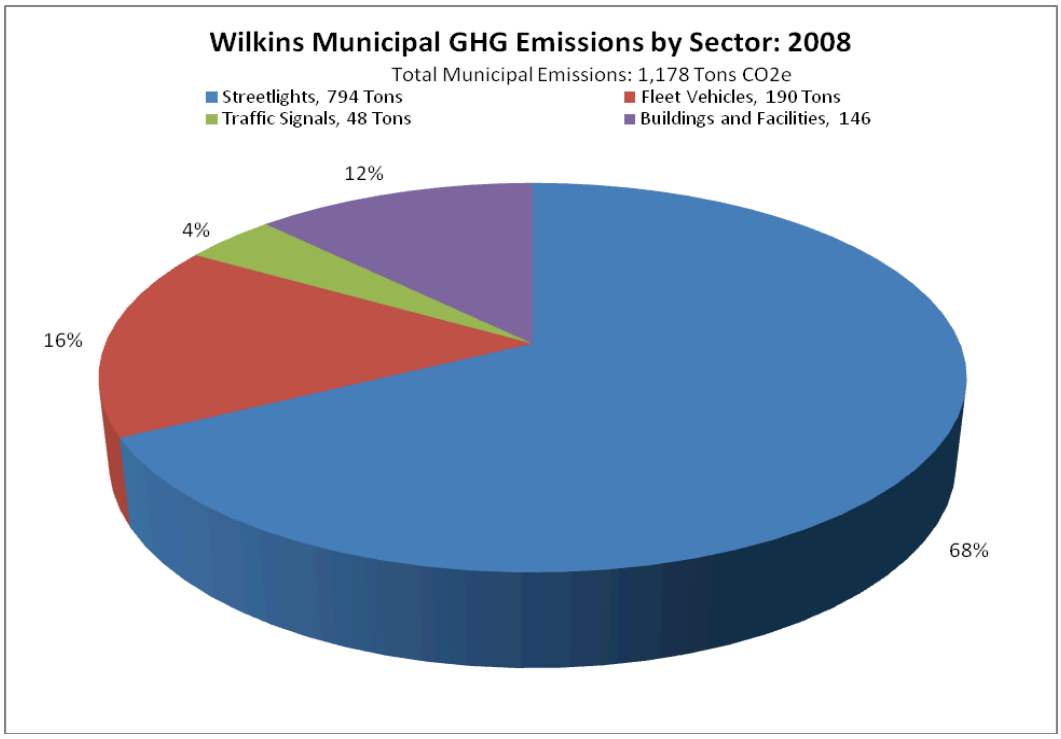

Figure 3: Municipal GHG Emissions by Sector for 2008

Source: CACP Output

Building and Facilities emitted 12% of GHG gases the year of 2008; the charts below details emissions from each building and facility located within the municipality operations of Wilkins. Among the charts is a detailed illustration of the natural gas and electricity usage.

GHG Emissions Building and Facility Breakdown	***Total CO_2e tons/year***
	Baseline year[1]
110 Peffer Municipal Building	***123***
120 Peffer Community Center	***19***
Eastmont Park Road	***1***
James Street	***1***
Miller Street	***2***
TOTAL	***146***

Table 3: GHG Emissions Building and Facility Breakdown for Wilkins

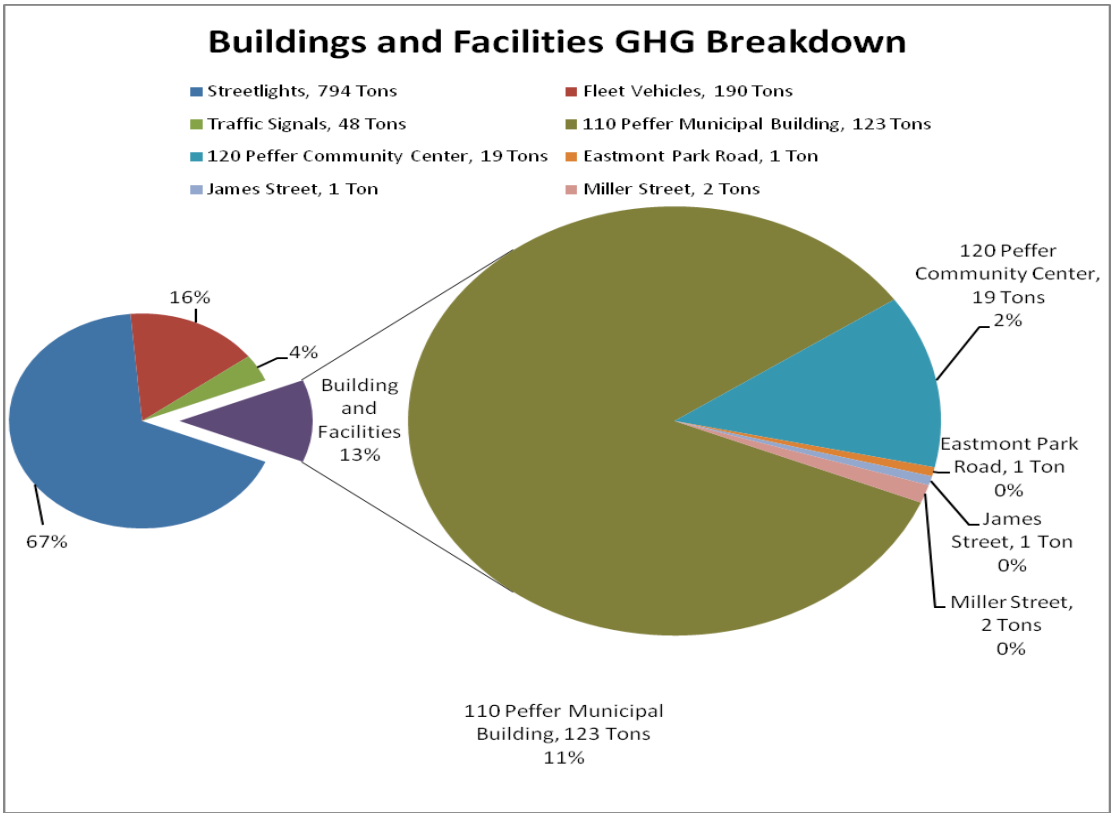

Figure 4: Breakdown of Buildings and Facilities

Source: CACP Output

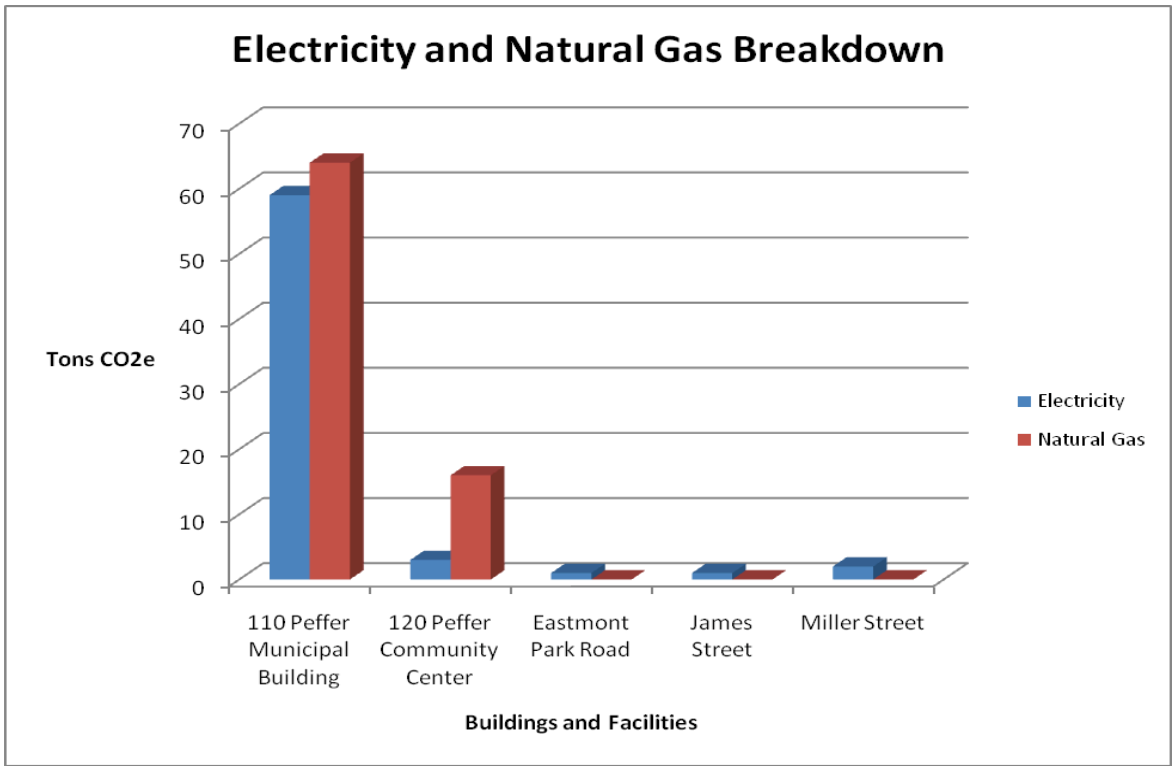

Figure 5: Building GHG Emissions from Electricity and Natural Gas

Source: CACP Output

Fleet Vehicle use is another major source of GHG. The following charts convey the specifics of emissions of each vehicle fleet.

GHG Emissions Fleet Vehicle Breakdown	***Total CO_2e tons/year***
	Baseline year[1]
Police	***100***
Public Works	***89***
Fire Marshall/Code Enforcement	***0***
TOTAL	***189***

Table 4: GHG Emissions Fleet Vehicle Breakdown

Source: CACP Output

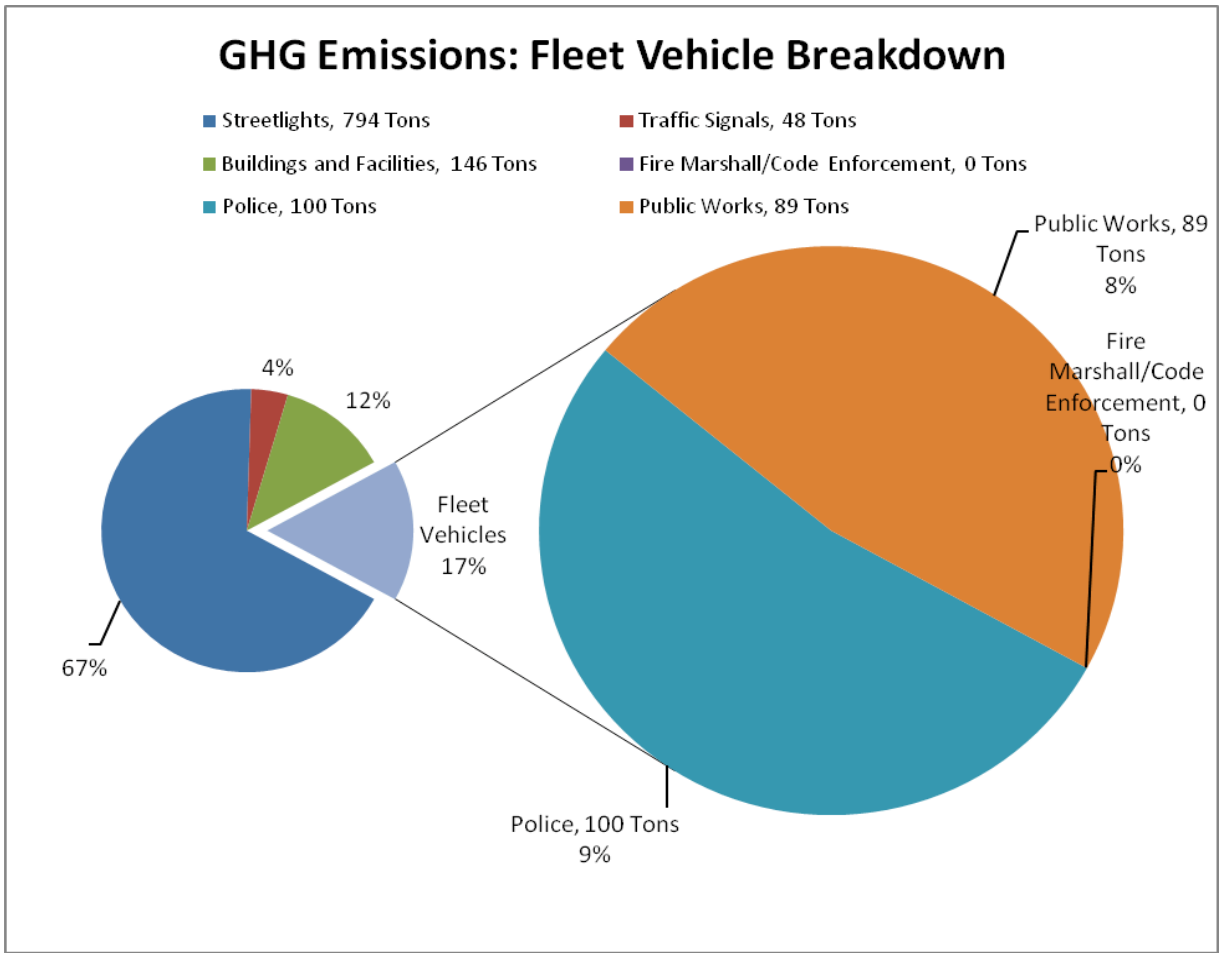

Figure 6: Fleet Vehicle GHG Breakdown

Source: CACP Output

Results

In 2008 WilkinsTownship was responsible for approximately 96,737 tons of emitted GHG. Of this total, 95,558 tons came from the community sector, while 1,179 tons came from the government sector.

Within the community sector electricity was accountable for 53% of GHG emissions, followed by gasoline, natural gas, paper products, and food waste with 28%, 16%, 2% and 1% respectively.

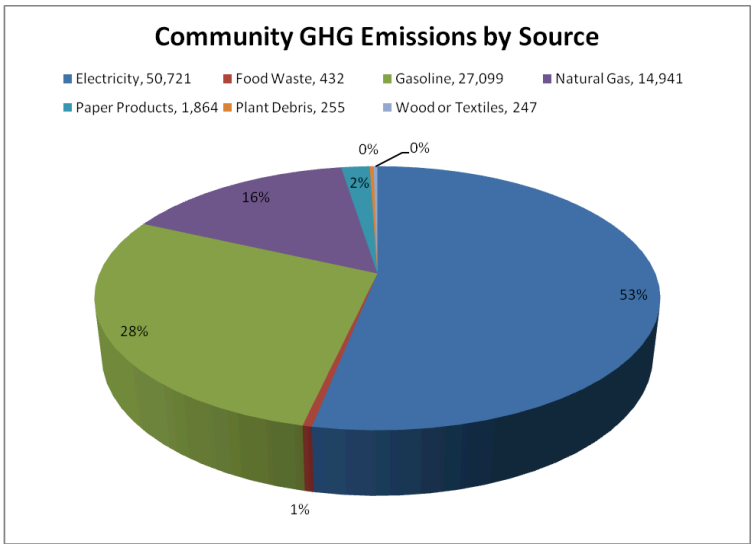

Figure 7: Community Emissions by Source

Source: CACP Output

Within the government sector electricity was accountable for 77% of the greenhouse gas emissions, followed by gasoline, natural gas and diesel with 11%, 7%, and 5% respectively.

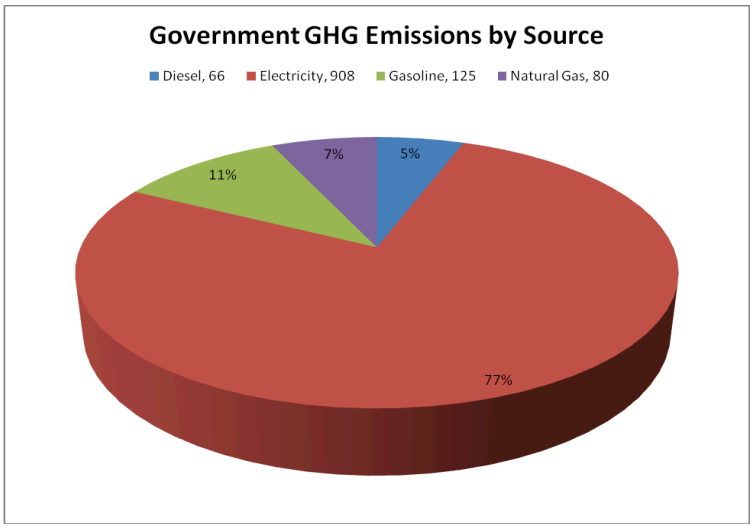

Figure 8: Government Emissions by Source

Source: CACP Output

Conclusion

Calculating GHG emissions is an important step toward creating a climate action plan that will enable the Township to take part in creating a sustainable future for the region and the country. The information in the GHG emissions inventory provides the necessary baseline data for comparison with other communities and future inventories. At the practical level, it gives the township a tool to gauge its progress toward its overall GHG emissions reduction goals.

The next step in the process of reducing the carbon footprint is to create a Climate Action Plan (CAP) detailing Wilkins' GHG emissions reduction goals and the strategies that can be used to reach those goals. Their current efforts coupled with the reductions set out in the CAP are the most effective options currently available for Wilkins to reduce its carbon footprint, but they are not the only ones.

To move forward with implementation of these actions, Wilkins will need to rely on support from a variety of sources, including, local businesses, corporations, and organizations; institutions of higher education; and the community at large. The insight gleaned from these sources will provide the township's elected officials with the necessary tools to implement policies that will reduce the township's GHG emissions. Wilkins will face the challenge of implementing these suggestions/policies and monitoring their results with future GHG inventories.

Bibliography

American FactFinder, *U.S. Census Bureau*
http://factfinder.census.gov/home/saff/main.html?_lang=en

Climate Change Roadmap for Pennsylvania, *Pennsylvania Environmental Council*
http://www.pecpa.org/roadmap.htm

ICLEI: Local Governments for Sustainability, 2010
http://www.icleiusa.org/about-iclei/faqs/general-information-faq

Pittsburgh Climate Initiative
http://www.pittsburghclimate.org/aboutUs.htm

"Emission Facts: Greenhouse Gas Emissions from a Typical Passenger Vehicle," U.S. Environmental Protection Agency, 2005
http://www.epa.gov/oms/climate/420f05004.htm#step3

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