2012 Greenhouse Gas Inventory
Portsmouth, NH
August 2013

Executive Summary

With this report, the City of Portsmouth, NH has updated its 2006 greenhouse gas inventory, which measures emissions from City operations and community-wide activities, for the 2012 calendar year. Even with a more comprehensive 2012 inventory, the City reduced its total annual energy consumption by 15 percent between 2006 and 2012. The City achieved these results through the construction of LEED buildings, improved energy management in school facilities, reduced building square-footage, and more fuel efficient vehicles.

In 2012 alone, City government operations resulted in 15,419 tonnes of CO_2 equivalent emissions. Buildings made up the majority of this amount (52 percent), followed by waste water (14 percent), water delivery services (10 percent), the employee commute (10 percent), the vehicle fleet (10 percent), wastewater and streetlights (four percent). Portsmouth City Government emissions produced one percent of the entire community's emissions, which totaled an estimated 1,571,947 tonnes of CO_2 equivalent emissions throughout the 2012 calendar year.

The City reduced its energy consumption in every comparable sector. City buildings reduced energy consumption by eight percent. The new LEED Silver library reduced its overall per-square-foot energy consumption by 65 percent. Likewise, the new LEED Silver fire station reduced its per-square-foot energy consumption by 26 percent. The school department achieved dramatic reductions in energy consumption in almost all of its facilities, reducing its per-square-foot energy consumption the most at Sherburne Elementary (71 percent) and Portsmouth High School (46 percent). The City reduced emissions from its vehicle fleet by 2 percent, despite the addition of several new vehicles. This decrease is the result of the newly purchased cars and trucks having an improved fuel economy. The Portsmouth City government reduced its energy consumption from street and traffic lights by 5 percent, and by 4 percent from waste water and water delivery facilities combined. There was a change in methodology between the 2006 and 2012 inventories for the employee commute portion, so a direct comparison cannot be given.

The City reduced its total annual energy consumption by 15 percent between 2006 and 2012.

Between 2006 and 2012, the community of Portsmouth made significant strides in reducing its natural gas consumption and

emissions from the decomposition of waste, but residents and the commercial sector need to take steps to reduce their electricity consumption. Residents and the commercial and industrial sectors decreased their natural gas consumption by five percent, six percent, and 26 percent, respectively. Residents and the commercial sectors increased their electricity consumption seven percent and four percent, respectively, while the industrial sector managed to decrease its electricity consumption by 10 percent. Emissions from the decomposition of waste decreased 35 percent, largely due to the Turnkey Landfill's switch to methane-capture technology. Transportation within and through Portsmouth produced 1.2 million tonnes of CO_2 in 2012. The methodologies changed from 2006 to 2012, so an adequate comparison cannot be stated.

The City plans to continue to measure its energy consumption and greenhouse gas emissions in order to track the results of governmental and community improvements moving forward. As the City researches future improvements in its energy consumption, the community of Portsmouth is encouraged to seek out ways to reduce its greenhouse gas emissions though reductions in electricity and heating fuel consumption, transportation fuels, and waste production.

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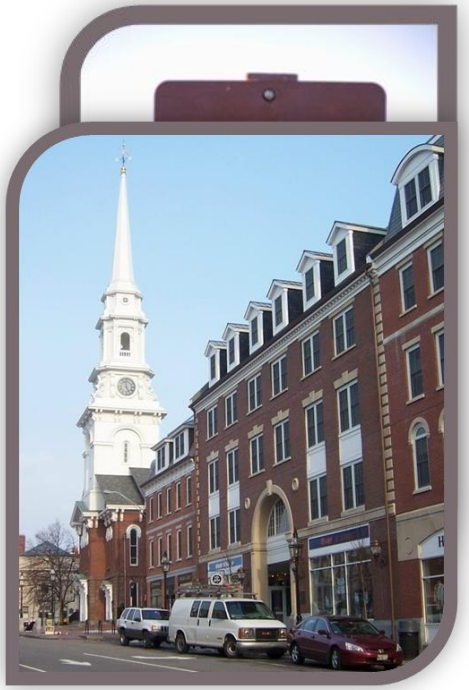

Introduction

In November 2007, the Portsmouth, NH City Council passed a resolution to become an Eco-municipality, formalizing its commitment to the principles of sustainability. By definition, an eco-municipality "aspires to develop an ecologically, economically and socially healthy community for the long term[1]," using four systems conditions to guide participatory-based decision-making. The four sustainability principles are:

1. Reduce dependence upon fossil fuels and extracted underground metals and minerals;
2. Reduce dependence on chemicals and other manufactured substances that can accumulate in nature;
3. Reduce dependence on activities that harm life-sustaining eco-systems; and
4. Meet the hierarchy of present and future human needs fairly and efficiently.

In an effort to measure its progress towards sustainability, the Portsmouth City government periodically measures its municipal and community-wide greenhouse gas (GHG) emissions. Using the software and guidance documents provided by the International Council for Local Environmental Initiatives (ICLEI), the City of Portsmouth has completed two GHG inventories to date. This report updates Portsmouth's municipal and community GHG inventory for the 2012 calendar year and provides an assessment of changes since the 2006 baseline[2]. The municipal inventory includes all emissions resulting from city government operated vehicles, buildings, street lights and traffic lights, and from the employee commute. The community analysis portion includes all residential, commercial, industrial, and transportation emissions occurring within the Portsmouth City limits, as well as emissions resulting from waste created within Portsmouth and sent to external localities. The inventory results are followed by recommendations on how to reduce emissions in the future.

[1] http://www.naturalstep.org/en/usa/glossary

[2] This data in this report was compiled and analyzed in the summer of 2013 by a Climate Fellow funded by the local nonprofit, Clean Air-Cool Planet. The Fellow served under the supervision of Peter Britz, the City's Environmental Planner.

Methodology

In the majority of cases, data was collected and processed using the methodologies outlined in ICLEI's Local Government Operations Protocol (LGOP) v1.1 and the Community Protocol v1. Methodologies that deviate from either Protocol are specified in the respective results sections below. All attempts were made to employ the same methodologies as 2006. The main differences result from changes in the recommended approach in the ICLEI Protocols and the increased amount of data available for the 2012 inventory. The known differences between the 2006 baseline and the 2012 update are listed within each subsection. Whereas the 2006 inventory was based on FY2006 (July 1, 2005 – June 30, 2006), the 2012 inventory includes the 2012 calendar year. ICLEI recommends using a calendar year.

Greenhouse Gases

CO2 – Carbon Dioxide

CH4 – Methane

N20 – Nitrous Oxide

CFCs – Chlorofluorocarbons

HFCs – Hydrofluorocarbons

SF6 – Sulfur Hexafluoride

The government data was collected and processed in ICLEI's Master Data Workbook v1.1 and then entered into the Clean Air and Climate Protection (CACP) Software v3.0. The community data was entered directly into the CACP software. The CACP software calculates six greenhouse gases (seen at right) resulting from electricity consumption, fuel use, waste disposal, and other processes and fugitive sources.

To simplify the data output, the program converts all of the gases into one CO_2 equivalent (CO_2e) value according to the relative greenhouse effect of each gas. For example, CH_4 is about 21 times more potent than CO_2 as a greenhouse gas, so the program multiplies the mass of CH_4 by 21 to obtain the CO_2 equivalent value.

Once the data was fully entered into the software, a report was generated detailing the energy consumption and greenhouse gas emissions produced by the city government (see Appendix A) and by the community (see Appendix B). The analysis in this report is based off of the CACP software reports. Data collection contacts are listed in Appendices C and D.

Emission Factors

Emission factors vary depending on the mix of fuels used by the electricity provider, or in the case of vehicles, by the make and model year. The CACP software does not provide electricity emission factors for New Hampshire. ICLEI recommends using the most recent 2009 emission factors published by the U.S. Environmental Protection Agency (EPA). Because the EPA data points are three years old, and because New Hampshire burns significantly more coal than the rest of New England (which results in higher CO_2 emission levels), the emission factors used to produce this report were calculated using the energy mix published in the local utility's

disclosure label[3] and the Custom Fuel Mix worksheet in the Clean Air-Cool Planet greenhouse gas inventory software[4]. The purpose of this alternate methodology was to obtain more accurate data points.

Table 1. Electricity Emission Factors for Portsmouth, NH GHG Inventory (lbs/MWh)

	CO_2	N_20	CH_4
2006*	709.500	.144	.113
2012**	1,300.400	.088	.029

*Emission factors were based off of EPA eGrid estimates.

**Emission factors were calculated using the fuel mix published in PSNH's 2012 Disclosure Label and the Clean Air-Cool Planet software's Custom Fuel Mix worksheet.

Emission factors from 2006 and 2012 differ (Table 1). Whereas the emission factors used for 2012 were calculated using local data, the factors used in the 2006 inventory were based on U.S. Environmental Protection Agency estimates for New England. It is likely that if the 2006 emission factors were calculated based on the local utility fuel source mix, the CO_2 emissions reported in the 2006 inventory would have been higher.

The City of Portsmouth, New Hampshire

Portsmouth, New Hampshire, a historic seaport located on the northern-most point of the state's 18-mile coastline[5], has a population of 21,532 (2012 est.). As the cultural and commercial hub of the seacoast region, 6.8 million people visit the area each year. Attractions include the Strawbery Banke Museum, the Music Hall, the Prescott Park Arts Festival and over 100 restaurants. The 16.8 square mile city is crossed by one Interstate, two U.S. Routes, three state routes, and three rail lines. The highest point in Portsmouth is 110 feet above sea level. Portsmouth fared well through the Great Recession. Unemployment grew from 3.3 percent in 2006 to 4.1 percent in 2012, maintaining a much lower rate than the national average, which reached 9.6 in 2010. Portsmouth's highest level of unemployment since 2006 was in 2010 at 5.4 percent. The 2012 fiscal year (July 1, 2011 – June 30, 2012) General Fund budget totaled $87.4M, $68.7M of which was dedicated to operations. By comparison, the FY2006 General Fund budget totaled $73.1M, $57.8M of which was directed at operations.

[3] Public Service of New Hampshire (PSNH) 2012 Disclosure Label: http://www.psnh.com/downloads/PSNHdisclosurelabel.pdf?id=4294987415&dl=t

[4] Contact: Anna Mika, Campus Program Associate for Clean Air-Cool Planet

[5] http://www.nh.gov/nhinfo/history.html Accessed 15 August 2013

Municipal Inventory

The municipal portion of the inventory reports total greenhouse gas emissions resulting from employees' commute to and from work, and for all energy consumption from buildings, street and traffic lights, facilities, and vehicles under the operational control of the city government during the 2012 calendar year. This includes employees and vehicles under the City Manager, within the School Department, and in the Police and Fire Departments. This does not include the Public Housing Authority or Prescott Park, which are not under the oversight of the City Council. Operational control is defined as having "the full authority to introduce and implement operating policies[6]." Only in a few instances was this defined scope dismissed. In such cases, the rationale is provided in the relevant subsections. The specific scope for the municipal inventory is shown in Table 2.

Table 2. Specified Scope of the 2012 Portsmouth, NH Municipal Inventory

Scope	Items Included
1	Mobile combustion emissions (CO_2, CH_4, and N_2O) from city-owned vehicles
	Fugitive emissions from mobile air conditioning units
	Stationary combustion from emergency generators
	Purchased natural gas, propane, and fuel oil
2	Purchased electricity
3	Employee commute emissions (CO_2, CH_4, and N_2O)
	Mobile combustion emissions (CO_2, CH_4, and N_2O) from school bus contract
	Effluent discharge from wastewater treatment
Biogenic Sources	B100 biodiesel emissions from city-owned vehicles

Overall Emissions

City government operations resulted in 15,419 tonnes of CO_2 equivalent emissions during the 2012 calendar year (Table 3). Buildings made up the majority of this amount, followed by wastewater facilities, the employee commute, the vehicle fleet, water delivery facilities, and streetlights (Figure 1).

The City's overall energy consumption decreased 15 percent between 2006 and 2012, even with the addition of six subcategories, making this report more comprehensive than its baseline. This decrease is a result of downsizing the overall building square footage operated by the City, the construction of three LEED Silver facilities, purchasing more efficient vehicles, and energy management improvements in school department facilities. Fugitive emissions from mobile air conditioning units, emissions from stationary combustion of diesel fueled emergency generators, CH_4 and N_2O emission from the vehicle fleet and employee commute, and effluent

[6] Definition taken from page 14 of the Local Government Operations Protocol

discharge emissions from wastewater treatment were included in the 2012 inventory, but not in 2006.

Table 3. 2012 Itemized Municipal CO2 Equivalent (CO_2e) Emissions

Category	Tonnes CO_2e
Buildings	8,008
Water Delivery Facilities	2,447
Employee Commute	1,606
Vehicle Fleet*	1,502
Wastewater Facilities	1,185
Streetlights	671
Total	15,419

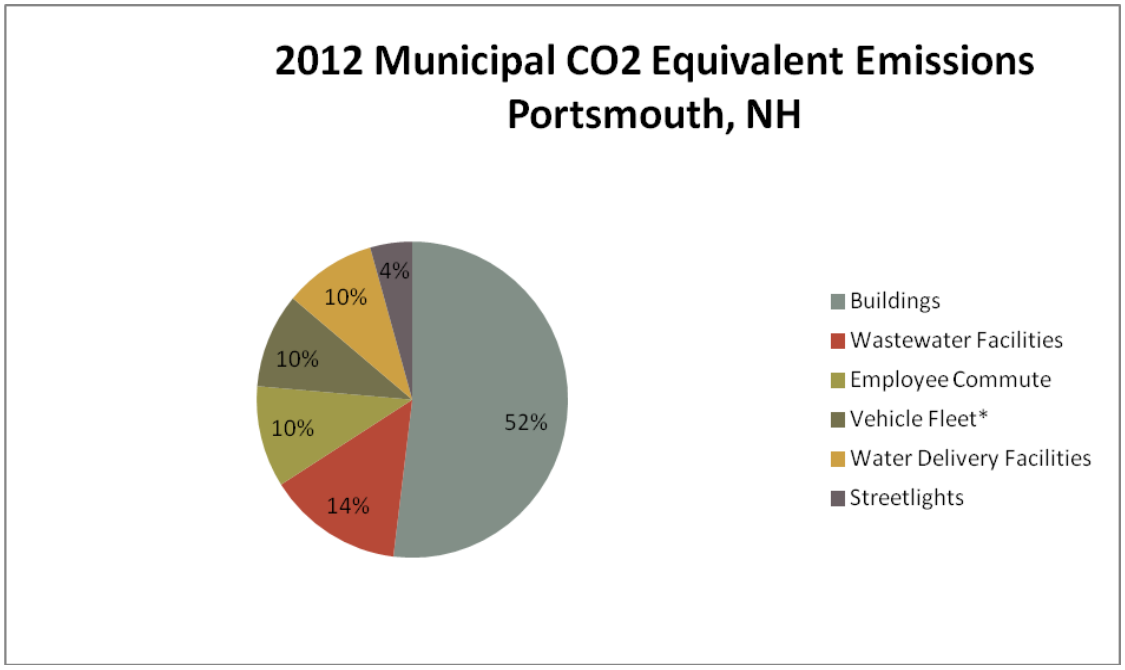

Figure 1. Total municipal CO_2 equivalent (CO_2e) emissions, 2012, Portsmouth, NH

Compared to the reported CO_2e emission in the 2006 inventory, the 2012 emissions were higher than in 2006 even though the City decreased its energy consumption by 15 percent. This increase is the direct result of updating the 2012 emissions factors, which convert energy consumption to equivalent CO_2, to be more accurate than the 2006 emission factors. Whereas the 2006 emission factors were based on EPA estimates for all of New England, the 2012 emissions factors were calculated using the fuel source mix published in Public Service New Hampshire's (PSNH's) 2012 disclosure label. The 2012 CO_2 emission factor is higher than the

2006 estimate because New Hampshire burns more coal, a more carbon-intensive fuel, than the surrounding New England states. The 2012 emission factors are more accurate and will provide for a better comparison with future inventories.

Buildings

The buildings methodologies used in the 2012 inventory were consistent with the recommended approach in LGOP v1.1. However, in an effort to maintain consistency throughout the report, the emissions from emergency generators affiliated with city-operated building facilities were included in the buildings category instead of a separate category for stationary combustion. Emissions from emergency generators at the Pease and Peirce Island wastewater treatment plants (which are filed in the Wastewater Facilities category) cannot be separated from general wastewater building emissions because they are not tracked separately. Another difference between the 2006 and 2012 reports is that the wastewater treatment facilities were moved from the *Buildings* category to the *Wastewater* category to more accurately reflect the emission sources.

In 2012, buildings made up 52 percent of the City's total 2012 greenhouse gas emissions. These structures generated 4,389 tonnes of CO_2e from electricity, 3,603 tonnes of CO_2e from natural gas, and 16 tonnes of CO_2e from fuel oil, for a total of 8,008 tonnes of equivalent CO_2.

Table 4. Electricity and Natural Gas Usage for the Old and New Libraries

	Old Library, 2006	New Library, 2012	% Change
Electricity (kWh)	320,560	574,400	79%
Natural Gas (therms)	19,611	3,842	-80%

Comparing 2006 and 2012 emissions based on equivalent methodologies, the Portsmouth municipal government reduced its CO_2e emissions from buildings by 8.3 percent, saving $320,482 in 2012 alone (based on 2012 energy prices). As mentioned above, the decrease is, in part, a result of reducing the total square footage of City-operated facilities, constructing more energy efficient buildings, and managing some facilities in a more energy-efficient manner. Specifically, between 2006 and 2012, a new LEED Silver library was constructed on Parrot Avenue. The new library used 79 percent more electricity and 80 percent less natural gas in 2012 than in 2006 (Table 4). Library staff reported that the increase in electricity usage is due to more people plugging in phones, ipads, and laptops since 2006; the need to keep the lights on at night while the facility is being cleaned; and the library's new Sunday hours. The structure used significantly less natural gas despite being 16,000 square feet larger than the previous library. The old library on Islington Street has been leased out; therefore, it is no longer included in the inventory.

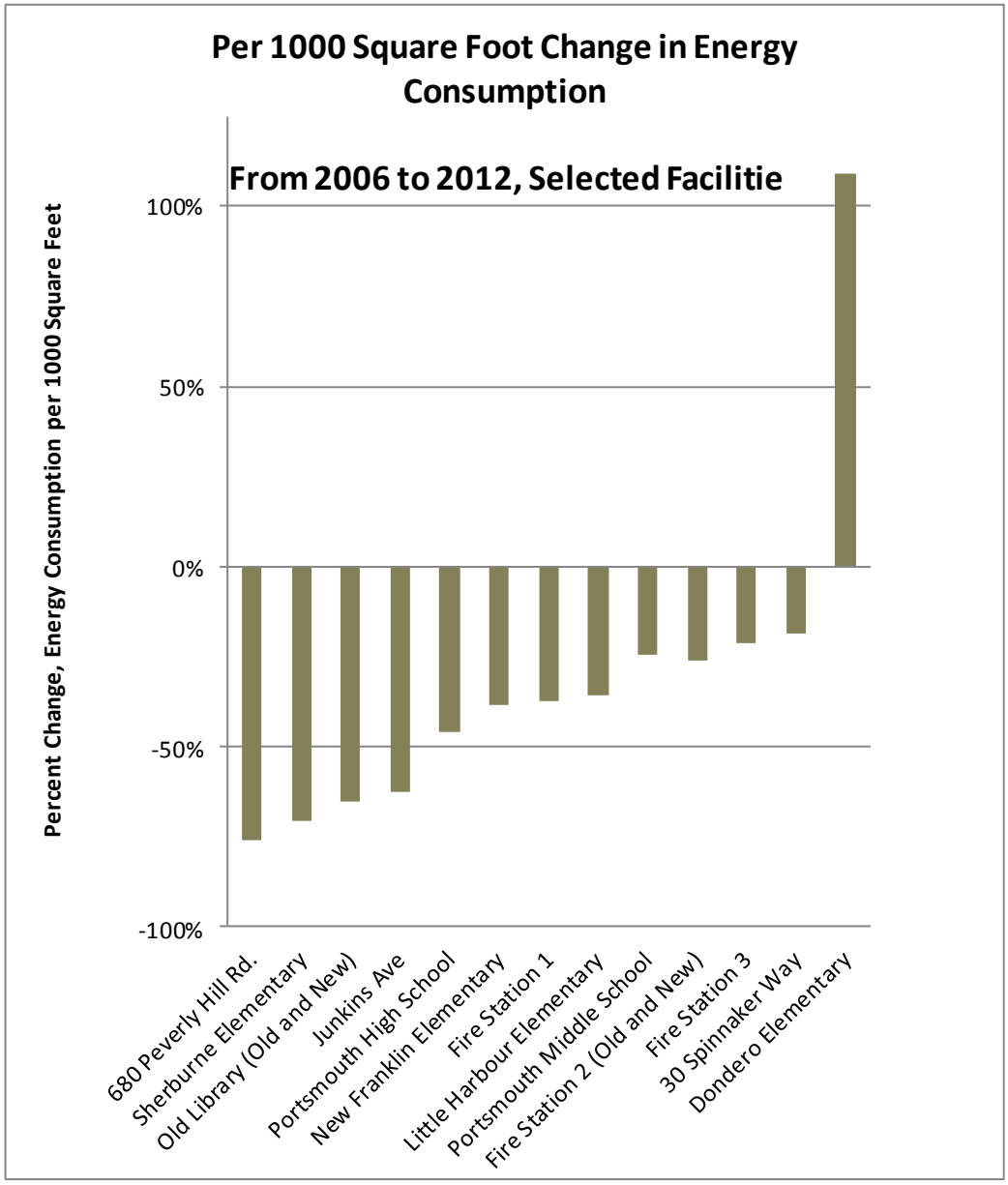

Figure 2. Change in energy consumption per 1000 square feet from 2006 to 2012 in selected Portsmouth, NH municipal facilities, in order of most favorable change to least favorable change.

The buildings operated by the City vary widely in size. Figure 2 shows the percent change in energy consumption from 2006 to 2012 per 1000 square feet. Using this metric, the Public Works complex (690 Peverly Hill Road) reduced its emissions the most (76 percent). The cause of this decrease is currently unknown, but the staff is looking into this positive result. The new LEED Silver library reduced its per 1000 square foot energy consumption by 65 percent, compared to the old library located on Islington Street. Between 2006 and 2012, the utility bills for the Portsmouth Cottage Senior Housing located next to City Hall (Junkins Avenue) were

transferred to the Public Housing Authority, which explains the decrease in energy consumption per 1000 square feet at City Hall.

Nearly all of the school buildings reduced their per-square foot emissions. Since the last inventory, the school department has implemented building management changes that have resulted in significant reductions in energy consumption, especially in natural gas. Facilities employees now turn down the heat and employ fewer air handlers during off-school hours, and the student Eco-Club has put notes on light switches, for example, to remind people to turn off the lights. Dondero Elementary School's per 1000 square foot increase is a result of a dramatic increase in natural gas consumption. The school department facilities staff is looking into this issue.

There were other changes as well. The City built a new LEED Silver Fire Department facility (Station 2), and tore down the old building. The facilities at 195 Greenleaf Avenue and Marcy Street were leased out. The Wentworth School was demolished and turned into a softball field, and the Rock Street location, which was slated for demolition in 2012, was not used most of the year. The Portsmouth Middle School is undergoing a green addition and renovation which began in 2012 and continued into 2013. This renovation is following the guidelines of the Northeast Collaborative for High Performance Schools, which is comparable to LEED certification. Furthermore, in February 2009, the City replaced the lighting in the High-Hanover Parking Garage with 275 compact fluorescent fixtures. The structure at 135 Daniel Street was sold at the end of 2012, and will not appear in the next inventory.

There are many options the City could consider to reduce its emissions coming from buildings. The City should begin evaluating all energy management systems in buildings to determine as the school department has, where it can achieve the greatest energy reductions. The City could conduct a systematic evaluation of current insulation standards, building management policies, light bulb purchases, and ventilation equipment. Another option is to conduct a thermal energy imaging study. This type of test will reveal portions of buildings that lose the most heat in the winter, and the most cooling in the summer.

Once conservation strategies have been implemented on existing buildings, the City could consider installing photovoltaic (PV) panels. Many arrays in the northeastern U.S. have a five to seven year payback period. The new LEED Silver library, which is very visible in the community and has experienced an increase in electricity consumption, might be a good place to evaluate a PV installation. The City could also consider PV installations on buildings with a constant energy demand such as the Pease Waste Water Treatment Plant or Madbury drinking water treatment plant, which both appear to have plenty of open land on which to install a solar panel system. The City could also consider formalizing its LEED policy to ensure that all new construction conserves as much energy as possible. New construction and renovations could also consider ground-sourced, closed-loop geothermal to reduce heating and cooling costs throughout the year. Since buildings produce the majority of the City's greenhouse gas emissions, this sector presents the best opportunity to conserve energy and reduce emissions.

Vehicle Fleet

ICLEI's recommended approach was used to calculate the mobile CO_2 emissions for all gasoline vehicles. The biodiesel purchasing records in the Gasboy system were used to estimate the percentage of B5 and B20 consumed annually, and the recommended approach was used to calculate carbon dioxide emissions coming from B100 and pure diesel. LGOP alternate approach 7.1.3.2.1 was used to calculate N_2O and CH_4 emissions for all vehicles because mileage is not tracked by the City. This approach uses the fuel consumption and mpg ratings to calculate annual miles traveled per vehicle. The refrigerant-based emissions were also calculated using the alternate approach (7.4.2). The City does not track the storage and purchase of refrigerants used for vehicle air conditioning, so all usage was estimated based on the charge capacity, ICLEI's recommended operating emissions factor, and an estimated number of month's air conditioning is used in each vehicle. The emissions results reported in this section combine the CO_2, N_2O, CH_4, and refrigerant emissions.

The City's vehicle fleet consumed 99,718 gallons of gasoline, 94,106 gallons of diesel, and 11,152 gallons of B100 biodiesel in 2012, contributing 10% of the total municipal CO_2 equivalent emissions. The inventory included vehicles from Fire, Police, Public Works (which includes Sewer and Water), and School Department, as well as from the School Bus Contract[7]. The breakdown of each department's contribution to the vehicle fleet's 1,502 tonnes of CO_2 equivalent emissions[8] in 2012 is shown in Figure 3. The Public Works Department made up the largest portion of the vehicle fleet emissions (47 percent), followed by Police (21 percent), the

[7] Emissions from school buses were included in the 2006 and 2012 inventories. Although the school department contracts out this responsibility, meaning that it would fall outside of the defined inventory scope, the emissions were included because bus routes are vital to school department operations.
[8] This includes 1,492 tonnes of CO2e of direct emissions plus 10 tonnes of CO2e from the mobile source refrigerant fugitive emissions.

School Bus contract (18 percent), the Fire Department (10 percent), and the School Department (four percent).

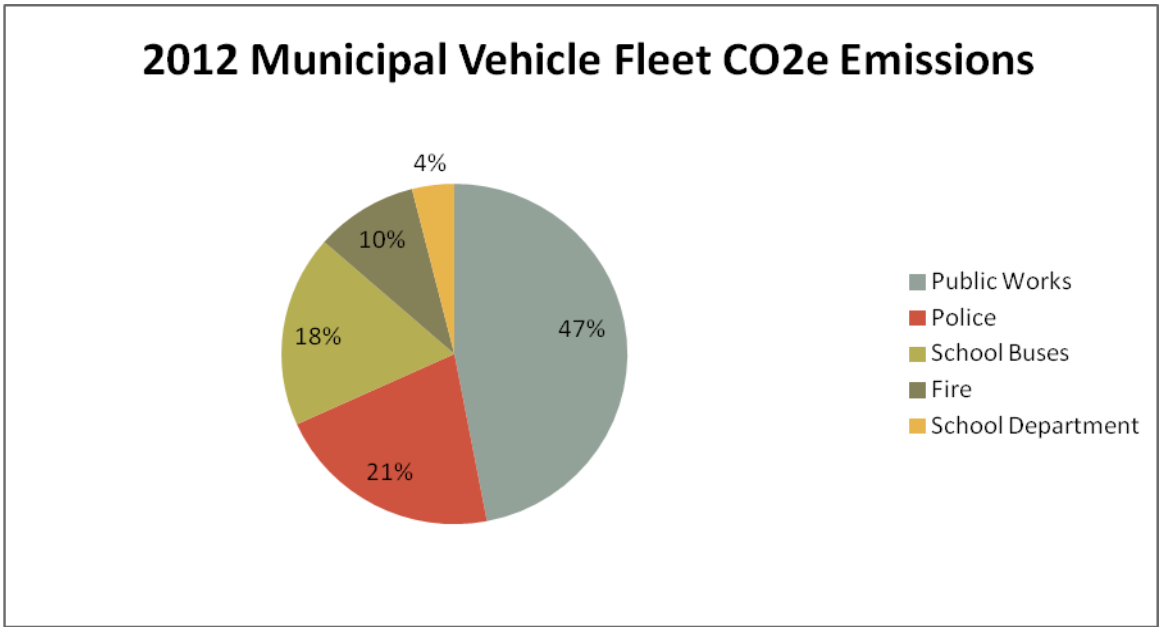

Figure 3. The percentage of the total municipal vehicle fleet's CO_2 equivalent emissions that each department's vehicles generate.

Table 5. Municipal Vehicle Fleet Results with Adjusted Categories to Match 2006 Inventory

Department	2006*			2012		
	# of Active Vehicles**	Emissions (Tonnes Co2e)	% Contribution to Total	# of Active Vehicles**	Emissions (Tonnes Co2e)	% Contribution to Total
Fire	18	139	9%	23	144	10%
Police	30	376	25%	33	316	21%
Public Works	78	712	47%	123***	699	47%
School	9	41	16%	14	59	18%
School Buses	unknown	250	3%	16	274	4%
Total	135	1519	100%	209****	1492	100%

*The 2006 column does not include the Public Housing Authority as it did in the original report. In addition, the 2006 column does not include CH4 and N20 emissions. These are included in the 2012 column.

**The count only includes vehicles that consumed fuel in 2012.

***This cell includes 78 vehicles in Public Works proper, 20 vehicles in the Sewer Department, and 24 vehicles in the Water Department.

****This would total to 193 without busses, which are contracted to a private firm.

Adjusting the 2006 inventory to match the methodology of the 2012 inventory[9], there was a 1.8 percent decrease (from 1,519 to 1,492 tonnes CO_2e) in emissions from 2006 to 2012, despite a 43 percent increase in the number of vehicles (the majority of which was in the Public Works department), not including the School Bus Contract (Table 5). The decrease in emissions is likely due to an improvement in fuel economy of new vehicles. For example, Public Works (including Sewer and Water) has purchased 48 new vehicles since 2006[10]. In 2012, 75 percent of Public Work's mileage came from vehicles that were newer than 2006 that had an average fuel economy of 15.2 mpg, a full 3 mpg higher than the average mpg for vehicles that have a model year of 2006 or older. Figure 4 shows that all departments experienced a decrease in emissions per vehicle, meaning that each department had more fuel efficient cars and trucks in 2012 than in 2006. Public Works had the biggest decrease (3.4 tonnes of CO_2e) in emissions per vehicle. The reason for this decrease is likely due to the improvement in the fuel economy of the newer vehicles. Likewise, Police, the department with the second largest improvement in CO_2e emissions per vehicle, purchased 24 new vehicles since 2006. Given that the Police Department's total active vehicle count only increased by three vehicles, it can be assumed that older Police vehicles were sold. The majority of mileage came from vehicles with a model year newer than 2006.

Since 2006, the City switched from pure diesel fuel to using B5 biodiesel in the winter and B20 biodiesel in the summer. The 2012 biodiesel consumption saved 105 tonnes of CO_2 emissions. These emissions are biogenic and do not count towards the municipality's CO_2e emissions. Biogenic emissions are natural emissions that would have been released into the atmosphere regardless of whether humans used them or not.

The 2012 inventory includes estimated fugitive emissions from air conditioning units and N_2O and CH_4 emissions calculated from vehicle miles traveled. These two items were not included in the 2006 inventory.

[9] The 2006 inventory included the Public Housing Authority (PHA) Vehicles. The PHA was determined to be outside of the defined scope in 2012, and was not included. The 2012 inventory included emissions from refrigerant usage; this was not included in 2006. The match-up does not include refrigerant emissions or emissions from PHA vehicles.

[10] Vehicle purchase information is from the 2012-2013 Rolling Stock Program document, which was compiled in November 2012. This is not calculated from Table 5.

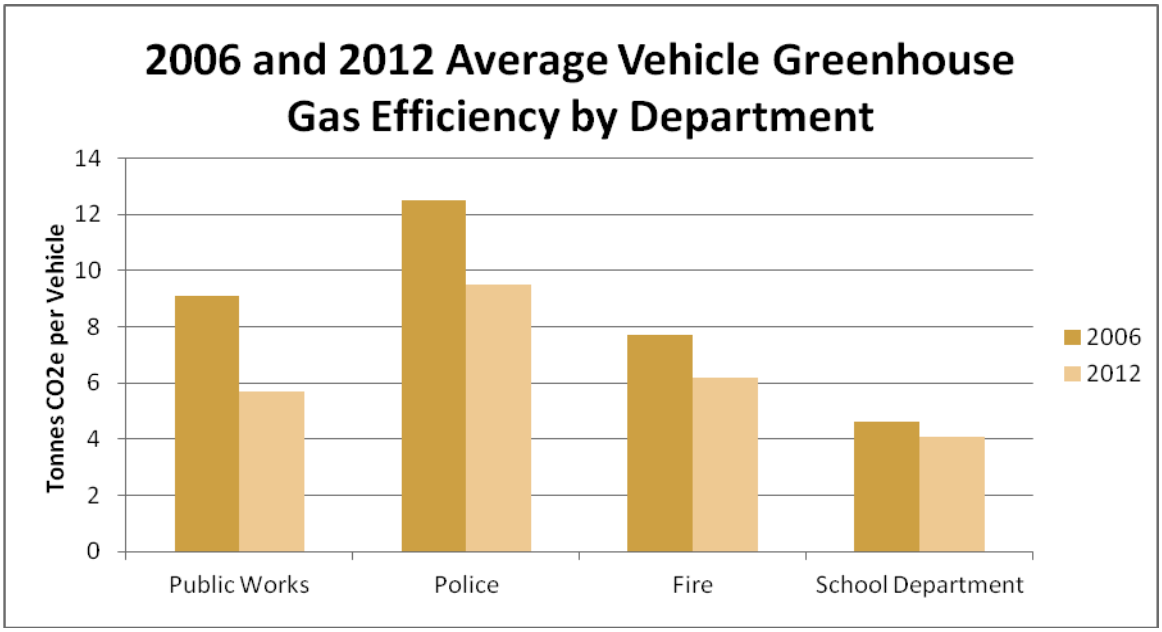

Figure 4. The average per vehicle CO_2e emissions, by department, in order of largest change from 2006 to 2012.

Table 6. Average Annual Miles Per Vehicle*, by Department

Department	Miles
Police	23,507
Public Works	11,581
Fire	10,519
School	7,130

*This does not include non-highway vehicles such as backhoes and lawnmowers.

The City could reduce its emissions coming from its vehicle fleet by continuing to update its fleet with more fuel efficient cars and trucks. The City would achieve its greatest reduction in emissions by purchasing highly fuel efficient vehicles, such as hybrids, for the Police Department, which averages the most miles per vehicle (Table 6).

Employee Commute

Greenhouse gas emissions from employees' commutes to and from work were calculated using a survey that was administered to all City employees, including the School Department, the Fire Department, the Police Department, and all employees under the City Manager. This is the approach recommended by the LGOP; however; a shorter, more succinct survey was developed in place of using the questionnaire provided by ICLEI. The survey, which was administered through SurveyMonkey to staff with email and via paper for staff without email, is included in Appendix E.

Thirty-nine percent of staff (347 individuals) completed the survey, and 86 percent (296) of completed surveys were usable. The final results were extrapolated to the 884 individuals employed by the City in 2012 (Table 7). The extrapolation took into account the number of employees who are on a school year contract (~180 days). The survey and extrapolation accounted for part-time, as well as full-time, employees.

Table 7. Employee Head Count, 2006 and 2012*

Employee Type	2012 Count
Full Time Employees	
City	321
School	429
Part Time Employees	
City	90
School	44
Total	884

*The School Department has a separate payroll system from the rest of the City, so the count is divided between the two groups.

The employee commute contributed 10% (1,606 tonnes of CO_2e) of the total municipal greenhouse gas emissions in 2012. The average amount of emissions per employee was 1.8 tonnes of CO_2e in 2012. Out of the 296 usable responses, one person indicated that s/he carpools five days per week, one person carpools three days per week, four people carpool two days per week, and four people carpool one day per week, on average. No one uses public transportation, no one telecommutes, one person rides his/her bike four days per week, one person rides his/her bike two days per week, and seven people ride their bikes one day per week, on average. Five people indicated that they walk to work five days per week, one person walks three days per week, seven people walk two days per week, and two people walk to work one day per week, on average. The average commute is 11.8 miles one way.

The methodology used for 2006 was different than in 2012, so the results are not comparable[11].

The City could improve its emissions coming from employees' commutes to and from work by encouraging alternative forms of transportation and a flexible work schedule. The City could offer incentives such as preferred parking or gift certificates for carpooling and driving more fuel efficient vehicles. There is already a few staff that carpool; this number could be increased by introducing an online or bulletin-board sign-up sheet for those interested in

[11] See the 2006 methodology and results in the "Cities for Climate Protection Campaign" document, published in September 2007.

carpooling. As the City works to install more bike lanes, employees might feel more comfortable biking to work. If a flex time schedule were implemented, employees could commute during non-peak hours, reducing the amount of time they are driving and emitting greenhouse gas emissions. City staff could also consider adding a question to the next commuter survey on what would encourage employees to use alternative forms of transportation.

Streetlights

All streetlights and traffic lights in Portsmouth are owned and maintained by PSNH, but the electricity usage is paid by the City. Although this arrangement technically falls outside of the inventory's defined scope, the emissions from streetlights and traffic lights are still included because they are a core service provided by the City. The recommended LGOP methodology for street and traffic lights was used. The City's data tracking has improved since 2006 with the creation of a spreadsheet identifying which account numbers are streetlights and which are traffic lights.

The streetlights and traffic lights produced 491 tonnes and 180 tonnes of CO_2e, respectively, for a total of 671 tonnes of CO_2e, or 4% of the City's total emissions. The 2006 inventory did not report by location or whether the electricity came from a traffic or streetlight, so detailed comparisons will only be possible in future inventories. From 2006 to 2012, energy consumption from streetlights and traffic lights combined decreased 5 percent, even with the addition of new lights throughout the city. This improvement is likely the result of using CFLs when installing new streetlights. The existing streetlights in the Portsmouth are almost entirely high pressure sodium fixtures.

An even more advanced emission reduction strategy than LEDs and CFLs is to install a data communication system that automatically adjusts light output to need depending on daylight availability. In addition to reducing CO_2e emissions, this type of system would also increase the life expectancy of street lamps. Another idea is to install grid-interactive PV-powered lamps.

Wastewater Facilities

The recommended approach was used to calculate the CO_2e emissions from Portsmouth's wastewater facilities, and the Master Data Workbook was used to calculate the byproduct N_2O emissions from wastewater treatment. The latter estimation was based on the Portsmouth population and standardized emissions factors for wastewater treatment. No CH_4 emissions were calculated because there are no anaerobic processes or septic systems used by the Portsmouth Wastewater Treatment Plants (WWTPs).

Portsmouth's wastewater treatment facilities generated 14 percent of the total municipal emissions, for a total of 2,161 tonnes of carbon dioxide equivalent. Ten percent (213 tonnes of CO_2e) of the total wastewater emissions came from effluent discharge, and 43 percent (926 tonnes of CO_2e) was produced from electricity, fuel oil, and propane usage at the Pease and Peirce Island WWTPs. The remaining emissions came from pumps, lift stations, and emergency generators.

The 2006 CACP software did not distinguish between the *Wastewater Facilities* and *Water Delivery Facilities* categories (instead, it was combined into one "Water/Sewage" category), so the results from 2006 to 2012 cannot be compared individually. Looking at the combined total for wastewater and water delivery facilities, the City reduced its energy consumption four percent between 2006 and 2012.

The City has reduced the volume of water it sends to WWTPs though the sewer separation project, called the Long Term Control Plan, which has been underway since 2000. The stormwater that is now separated from the WWTP has reduced the amount of wastewater treatment necessary, giving rise to electricity usage and effluent emissions reductions.

To help reduce rain water that enters the sewer in areas that still have a combined system, residents and the City could continue and expand on its installation of green infrastructure to help manage rainwater on-site. The planned upgrade to the Peirce Island WWTP offers an opportunity to reduce energy consumption during the wastewater treatment process through an integrated design process.

Water Delivery Facilities

ICLEI's recommended approach was used to calculate the CO_2e emissions for this section. Portsmouth's water delivery facilities generated 10 percent (1,471 tonnes of CO_2e) of the City's total greenhouse gas emissions. Energy consumption at the Spaulding Turnpike booster station decreased 20 percent. The new LEED Madbury water delivery facility, located at 60 Freshet Road, caused the release 819 tonnes of carbon dioxide equivalent in 2012 and consumed 24 percent more energy than the old structure in 2006. Although the new treatment process is more energy intensive, it provides better quality drinking water. In addition, the old plant would not have been able to meet the new requirements of the Safe Drinking Water Act.

The 2006 inventory combined the wastewater and water delivery categories into one, called "Water/Sewer." Combining the 2012 results from these two categories reveals that the City reduced its energy consumption from water delivery *and* sewage treatment four percent between 2006 and 2012.

Currently, approximately half of the City's water comes from Madbury reservoir and wells, and the other half comes from groundwater wells in Portsmouth and Greenland. Since 2012, the City has operated under a system known as conjunctive management which is dictated by water source availability as opposed to energy efficiency. Therefore in times of high surface water at the reservoir that water gets used rather than wells which are less energy intensive that can be saved in times of drought or low rainfall been drawing down the reservoir more than its aquifers as a conservation measure. It appears as if this has led to increased energy usage in delivering the surface water to the City.

The City of Portsmouth could further reduce its greenhouse gas emissions coming from water delivery services by looking more closely at the balance of water conservation versus electrical energy conservation. In addition, increasing insulation at pump stations, replacing lighting with more efficient alternatives, and installing more efficient pumps and motors are ideas for decreasing overall emissions. The City has implemented these ideas in many places around Portsmouth, resulting in the overall 4 percent decrease in energy consumption. **Community Inventory**

The community portion of the inventory reports total greenhouse gas emissions resulting from the residential, commercial, and industrial sectors, as well as from vehicles traveling within and through Portsmouth and waste generated in Portsmouth. The scope is defined as all emissions in these five categories taking place within the Portsmouth city limits. The specific scope for the community inventory is shown in Table 8.

Table 8. Specified Scope of the 2012 Portsmouth, NH Community Inventory

Emissions Type	Items Included
Built Environment	Commercial and industrial stationary combustion equipment (e.g., generators) Use of electricity by the community Use of district heating/cooling by the community (including natural gas, fuel oil, and propane)
Transportation	On-road passenger, transit, and freight and service vehicles operating within the community boundary
Solid Waste	Generation and disposal of solid waste by the community

Overall Emissions

During the 2012 calendar year, the community of Portsmouth produced 1,571,947 tonnes of equivalent CO_2 emissions (Table 9). Transportation made up the largest portion (77 percent) of the community-wide emissions, followed by the Commercial (9 percent), Residential (8 percent), Industrial (6 percent), and Waste (<1 percent) sectors (Figure 5).

Table 9. 2012 Itemized Community CO2 Equivalent (CO2e) Emissions

Sector	Tonnes CO_2e
Residential	126,447
Commercial	147,168
Industrial	88,835
Transportation	1,209,093

Waste	404
Total	1,571,947

The 2006 and 2012 community greenhouse gas inventory totals are not easily compared. The methodologies for propane, fuel oil, and transportation data collection varied widely, skewing the percentage breakdown of the overall total. The details from each sector are reported below.

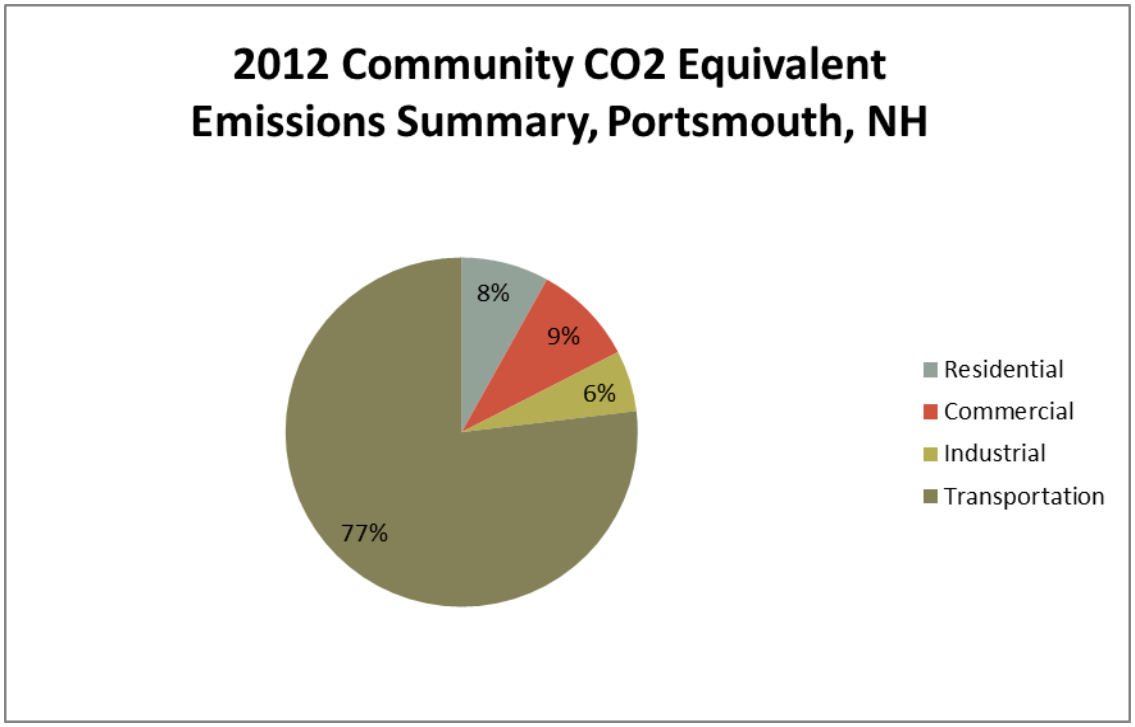

Figure 5. Total 2012 community-wide carbon dioxide equivalent (CO_2e) emissions broken down by sector. The waste sector is not shown because it makes up less than one percent of overall emissions.

Residential

For the residential sector, electricity and natural gas data was obtained from Public Service New Hampshire (PSNH) and Unitil, respectively. The methodology in Appendix C of the ICLEI Community Protocol was used to estimate fuel oil and propane usage in the residential sector. This involved using fuel use estimates from the Energy Information Administration and data on the number of households from the U.S. Census.

Table 10. Residential Electricity and Natural Gas Usage for 2006 and 2012

Energy Type	2006	2012	Change
Electricity (kWh)	148,523,653	158,735,693	7%
Natural Gas (therms)	3,242,692	3,077,386	-5%

In 2012, Portsmouth residents used 158.7 million kWh of electricity, an increase of seven percent over 2006 (Table 10). This resulted in 126,447 tonnes of CO_2 equivalent emissions in 2012 (Table 11). The 2012 electricity usage resulted in 95,639 tonnes of equivalent CO_2 emissions. Natural gas usage decreased five percent between the two inventories, emitting 16,358 tonnes of CO_2e in 2012. The electricity and natural gas data collection methodologies were the same in 2006 and 2012; data collection methodologies varied for propane and fuel oil so comparisons will not be made using these two sources. The 2012 methodologies will provide a better basis for comparison in future inventories.

Table 11. 2012 Residential Energy Usage and Carbon Dioxide Equivalent (CO_2e) Emissions by Source

Energy Type	Amount	Units	Tonnes CO_2e
Electricity	158,735,693	kWh	95,639
Natural Gas	3,077,386	therms	16,358
Fuel Oil (#1 2 4)	32,301	barrels	13,933
Propane	2,184	barrels	518
Total			126,447

To reduce emissions from the residential sector, Portsmouth residents could begin by focusing on energy conservation. Installing energy efficient windows, increasing the amount of insulation in walls and attics, and turning down the thermostat in the winter and turning up the thermostat in the summer all ways to conserve energy in homes. There are many programs around the country that use college student volunteers to perform energy upgrades in low income neighborhoods. The community could consider a partnership with a local higher education institution to development one of these energy-smart programs. Residents could also consider installing renewable energy on-site. Many solar arrays have a five to seven year payback period. The City could develop an energy loan program to help Portsmouth residents install renewable energy on their property, in addition to promoting the incentive programs offered at the state and federal level.

Commercial

The commercial sector electricity and natural gas usage was obtained from PSNH and Unitil. The methodology in Appendix C of the ICLEI Community Protocol was used to estimate propane usage. This involved using fuel usage estimates from the Energy Information Administration and data on the number of households from the U.S. Census.

Table 12. Commercial Electricity and Natural Gas Usage for 2006 and 2012

Energy Type	2006	2012	Change
Electricity (kWh)	160,868,476	167,689,235	4%
Natural Gas (therms)	6,603,370	6,195,807	-6%

Portsmouth businesses increased their electricity usage four percent between 2006 and 2012 (Table 12). During the same timeframe, Portsmouth's commercial sector natural gas usage decreased by six percent. Overall, the Portsmouth commercial sector produced 147,168 tonnes of CO_2 equivalent emissions (Table 13). The same data collection methodology was used for electricity and natural gas usage. Commercial fuel oil usage was not estimated in 2006 or 2012, and data collection methodologies for propane varied between the two inventories.

Table 13. 2012 Commercial Energy Usage and Carbon Dioxide Equivalent (CO_2e) Emissions by Source

Energy Type	Amount	Units	Tonnes CO2e
Electricity	167,689,235	kWh	101,033
Natural Gas	6,195,807	therms	32,934
Propane	55,671	barrels	13,200
Total			147,168

At the commercial level, businesses in Portsmouth can take some of the same steps as local residents to reduce their energy consumption. Switching from incandescent bulbs to CFLs or LEDs, installing smart strip power cords that reduce phantom power, and planting trees close to the perimeter of buildings (which provides shade during the summer and decreases wind speeds that increase heating needs in the winter), are all ways to conserve energy. After reducing energy use as much as possible, businesses could install on-site renewable energy which can decrease greenhouse gas emissions. Tax credits are available for businesses as well.

Industrial

The recommended approach was used to calculate electricity and natural gas consumption in 2012. Proxy data for 2011 was obtained from the New Hampshire Department of Environmental Services to estimate 2012 fuel oil usage in the industry sector.

Table 14. Industrial Electricity and Natural Gas Usage for 2006 and 2012

Energy Type	2006	2012	Change
Electricity (kWh)	75,997,817	68,036,809	-10%
Natural Gas (therms)	11,284,045	8,350,499	-26%

Industrial electricity usage decreased 10 percent between 2006 and 2012 (Table 14), producing 40,990 tonnes of equivalent CO_2 emissions (Table 15). Portsmouth's industrial natural gas usage decreased by 26 percent during the same time frame. The 2006 fuel oil usage data could not be obtained to make a comparison against the baseline inventory. Overall, the Portsmouth industrial sector produced 88,835 tonnes of CO_2 equivalent emissions. The data collection methodologies for 2006 and 2012 were the same for electricity, natural gas, and fuel

oil consumption. Propane usage was not estimated for 2006 or 2012 because the data was not available.

Small improvements at the industrial level can result in a dramatic reduction in energy use. There are several companies that offer industrial-scale energy reduction services, including commissioning and energy saving performance contracts. All come with large monetary savings. Training focused on improved efficiency can also provide substantial benefits. These industrial energy efficiency efforts focus on lighting, electrical demand, HVAC systems, energy management systems, and more.

Table 15. 2012 Industrial Energy Usage and Carbon Dioxide Equivalent (CO_2e) Emissions by Source

Energy Type	Amount	Units	Tonnes CO_2e
Electricity	68,036,809	kWh	40,992
Natural Gas	8,350,499	therms	44,318
Fuel Oil (#1 2 4)	344,050	gallons	3,525
Total			88,835

Transportation

The 2012 transportation emissions were estimated using the Rockingham Planning Commission's (RPC's) database. ICLEI recommends using a travel demand model such as was provided by RPC. Vehicles driving within and around Portsmouth drove an estimated 2 billion miles and emitted an estimated 1,209,093 tonnes of equivalent CO_2 in 2012 (Table 16). RPC reports that this estimate is likely lower than what actually occurs because the transportation demand model does not account for smaller streets in Portsmouth.

Table 10. 2012 Vehicle Miles Traveled (VMT) in Portsmouth, NH

	Vehicle Fuel Fractions*	VMT
Passenger Vehicle		
Gasoline	99.6%	1,443,616,442
Diesel	0.4%	5,507,221
Subtotal	100.0%	1,449,268,590
Light Truck		
Gasoline	97.7%	505,137,340
Diesel	2.3%	11,945,815
Subtotal	100.0%	517,134,869
Heavy Truck		
Gasoline	4.0%	5,969,949
Diesel	96.0%	143,278,776
Subtotal	100.0%	149,248,725
Total**		2,115,652,184

*Exported from the U.S. EPA's MOVES2010b database

**Obtained from the Rockingham Planning Commission

Because the methodology used in 2012 differed dramatically from the process used in 2006[12], an adequate comparison cannot be completed. The Rockingham Planning Commission reports that Portsmouth likely experiences an increase on the lower range of between .5 and 2 percent per year. The new methodology will provide for a better comparison for future inventories. The Portsmouth community can always take steps to reduce its greenhouse gas emissions coming from travel in and around the city. Residents can rides their bikes, using the existing bike lanes and bike parking; they can take the trolley to travel within the downtown area; and they can carpool whenever possible. Purchasing more fuel efficient vehicles reduces greenhouse gas emissions and can help residents save money when purchasing gasoline or diesel. Efforts are underway to achieve a bike-friendly and pedestrian-friendly community design. Toward that end, the City is working to develop a Complete Streets Program and a Bicycle and Pedestrian Master Plan which will add more bike lanes within the city limits.

Waste

The community of Portsmouth produced 7,185 tons of waste, resulting in 404 tonnes of CO_2e emissions during the 2012 calendar year (Table 17). The largest amount of waste produced fell into the "other" category. This consists of plastics and other items. All waste in the "other" category, along with food and paper products, are sent to the Turnkey Landfill in Rochester, New Hampshire. In 2012, this facility captured and reused 85 percent of the methane released as a result of waste decomposition. This technology, which is new since 2006, is captured in the 2012 emissions inventory. Plant debris, or yard waste and brush, was the second largest category of waste produced. Plant debris is sent to a composting facility, so it does not count towards the community's emissions inventory. Wood and textiles are sent to a facility that uses a controlled burn disposal method.

Since 2006, the total greenhouse gas emissions from the decomposition of Portsmouth's waste has decreased 35 percent, from 623 to 404 tonnes of CO_2e (Table 18). This is due to the Turnkey facility's capture and reuse of methane emissions, and the City of Portsmouth's switch to single-stream recycling, which has reduced the amount of waste going to the landfill.

Table 11. 2012 Waste Totals and Carbon Dioxide Equivalent (CO_2e) Emissions Totals

Waste Type	Tons	Tonnes CO2e
Other Waste*	2,950	0
Plant Debris	2,053	0

[12] See the 2006 methodology and results in Portsmouth's 2006 GHG inventory, "Cities for Climate Protection Campaign," published in September 2007.

Food Waste	1,097	181
Paper Products	642	187
Wood/Textiles	496	36
Total	7,238	404

*ICLEI does not count emissions from "Other Waste" because all waste that is not paper, wood, food, or plant-based does not break down, and therefore does not create emissions.

Table 12. 2006 and 2012 Tonnes of Carbon Dioxide Equivalent from Waste

Waste Type	2006	2012
Wood/Textiles	58	36
Paper Products	515	187
Food Waste	50	181
Total	623	404

There are several ways the Portsmouth community can reduce the amount of waste it sends to the landfill. Curbside pickup of single-stream recycling diverted 2,800 tons from the landfill in 2012; composting could increase diversion rates even more. Residents could compost in their backyards, use vermicomposting (an earthworm-based method), or purchase an electronic composter. Alternatively, the City could offer curbside composting pickup like cities such as Ann Arbor, Michigan, Austin, Texas, or Portland, Oregon.

Conclusion

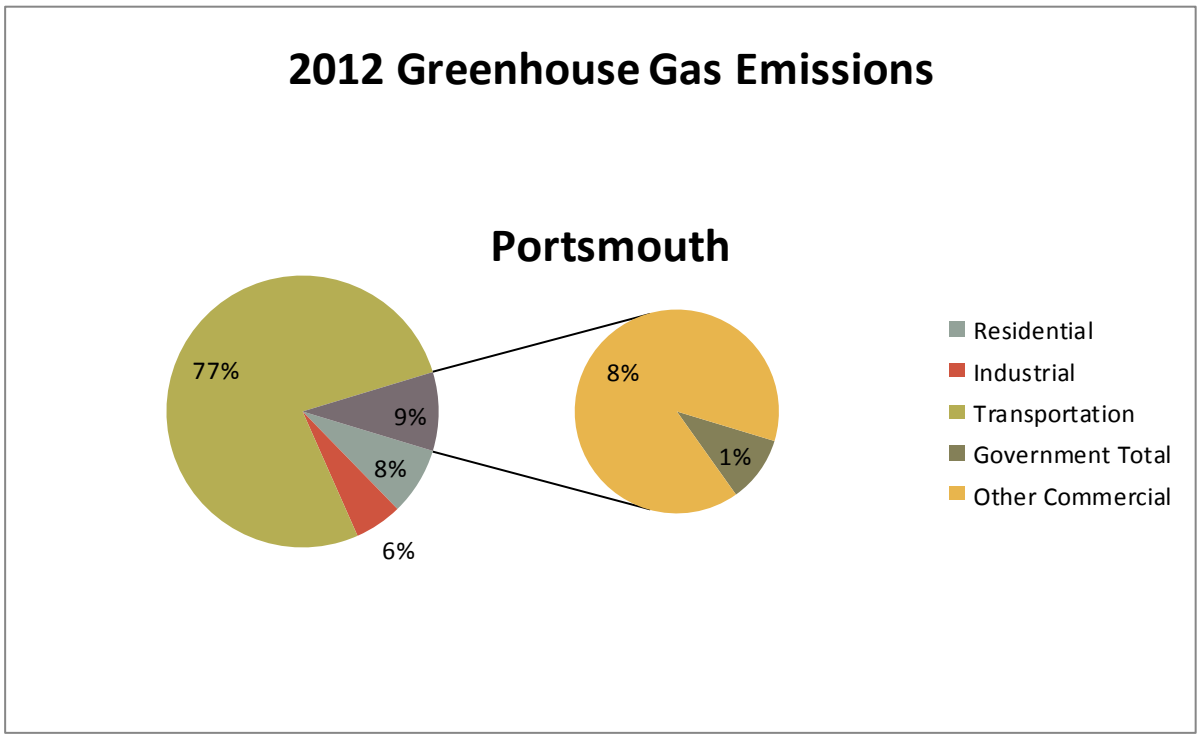

Figure 6. 2012 Municipal and Community Emissions in Perspective. Emissions from the waste sector were too small to appear on this graph.

Overall, the ICLEI methodology has improved since 2006, making this inventory more comprehensive and complete. While the changes in this 2012 report made some comparisons between 2006 and 2012 impossible, these new methodologies will lead to more consistent future reporting and will facilitate more accurate comparisons between inventory years.

Municipal operations made up just one percent of Portsmouth's total community greenhouse gas emissions in 2012 (Figure 6). Comparing 2006 to 2012, the City decreased its energy consumption 15 percent, including in all comparable sectors. This decrease was achieved through three new LEED buildings, improvements in building energy management, space consolidation, and more energy efficient vehicles. The community increased its emissions in the residential and commercial sectors, and decreased its emissions from the industrial sector and from the decomposition of waste.

The City has achieved significant reductions in energy consumption since 2006, but municipal energy consumption is a very small portion of the community total. Since the City makes up on one percent of overall emissions, its impact on Community emissions is negligible. As the City continues to serve as a leader in the community taking steps to reduce its overall

emissions, Portsmouth residents and businesses need to do the same. There are many ways to conserve electricity, heating fuels, and transportation fuels without incurring large costs. Climate-change-causing greenhouse gases will impact the coastal city of Portsmouth; everyone needs to take steps to reduce their reliance on electricity, gasoline, diesel, natural gas, propane, and heating fuel. The City will repeat this greenhouse gas inventory in a few years; it hopes to see a decrease in energy consumption in City operations as well as in the community as a whole.

Government Greenhouse Gas Emissions in 2012
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	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)	Cost ($)
Buildings and Facilities							
Portsmouth, New Hampshire							
1 Junkins Ave - City Hall							
Electricity	575	39	13	587	0	3,326	76,201
Natural Gas	197	0	19	197	0	3,709	44,323
Subtotal 1 Junkins Ave - City Hall	771	39	31	784	0	7,035	120,524
135 Daniel Street							
Electricity	25	2	1	25	0	143	3,278
Natural Gas	71	0	7	71	0	1,335	15,952
Subtotal 135 Daniel Street	96	2	7	96	0	1,478	19,230
This facility was sold at the end of 2012.							
30 Spinnaker Way							
Electricity	220	15	5	225	0	1,273	29,168
Natural Gas	92	0	9	92	0	1,730	20,676
Subtotal 30 Spinnaker Way	312	15	14	317	0	3,003	49,844
680 Peverly Hill Road							
Electricity	149	10	3	152	0	861	19,724
Natural Gas	92	0	9	93	0	1,740	20,798
Subtotal 680 Peverly Hill Road	241	10	12	244	0	2,601	40,522
Andrew Jarvis Drive - Indoor Pool							
Electricity	164	11	4	167	0	948	21,723
Natural Gas	286	1	27	286	0	5,388	64,384
Subtotal Andrew Jarvis Drive - Inc	450	12	31	454	0	6,336	86,107
This facility is run by a nonprofit, but the City pays the utility bills.							
Dondero Elementary School							
Electricity	141	10	3	144	0	814	18,640
Natural Gas	1,462	3	138	1,466	0	27,579	329,572
Subtotal Dondero Elementary Sch	1,603	12	141	1,610	0	28,393	348,212

Government Greenhouse Gas Emissions in 2012
Detailed Report

Scope 1 + Scope 2 + Scope 3

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)	Cost ($)
Emergency Generator - Beans Hill							
Fuel Oil (#1 2 4)	3	0	0	3	0	43	1,228
Subtotal Emergency Generator - I	3	0	0	3	0	43	1,228
Emergency Generator - City Hall							
Fuel Oil (#1 2 4)	3	0	0	3	0	42	1,207
Subtotal Emergency Generator - (	3	0	0	3	0	42	1,207
Emergency Generator - High School							
Fuel Oil (#1 2 4)	8	0	1	8	0	107	3,067
Subtotal Emergency Generator - I	8	0	1	8	0	107	3,067
Emergency Generator - Police Station							
Fuel Oil (#1 2 4)	2	0	0	2	0	22	617
Subtotal Emergency Generator - I	2	0	0	2	0	22	617
Fire Station 1 - 170 Court St							
Electricity	51	3	1	52	0	295	6,759
Natural Gas	22	0	2	22	0	411	4,914
Subtotal Fire Station 1 - 170 Cour	73	3	3	74	0	706	11,673
Fire Station 2 - 3000 Lafayette Road							
Electricity	81	5	2	83	0	469	10,740
Natural Gas	49	0	5	49	0	925	11,056
Subtotal Fire Station 2 - 3000 Laf	130	6	6	132	0	1,394	21,796
Fire Station 3 - 127 International Drive							
Electricity	22	1	0	22	0	125	2,859
Natural Gas	20	0	2	20	0	386	4,608
Subtotal Fire Station 3 - 127 Inter	42	1	2	43	0	510	7,467
High-Hanover Parking Garage							
Electricity	199	13	4	204	0	1,154	26,437
Natural Gas	0	0	0	0	0	4	44
Subtotal High-Hanover Parking G	200	13	4	204	0	1,158	26,481

Government Greenhouse Gas Emissions in 2012
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	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)	Cost ($)
Ladd Street							
Electricity	4	0	0	4	0	22	502
Subtotal Ladd Street	4	0	0	4	0	22	502
Library - Parrott Avenue							
Electricity	339	23	8	346	0	1,960	44,912
Natural Gas	20	0	2	20	0	384	4,591
Subtotal Library - Parrott Avenue	359	23	9	366	0	2,345	49,503
Little Harbour Elementary School							
Electricity	224	15	5	229	0	1,296	29,700
Natural Gas	184	0	17	184	0	3,461	41,360
Subtotal Little Harbour Elementar	408	16	22	413	0	4,757	71,060
Market Square							
Electricity	0	0	0	0	0	2	35
Subtotal Market Square	0	0	0	0	0	2	35
New Franklin Elementary School							
Electricity	118	8	3	121	0	684	15,679
Natural Gas	125	0	12	125	0	2,358	28,176
Subtotal New Franklin Elementar	243	8	14	246	0	3,042	43,855
Parrott Avenue Scoreboard							
Electricity	0	0	0	0	0	2	56
Subtotal Parrott Avenue Scoreboa	0	0	0	0	0	2	56
This is the scoreboard on the athletic field.							
Pierce Island Pool							
Electricity	73	5	2	74	0	421	2,626
Subtotal Pierce Island Pool	73	5	2	74	0	421	2,626
Portsmouth High School							
Electricity	1,438	97	32	1,469	0	8,322	190,658
Natural Gas	575	1	54	576	0	10,838	129,508
Subtotal Portsmouth High School	2,013	98	86	2,045	0	19,160	320,166

Government Greenhouse Gas Emissions in 2012
Detailed Report

Scope 1 + Scope 2 + Scope 3

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)	Cost ($)
Portsmouth Middle School							
Electricity	410	28	9	418	0	2,370	54,287
Natural Gas	332	1	31	333	0	6,259	74,800
Subtotal Portsmouth Middle Scho	741	28	40	751	0	8,629	129,087
Redundant Back Up System							
Electricity	4	0	0	4	0	25	580
Subtotal Redundant Back Up Sys	4	0	0	4	0	25	580
Rockland Street							
Electricity	20	1	0	20	0	115	2,626
Subtotal Rockland Street	20	1	0	20	0	115	2,626
Sherburne Elementary School							
Electricity	41	3	1	42	0	237	5,434
Natural Gas	67	0	6	68	0	1,272	15,201
Subtotal Sherburne Elementary S	108	3	7	109	0	1,509	20,635
Subtotal Buildings and Facilities	7,907	298	437	8,008	0	92,857	1,378,706
Streetlights & Traffic Signals							
Portsmouth, New Hampshire							
Other Outdoor Lighting							
Electricity	0	0	0	0	0	0	6
Subtotal Other Outdoor Lighting	0	0	0	0	0	0	6

Other Outdoor Lighting items are listed by account in the Master Data Workbook.

Streetlights							
Electricity	481	33	11	491	0	2,781	63,723
Subtotal Streetlights	481	33	11	491	0	2,781	63,723

Streetlights are listed by account in the Master Data Workbook.

"Lamp 10: 1 Junkins Avenue" and "Lamp 21: City Hall," which are listed in the Master Data Workbook, have large electricity usage reported for 2012. Mark Nelson contacted PSNH, and these large numbers are due to the account number hosting several streetlights rather than just one or a few.

Government Greenhouse Gas Emissions in 2012
Detailed Report

Scope 1 + Scope 2 + Scope 3

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)	Cost ($)
Traffic Signals/Controlers							
Electricity	176	12	4	180	0	1,018	23,312
Subtotal Traffic Signals/Controler	176	12	4	180	0	1,018	23,312
Traffic Lights are listed by account in the Master Data Workbook.							
Subtotal Streetlights & Traffic Signa	657	44	15	671	0	3,799	87,041
Water Delivery Facilities							
Portsmouth, New Hampshire							
0 Country Club Road							
Electricity	41	3	1	42	0	238	5,450
Subtotal 0 Country Club Road	41	3	1	42	0	238	5,450
60 Freshet Road							
Electricity	802	54	18	819	0	4,638	106,260
Subtotal 60 Freshet Road	802	54	18	819	0	4,638	106,260
Constitution Avenue - Water Tank							
Electricity	3	0	0	3	0	15	348
Subtotal Constitution Avenue - W	3	0	0	3	0	15	348
Emergency Generator - Madbury Drinking Water Plant							
Fuel Oil (#1 2 4)	9	0	1	9	0	116	3,338
Subtotal Emergency Generator - I	9	0	1	9	0	116	3,338
Grafton Drive Pease Treatment Plant							
Electricity	36	2	1	36	0	205	4,707
Subtotal Grafton Drive Pease Tre	36	2	1	36	0	205	4,707
Grafton Drive Well							
Electricity	34	2	1	35	0	196	4,488
Subtotal Grafton Drive Well	34	2	1	35	0	196	4,488
Greenland Road							
Electricity	60	4	1	61	0	346	7,922
Subtotal Greenland Road	60	4	1	61	0	346	7,922

Government Greenhouse Gas Emissions in 2012
Detailed Report

Scope 1 + Scope 2 + Scope 3

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)	Cost ($)
Griffin Road							
Electricity	11	1	0	12	0	66	1,521
Natural Gas	1	0	0	1	0	27	320
Subtotal Griffin Road	13	1	0	13	0	93	1,842
There are two meters for this entry: Sewer 17 and 18 on the Mark Nelson spreadsheet.							
Harvard Street							
Electricity	38	3	1	39	0	219	5,012
Subtotal Harvard Street	38	3	1	39	0	219	5,012
International Drive							
Electricity	4	0	0	4	0	24	543
Subtotal International Drive	4	0	0	4	0	24	543
Mill Hill Road							
Electricity	31	2	1	31	0	178	4,074
Subtotal Mill Hill Road	31	2	1	31	0	178	4,074
Northwood Road							
Electricity	4	0	0	4	0	25	573
Subtotal Northwood Road	4	0	0	4	0	25	573
Post Road Greenland							
Electricity	77	5	2	79	0	447	10,237
Subtotal Post Road Greenland	77	5	2	79	0	447	10,237
Sherburn Road							
Electricity	2	0	0	2	0	9	206
Subtotal Sherburn Road	2	0	0	2	0	9	206
Spaulding Trnpke Newington							
Electricity	273	18	6	279	0	1,580	36,202
Subtotal Spaulding Trnpke Newin	273	18	6	279	0	1,580	36,202
Spinney Road							
Electricity	15	1	0	16	0	89	2,038
Subtotal Spinney Road	15	1	0	16	0	89	2,038

Government Greenhouse Gas Emissions in 2012
Detailed Report

Scope 1 + Scope 2 + Scope 3

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)	Cost ($)
Subtotal Water Delivery Facilities	1,440	97	33	1,471	0	8,418	193,239
Wastewater Facilities							
Portsmouth, New Hampshire							
120 Gosling Road							
Electricity	24	2	1	24	0	138	3,156
Natural Gas	2	0	0	2	0	32	382
Subtotal 120 Gosling Road	26	2	1	26	0	170	3,538
3618 Lafayette Road							
Electricity	26	2	1	26	0	150	3,431
Natural Gas	2	0	0	2	0	29	343
Subtotal 3618 Lafayette Road	27	2	1	28	0	178	3,774
630 Lafayette Road							
Electricity	115	8	3	117	0	666	15,247
Natural Gas	2	0	0	2	0	28	339
Subtotal 630 Lafayette Road	117	8	3	119	0	694	15,586
Clough Road							
Electricity	1	0	0	1	0	6	145
Subtotal Clough Road	1	0	0	1	0	6	145
Constitution Ave - Lift Station							
Electricity	9	1	0	9	0	50	1,147
Propane	0	0	0	0	0	5	117
Subtotal Constitution Ave - Lift St	9	1	0	9	0	55	1,264
Corporate Drive							
Electricity	13	1	0	13	0	74	1,698
Natural Gas	2	0	0	2	0	40	477
Propane	31	1	6	32	0	512	11,522
Subtotal Corporate Drive	46	1	6	47	0	626	13,697

Government Greenhouse Gas Emissions in 2012
Detailed Report

Scope 1 + Scope 2 + Scope 3

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)	Cost ($)
Deer Street							
Electricity	194	13	4	198	0	1,121	25,678
Subtotal Deer Street	194	13	4	198	0	1,121	25,678
Effluent Discharge							
Nitrous Oxide	0	686	0	213	0	0	0
Subtotal Effluent Discharge	0	686	0	213	0	0	0
This was calculated in the Master Data Workbook. The total N20 emissions were entered into the software directly.							
Emergency Generator - Lafayette Road WWLS							
Fuel Oil (#1 2 4)	6	0	1	6	0	78	2,231
Subtotal Emergency Generator - l	6	0	1	6	0	78	2,231
Emergency Generator - Market Street WWLS							
Fuel Oil (#1 2 4)	6	0	1	6	0	80	2,295
Subtotal Emergency Generator - l	6	0	1	6	0	80	2,295
Emergency Generator - Mechanic Street WWLS							
Fuel Oil (#1 2 4)	21	0	3	21	0	281	8,096
Subtotal Emergency Generator - l	21	0	3	21	0	281	8,096
Emergency Generator - Pease WWTP							
Fuel Oil (#1 2 4)	3	0	1	3	0	47	1,337
Subtotal Emergency Generator - l	3	0	1	3	0	47	1,337
Emergency Generator - Pierce Island WWTP							
Fuel Oil (#1 2 4)	10	0	1	10	0	134	3,864
Subtotal Emergency Generator - l	10	0	1	10	0	134	3,864
FW Hartford Drive							
Electricity	22	2	0	23	0	128	2,943
Propane	1	0	0	1	0	17	388
Subtotal FW Hartford Drive	23	2	1	24	0	146	3,331
There are two meters for this entry: Sewer 13 and 14 on the Mark Nelson spreadsheet.							

Government Greenhouse Gas Emissions in 2012
Detailed Report

Scope 1 + Scope 2 + Scope 3

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)	Cost ($)
Gosport Road							
Electricity	6	0	0	6	0	32	40
Propane	2	0	0	2	0	27	612
Subtotal Gosport Road	7	0	0	7	0	59	652
Heritage Road							
Electricity	5	0	0	5	0	30	695
Subtotal Heritage Road	5	0	0	5	0	30	695
Marcy Street							
Electricity	7	0	0	8	0	43	975
Natural Gas	2	0	0	2	0	29	344
Subtotal Marcy Street	9	1	0	9	0	71	1,319
Market Street							
Electricity	13	1	0	14	0	78	1,776
Natural Gas	2	0	0	2	0	35	417
Subtotal Market Street	15	1	0	16	0	112	2,193
Marsh Lane							
Electricity	1	0	0	1	0	3	77
Subtotal Marsh Lane	1	0	0	1	0	3	77
Mechanic Street							
Electricity	444	30	10	454	0	2,571	58,893
Natural Gas	9	0	1	9	0	172	2,059
Subtotal Mechanic Street	453	30	11	463	0	2,743	60,952
Mill Pond Way							
Electricity	2	0	0	2	0	10	228
Subtotal Mill Pond Way	2	0	0	2	0	10	228
Northwest Street							
Electricity	1	0	0	1	0	5	113
Subtotal Northwest Street	1	0	0	1	0	5	113

Government Greenhouse Gas Emissions in 2012
Detailed Report

Scope 1 + Scope 2 + Scope 3

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)	Cost ($)
Pease Treatment Plant (Rye Street)							
Electricity	525	36	12	536	0	3,038	69,605
Subtotal Pease Treatment Plant (	525	36	12	536	0	3,038	69,605
Pierce Island Treatment Plant							
Electricity	348	24	8	355	0	2,014	46,132
Fuel Oil (#1 2 4)	31	0	5	31	0	415	11,727
Propane	3	0	1	3	0	52	1,172
Subtotal Pierce Island Treatment	382	24	13	390	0	2,481	59,031
Preble Way							
Electricity	10	1	0	10	0	57	1,305
Subtotal Preble Way	10	1	0	10	0	57	1,305
West Road							
Electricity	11	1	0	11	0	62	1,416
Propane	0	0	0	0	0	6	125
Subtotal West Road	11	1	0	11	0	67	1,541
Subtotal Wastewater Facilities	1,910	808	59	2,161	0	12,294	282,547
Vehicle Fleet							
Portsmouth, New Hampshire							
Fire Department - CO2							
Diesel	104	0	0	104	0	1,405	34,365
Gasoline	40	0	0	40	0	565	9,593
Subtotal Fire Department - CO2	144	0	0	144	0	1,970	43,957
Fire Department - N20 and CH4 - new models							
Diesel	0	0	0	0	0	1,669	0
Gasoline	0	0	0	0	0	269	0
Subtotal Fire Department - N20 a	0	1	1	0	0	1,938	0
Fire Department - N20 and CH4 - old models							
Diesel	0	0	0	0	0	910	0
Gasoline	0	0	0	0	0	132	0
Subtotal Fire Department - N20 a	0	1	1	0	0	1,042	0

Government Greenhouse Gas Emissions in 2012
Detailed Report

Scope 1 + Scope 2 + Scope 3

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)	Cost ($)
Police Department - CO2							
Diesel	0	0	0	0	0	6	139
Gasoline	314	0	0	314	0	4,476	104,115
Subtotal Police Department - CO2	315	0	0	315	0	4,482	104,254
Police Department - N20 and CH4 - new models							
Gasoline	0	3	12	1	0	4,936	0
Subtotal Police Department - N20	0	3	12	1	0	4,936	0
Police Department - N20 and CH4 - old models							
Gasoline	0	0	0	0	0	52	0
Subtotal Police Department - N20	0	0	0	0	0	52	0
Public Works - CO2							
Gasoline	181	0	0	181	0	2,573	49,752
OFF ROAD Diesel	112	0	0	112	0	1,511	35,197
OFF ROAD Gasoline	18	0	0	18	0	262	5,294
Subtotal Public Works - CO2	311	0	0	311	0	4,346	90,243
Public Works - N20 and CH4 - new models							
Diesel	0	0	0	0	0	2,092	0
Gasoline	0	3	7	1	0	5,055	0
Subtotal Public Works - N20 and	0	4	7	1	0	7,147	0
Public Works - N20 and CH4 - old models							
Diesel	0	0	0	0	0	2,108	0
Gasoline	0	5	2	2	0	1,194	0
Subtotal Public Works - N20 and	0	6	3	2	0	3,301	0
School Buses - CO2							
Diesel	225	0	0	225	0	3,042	0
Gasoline	49	0	0	49	0	699	0
Subtotal School Buses - CO2	274	0	0	274	0	3,741	0

The School Buses are contracted out to "The Provider" and to "STA: Student Transportation Authority." Even though they are outside of our operational control, we decided to include their emissions since they were included in 2006 and are a core part of City services.

Government Greenhouse Gas Emissions in 2012
Detailed Report

Scope 1 + Scope 2 + Scope 3

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)	Cost ($)
School Buses - N20 and CH4 - new models							
Diesel	0	1	1	0	0	4,269	0
Subtotal School Buses - N20 and	0	1	1	0	0	4,269	0
School Department - CO2							
Gasoline	30	0	0	30	0	431	7,691
OFF ROAD Diesel	2	0	0	2	0	23	536
OFF ROAD Gasoline	26	0	0	26	0	366	6,175
Subtotal School Department - CO	58	0	0	58	0	820	14,402
School Department - N20 and CH4 - new models							
Gasoline	0	0	1	0	0	533	0
Subtotal School Department - N2(	0	0	1	0	0	533	0
School Department - N20 and CH4 - old models							
Gasoline	0	2	1	1	0	390	0
Subtotal School Department - N2(	0	2	1	1	0	390	0
Sewer - CO2							
Diesel	88	0	0	88	0	1,196	25,034
Gasoline	94	0	0	94	0	1,341	18,479
OFF ROAD Diesel	10	0	0	10	0	134	2,506
Subtotal Sewer - CO2	193	0	0	193	0	2,671	46,019
Sewer - N20 and CH4 - new models							
Diesel	0	0	0	0	0	939	0
Gasoline	0	1	2	0	0	1,630	0
Subtotal Sewer - N20 and CH4 - r	0	1	2	0	0	2,570	0
Sewer - N20 and CH4 - old models							
Diesel	0	0	0	0	0	91	0
Subtotal Sewer - N20 and CH4 - (	0	0	0	0	0	91	0
Water - CO2							
Diesel	47	0	0	47	0	641	15,082
Gasoline	123	0	0	123	0	1,749	28,304

Government Greenhouse Gas Emissions in 2012
Detailed Report

Scope 1 + Scope 2 + Scope 3

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)	Cost ($)
OFF ROAD Diesel	21	0	0	21	0	282	6,608
Subtotal Water - CO2	191	0	0	191	0	2,671	49,994
Water - N20 and CH4 - new models							
Diesel	0	0	0	0	0	788	0
Gasoline	0	1	2	0	0	1,621	0
Subtotal Water - N20 and CH4 - n	0	1	3	0	0	2,408	0
Water - N20 and CH4 - old models							
Gasoline	0	2	1	1	0	380	0
Subtotal Water - N20 and CH4 - c	0	2	1	1	0	380	0
Subtotal Vehicle Fleet	1,485	21	31	1,492	0	49,761	348,870
Employee Commute							
Portsmouth, New Hampshire							
All Employees - CO2 - new models							
Diesel	29	0	0	29	0	386	0
Gasoline	1,016	11	30	1,019	0	14,457	0
Subtotal All Employees - CO2 - ne	1,044	11	30	1,048	0	14,842	0
The data for this section was gathered using a commuter survey.							
All Employees - CO2 - old models							
Diesel	6	0	0	6	0	84	0
Gasoline	534	0	0	534	0	7,606	0
Subtotal All Employees - CO2 - ol	541	0	0	541	0	7,690	0
All Employees - N20 and CH4 - new models							
Diesel	0	0	0	0	0	737	0
Gasoline	0	16	46	6	0	22,216	0
Subtotal All Employees - N20 and	0	16	46	6	0	22,952	0
All Employees - N20 and CH4 - old models							
Diesel	0	0	0	0	0	185	0
Gasoline	0	33	27	11	0	11,785	0
Subtotal All Employees - N20 and	0	33	27	11	0	11,970	0

Government Greenhouse Gas Emissions in 2012
Detailed Report

Scope 1 + Scope 2 + Scope 3

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)	Cost ($)
Subtotal Employee Commute	1,585	61	103	1,606	0	57,455	0
Mobile Source Refrigerants							
Portsmouth, New Hampshire							
Fire Department							
HFC-134a 236cb 43-10mee	0	0	0	1	0		
Subtotal Fire Department	0	0	0	1	0		
Police Department							
HFC-134a 236cb 43-10mee	0	0	0	2	0		
Subtotal Police Department	0	0	0	2	0		
Public Works - HFCs							
HFC-134a 236cb 43-10mee	0	0	0	4	0		
Subtotal Public Works - HFCs	0	0	0	4	0		
School Department							
HFC-134a 236cb 43-10mee	0	0	0	0	0		
Subtotal School Department	0	0	0	0	0		
Sewer							
HFC-134a 236cb 43-10mee	0	0	0	1	0		
Subtotal Sewer	0	0	0	1	0		
Water							
HFC-134a 236cb 43-10mee	0	0	0	1	0		
Subtotal Water	0	0	0	1	0		
Subtotal Mobile Source Refrigerant	0	0	0	10	0		
Total	14,983	1,329	679	15,419	0	224,585	2,290,402

Community Greenhouse Gas Emissions in 2012
Detailed Report

Scope 1 + Scope 2 + Scope 3

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)
Residential						
Portsmouth, New Hampshire						
Entire City						
Electricity	93,630	6,336	2,088	95,639	0	541,760
Fuel Oil (#1 2 4)	13,848	136	2,035	13,933	0	187,237
Natural Gas	16,316	31	1,539	16,358	0	307,739
Propane	513	9	92	518	0	8,349
Subtotal Entire City	124,308	6,512	5,754	126,447	0	1,045,085
Subtotal Residential	124,308	6,512	5,754	126,447	0	1,045,085
Commercial						
Portsmouth, New Hampshire						
Entire City						
Electricity	98,912	6,694	2,206	101,033	0	572,318
Natural Gas	32,850	62	3,098	32,934	0	619,581
Propane	13,079	234	2,338	13,200	0	212,798
Subtotal Entire City	144,840	6,989	7,642	147,168	0	1,404,697
Subtotal Commercial	144,840	6,989	7,642	147,168	0	1,404,697
Industrial						
Portsmouth, New Hampshire						
Entire City						
Electricity	40,132	2,716	895	40,992	0	232,208
Fuel Oil (#1 2 4)	3,512	34	138	3,525	0	47,479
Natural Gas	44,274	84	835	44,318	0	835,050
Subtotal Entire City	87,917	2,834	1,868	88,835	0	1,114,736
Subtotal Industrial	87,917	2,834	1,868	88,835	0	1,114,736

Community Greenhouse Gas Emissions in 2012
Detailed Report

Scope 1 + Scope 2 + Scope 3

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Bio CO_2 (tonnes)	Energy (MMBtu)
Transportation						
Portsmouth, New Hampshire						
Entire City						
Diesel	243,772	0	0	243,772	0	3,296,785
Gasoline	965,320	0	0	965,320	0	13,741,688
Subtotal Entire City	1,209,093	0	0	1,209,093	0	17,038,473
Subtotal Transportation	1,209,093	0	0	1,209,093	0	17,038,473
Waste						
Portsmouth, New Hampshire						
Aggregate Recycling					*Disposal Method - Controlled Incineration*	
Wood or Textiles	0	0	1,730	36	0	
Subtotal Aggregate Recycling	0	0	1,730	36	0	
Turnkey Landfill					*Disposal Method - Managed Landfill*	
Paper Products	0	0	8,901	187	0	
Food Waste	0	0	8,606	181	0	
Subtotal Turnkey Landfill	0	0	17,507	368	0	
Subtotal Waste	0	0	19,237	404	0	
Total	1,566,159	16,335	34,500	1,571,947	0	20,602,991

Appendix D. Municipal Inventory Scope and Contacts List

Local Government Operations Emissions Inventory

Sector	Sub Sector	Potential Data Needs	Included (Yes/No)	Staff or External Contact Responsible for Providing Data (Name, Title, Contact Information)	Notes
Facilities Sources					
Buildings and Other Facilities	Utility-Derived Power	Electricity	Yes	Stacey Moss, Finance Dept.	From Monthly Energy Worksheets
		Natural Gas	Yes	Stacey Moss, Fianance Dept.	From Monthly Energy Worksheets
		Diesel (Back-up Generators)	No		n/a (none of our generators are located at power generation facilities; they are all located at our City facilities)
		Gasoline (Back-up Generators)	No		n/a
		Propane (Back-Up Generators)	No		n/a
	Back-Up & Off-Grid Power	Other Fuels (see notes)	No		n/a
	Direct Access Power	Electricity	No		n/a
		Natural Gas	No		n/a
	District Heating and Cooling	Purchased Cooling	No		n/a
		Purchased Steam	No		n/a
	Combined Heat and Power	Purchased Steam	No		n/a
Streetlight and Traffic Signals	Utility-Derived Power	Electricity	Yes	Stacey Moss, Finance Dept.	From Monthly Energy Worksheets
		Natural Gas	No		n/a
	Back-Up & Off-Grid Power	Diesel (Back-up Generators)	No		n/a
		Gasoline (Back-up Generators)	No		n/a
		Propane (Back-Up Generators)	No		n/a
		Other Fuels (see notes)	No		n/a
	Direct Access Power	Electricity	No		n/a
		Natural Gas	No		n/a

Water Transport (inlcuding sewage and storm water)	Utility-Derived Power	Electricity	Yes	Stacey Moss, Finance Dept.	From Monthly Energy Worksheets
		Natural Gas	Yes	Stacey Moss, Finance Dept.	n/a
	Back-Up & Off-Grid Power	Diesel (Back-up Generators)	Yes	Todd Croteau, Public Works	
		Gasoline (Back-up Generators)	No		n/a
		Propane (Back-Up Generators)	Yes	Downeast - 603.742.1565 (for Propane)	
		Other Fuels (see notes)	Yes	Hanscom's Truck Stop - 603.436.5171 (for Fuel Oil)	
	Direct Access Power	Electricity	No		n/a
		Natural Gas	No		n/a
Government Operated Wastewater Treatment Plants	**See below for further questions**	Electricity (Utility Derived)	Yes	Stacey Moss, Finance	Monthly Energy Worksheets
		Natural Gas (Utility Derived)	Yes	Stacey Moss, Finance	Monthly Energy Worksheets
		Diesel (Back-up & Off-Grid Generators)	Yes	Todd Croteau, Public Works	
		Gasoline (Back-up & Off-Grid Generators)	Yes	Downeast - 603.742.1565 (for Propane) and Hanscom's Truck Stop - 603.436.5171 (for Fuel Oil)	We don't have gasoline back-up generators, but we have fuel oil and propane generators.
		Electricity (Direct Access)	No		n/a
		Natural Gas (Direct Access)	No		n/a
		Stationary Methane Emissions from Incomplete Combustion of Digester Gas	No		
		Process Methane Emissions from Lagoons	No		n/a
		Fugitive Methane Emissions from Septic Systems	No		n/a
		Process N2O Emissions from Centralized Wastewater Treatment and Effluent Discharge to Aquatic Environments	Yes	Terry Desmarais, Public Works	
		CO2 Emissions from biogas combustion (biogenic)	No		n/a
Mobile Sources					
Vehicle Fleet and Mobile Equipment	Vehicle Fleet (passenger vehicles, AFVs, sanitation and street sweeping equipment, aircraft and maritime equipment, etc) Group by department if possible!	Mobile Combustion (consumption) of Fuels	Yes	Tom Richter, Public Works; Steve Bartlett, School Department (School Buses)	Tom will provide the Gasboy data. The vehicle inventory is listed in Appendix 1 of the FY2014 adopted budget (Rolling Stock)
		Incomplete Combustion (VMT)	Yes		These are calculated using the fuel usage and mpg ratings for each vehicle.
		Fugitive Emissions-Leaked Refrigerants	Yes	Larry Forkum, Public Works	
	Transit Fleet (buses, trains, etc used for transit)	Mobile Combustion (consumption) of Fuels	No		The Portsmouth City Government does not provide public transportation. The school bus transportation was included in the vehicle fleet portion of the inventory.

		Incomplete Combustion (VMT)	No		n/a
		Fugitive Emissions-Leaked Refrigerants	No		n/a
	Mobile Equipment (groundskeeping equipment, etc)	Fuel Combustion (consumption)	Yes	Tom Richter, Public Works	This is tracked in the gasboy system too
Employee Commute	Employee Commute Emissions	Mobile Combustion (consumption) of Fuels	Yes	Commuter Survey	
		Incomplete Combustion (VMT)	Yes	Commuter Survey	
Other Sources					
Refrigerants and Fire Suppressants	Buildings and Facilities (offices, airports, marinas, landfill facilities, wastewater facilities, power	Fugitive Emissions-Leaked Refrigerants	No		
		Fugitive (Leaked) Fire Suppression Emissions			
	Vehicle Fleet (all fleet vehicle air conditioning or refrigeration equipment)	Fugitive Emissions-Leaked Refrigerants	No		This is already included under "Fugitive Emissions - Leaked Refrigerants" under Mobile Sources
	Transit Fleet (buses, trains, etc used for transit)	Fugitive Emissions-Leaked Refrigerants			
Contracted Services	Various Facilities or Mobile Sources (e.g., trash collection, snow removal, mowing/landscaping services)	Gasoline	No		These do not fall within the scope of the inventory (using an operationally defined scope)
		Diesel	No		n/a
		Electricity	No		n/a
		Natural Gas	No		n/a
Government-Generated Solid Waste	***See below for further questions***	Fugitive Methane Emissions			
Other Process Emissions: Government Operated Industrial Processes	Adipic Acid Production		No		n/a
	Aluminum Production		No		n/a
	Ammonia Production		No		n/a
	Cement Production		No		n/a
	HCFC-22 Production		No		n/a
	Iron and Steel Production		No		n/a
	Lime Production		No		n/a
	Nitric Acid Production		No		n/a
	Pulp and Paper Production		No		n/a
	Refrigeration and Air Conditioning Equipment Manufacturing		No		n/a
	Semiconductor Manufacturing		No		n/a

ICLEI Local Governments for Sustainability USA

Community-wide GHG Emissions Inventory
Community Protocol Scoping and Reporting Tool

This tool is intended for use by local governments seeking to produce community-wide GHG emissions inventories that are consistent with version 1.0 of the Community Protocol. It is useful as a place to organize information that can be used internally as well as in creating final public reports. Use of the tool is not required in Protocol-compliant inventories, but it can help in developing features of an inventory that are required.

The Protocol calls for a step-wise process to developing an inventory, starting with scoping and ending with reporting. This tool address both of those steps. In scoping, the local government decides the emissions sources and activities it will include in the inventory, based on the stories it wishes to tell about community emissions and reporting frameworks it will use to tell them. The first part of this tool allows the user to indicate with bullets which activities and sources it intends to include in any of the reporting frameworks being used. The user should update the reporting framework columns to only reflect frameworks it is using.

The tool also uses "notation keys" for indicating why a source or activity is not being included within the scope of the inventory (a legend is provided below). Providing information about initial scoping in a final report is optional under the Protocol. By recording scoping decisions here, the user will be better able to begin the process of identfying data sources for each activity or source.

In Protocol-compliant inventory reporting, the local government is required to create a final report that indicates what was ultimately included and excluded from the inventory. A similar approach with bullets and notation keys is used in this part of the tool. Finally, the tool provides a place to describe line-item emissions for each included source or activity (required under the Protocol), as well as documenting which accounting methods were used (strongly recommended, but required when any non-Protocol methods used must be described).

Legend for Reporting Frameworks in Which Emissions Sources and Activities are Included

Required Activities:
- Five Basic Emissions Generating Activities

Strongly Encouraged:
- SI – Local Government Significant Influence
- CA – Community-Wide Activities
- HC – Household Consumption

Also Encouraged:
- IB – In-Boundary Sources
- GC – Government Consumption
- FC – Full Consumption-based Inventory
- LB – Life Cycle Emissions of Community Businesses
- IS – Individual Industry Sectors
- OS – Create Your Own Story

Notation Keys for Excluded Emission Sources and Activities

- IE – Included Elsewhere: Emissions for this activity are estimated and presented in another category of the inventory. The category where these emissions are included should be noted in explanation.
- NE – Not Estimated: Emissions occur but have not been estimated or reported (e.g., data unavailable, effort required not justifiable).
- NA – Not Applicable: The activity occurs but does not cause emissions; explanation should be provided.
- NO – Not Occurring: The source or activity does not occur or exist within the community.

Community-wide GHG Emissions Inventory
Scoping and Reporting Tool - October 2012
Portsmouth, NH: 2012 GHG Inventory

Exclusion Type		Source or Activity?	INITIAL SCOPING - INCLUDED / EXCLUDED							FINAL REPORTING - INCLUDED / EXCLUDED			
			Included, Required (Yes/No)	Included, under possible reporting frameworks:				Excluded (IE, NA, NO, or NE)	Explanatory Notes	Included, Required (Yes/No)	Acct Method Used	Contact(s)	Acct Method Notes
				SE	KA	MC	Other						
Stationary Fuel Combustion													
Use of fuel in residential and commercial stationary combustion equipment		Source AND Activity	•			x							
Industrial stationary combustion sources		Source			x							Newton (Sonny) Strickland (see above)	Fuel Oil was estimated using the recommended approach in Appendix C of the Community Protocol, v1.1, using data from the American Community survey, and the Energy Information Administration. Data available from these sources were from 2011, which was used as a proxy for 2012. This estimate includes both Fuel Oil and Kerosene usage because the AEA does not separate the two fuels, which have very similar CO2 emissions factors.
Electricity	Power generation in the community	Source						IE	These are included as part of community usage				
	Use of electricity by the community	Activity	•		x							Catalina J. Celentano Community Relations & Economic Development, Seacoast Area PSNH T 603-436-7708 x 5628 Fax 603-433-6931 catalina.celentano@nu.com	The electricity data was obtained in bulk for the residential, commercial, and industrial sectors. The sales figures from the Northwest Utilities 2012 Annual Report were used to calculate percentages to apply to the bulk number of kWh received from PSNH.
District Heating/ Cooling	District heating/cooling facilities in the community	Source						IE	These are included as part of community usage				
	Use of district heating/cooling by the community	Activity			x							David Beaulieu Sr. Business Development Representative Unitil	Portsmouth NH c: 603.294.5144 f: 603.294.5244 beaulieud@unitil.com	www.unitil.com	David provided the residential, commercial and industrial breakdown for natural gas. • Fuel Oil and Propane data for New Hampshire. I used the methodology in the ICLEI Community Protocol Appendix C. - Residential - http://www.eia.gov/state/data.cfm?sid=NH#Consumption - I obtained the number of households that use all types of heating fuel from the American Community Survey of the U.S. Census for Portsmouth, NH for the 2011 calendar year. I will use this as a proxy for 2012. b I obtained the total distillate fuel oil usage for all of New Hampshire for 2011 from the EIA SEDS database. http://www.eia.gov/state/seds/seds-data-fuel.cfm?sid=US
Industrial process emissions in the community		Source						NE					
Refrigerant leakage in the community		Source						NE					
Transportation and Other Mobile Source													
On-road Passenger Vehicles	On-road passenger vehicles operating within the community boundary	Source	• or		x							Tom Falk Rockingham Planning Commission (603) 778-0885 tfalk@rpc-nh.org	
	On-road passenger vehicle travel associated with community land uses	Activity	•										
On-road Freight Vehicles	On-road freight and service vehicles operating within the community boundary	Source						NE					I'm not sure if the Buckingham Planning Commission data accounts for on-road freight and transit vehicles.
	On-road freight and service vehicle travel associated with community land uses	Activity						NE					
On-road transit vehicles operating within the community boundary		Source						NE					
Transit Rail	Transit rail vehicles operating within the community boundary	Source						NE					
	Use of transit rail travel by the community	Activity						NE					
Inter-city passenger rail vehicles operating within the community boundary		Source						NO					
Freight rail vehicles operating within the community boundary		Source						NE					
Marine	Marine vessels operating within the community boundary	Source						NE					
	Use of ferries by the community	Activity						NE					
Off-road surface vehicles and other mobile equipment operating within the community boundary		Source						NE					
Use of air travel by the community		Activity						NE					
Solid Waste													
Solid Waste	Operations of solid waste disposal facilities in the community	Source						NO					
	Generation and disposal of solid waste by the community	Activity	•		x				Turnkey landfill recovers most of its landfill gas (>80% in 2012). The composition was estimated based on CACP software recommendations, in combination with the City's mandatory recycling policy and wood waste and yard waste programs.			Jim Dumont jdumont@cityofportsmouth.com Bill Howard Waste Management, Turnkey Landfill (603) 382- 2105 bhoward@wm.com	Obtain the Annual Facilities Report from Jim. Contact Bill to find out the percent of methane captured during the inventory year. This datapoint will need to be entered into CACP as a one-week coefficient.

Appendix C - 2012 Commuter Survey

The purpose of this survey is to gather information on your commute to work so the City can update its greenhouse gas inventory for the 2012 calendar year. All questions refer to a ONE-WAY commute TO WORK in the 2012 calendar year only. Please do not include any traveling you do during work hours (meetings, site visits, etc.) or your return trip home.

The survey should take no more than 5 minutes to complete. Please note that this survey is anonymous. We will not collect or report data on any individuals who respond. If you have any questions pertaining to this questionnaire, you may contact Peter Britz (610-7215) or Andrea Webster (427-9022). Thank you for your assistance.

If you would like to be entered in a drawing to win a $25 Regal Cinema gift card, you can enter your email address at the end of this survey.

1. Did you work for the City in 2012?

- ◯ Yes
- ◯ No

Comments

2. In 2012, how many miles did you commute to work on an average day (one way)?

- ◯ 0-5
- ◯ 6-10
- ◯ 11-15
- ◯ 16-20
- ◯ 21-25
- ◯ 26-30
- ◯ 31-35
- ◯ 36-40
- ◯ 40-45
- ◯ 46-50
- ◯ 51-75
- ◯ 76-100
- ◯ Over 100

Comments

Appendix C - 2012 Commuter Survey

3. On an average week, when traveling to work, how many days per week do you... (should add up to no more than five):

	0	1	2	3	4	5
Drive your vehicle alone or as a carpool driver	◯	◯	◯	◯	◯	◯
Carpool as a passenger	◯	◯	◯	◯	◯	◯
Use public transportation	◯	◯	◯	◯	◯	◯
Ride your bicycle	◯	◯	◯	◯	◯	◯
Walk	◯	◯	◯	◯	◯	◯
Telecommute	◯	◯	◯	◯	◯	◯
Drive a motorcycle or moped	◯	◯	◯	◯	◯	◯
Other	◯	◯	◯	◯	◯	◯

If other, please specify

4. Do you ever drive a vehicle to work, including driving a carpool?

◯ Yes

◯ No

Comments

5. What is the make and model of your vehicle? (Examples: "Toyota Prius," "Dodge Dakota").

6. What year is your vehicle? (Please enter a four digit year)

7. What is the average fuel efficiency rating of your vehicle (mpg)? It is OK to estimate or guess.

8. What type of fuel does your vehicle use? (If you drive a hybrid electric vehicle, please select the non-electricity fuel used by your vehicle)

- ◯ Gasoline
- ◯ Diesel
- ◯ Biodiesel
- ◯ Electricity
- ◯ Other (please specify)

9. What type of biodiesel does your vehicle use? (e.g., B5, B20, B100)

10. If you have other concerns or issues related to your commute, or if there is something we should know about that was not captured in any survey questions, please describe it here.

11. If you would like to be entered into a drawing for a $25 gift card to Regal Cinema, please enter your email address here.

Thanks again for taking the time to complete our survey. The results will be included in the City's 2012 greenhouse gas inventory, which will be released this summer.