# 2005 Greenhouse Gas Emissions Baseline Inventory & Analysis

Community Greenhouse Gas Emissions

Municipal Operations Greenhouse Gas Emissions

## City of Pittsburg

65 Civic Avenue | Pittsburg, California 94565

## Credits and Acknowledgements

**City of Pittsburg**
Lisa Folena, Marina
Sarah-Ann Hempstead, Planning
Dana Hoggatt, Planning
Sandra Navarro, Finance
Walter Pease, Public Works
Paul Reinders, Engineering
Kathleen Rosten, Finance
Leigha Schmidt, Planning
Russell Tank, Fleet Maintenance
Christy Terry, Public Works
Laura Wright, Public Works
Deborah Yamamoto, Finance

**Pittsburg Power Company**
Garrett Evans
Peter Guadagni
Ed Scales
Vanessa Xie

**Bay Area Air Quality Management District**
Brian Bateman, Director of Engineering
Rochelle Henderson, Public Records Coordinator
Harold Lips
Ana Sandoval, Senior Policy Advisor

**California Air Resources Board**
Andy Alexis, Air Pollution Specialist

**California Department of Transportation**
Brian J. Domsic

**Contra Costa County**
Deidra Dingman, Solid Waste Program Manager
Dana Riley, Climate Protection Planner

**Contra Costa County**
Matt Kelly, Associate Transportation Planner

**Garaventa Enterprise**
Salvatore Coniglio, Manager

**ICLEI – Local Governments for Sustainability**
Alden Feldon, Regional Manager
Wesley Look, Program Officer
Xico Manarolla, Program Officer
Jonathan Strunin, Program Officer

**Metropolitan Transportation Commission**
Benjamin Espinosa, Transportation Planner

**PG&E**
Jasmin Ansar, Environmental Policy Department
Corie Cheeseman, Program Manager
Brooke Lee, Program Manager

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A list of acronyms used in this report can be found in the Acronyms and Glossary at the end of the document.

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# 1. Introduction

The earth's unique atmosphere and complex ecosystems maintain a balanced state that supports life. Recent human activities threaten to upset this balance by raising the earth's temperature and creating catastrophic changes in the global climate. Measuring greenhouse gases is the first step toward mitigating such climate change.

## 1.1 Earth and Climate Change

Gases in the earth's atmosphere retain some of the sun's radiant heat energy. This "greenhouse effect" keeps the planet warmer than the open space that surrounds it. Natural systems create some of these "greenhouse gases" (mainly carbon dioxide, methane, and nitrous oxide) and also absorb them, maintaining a constant balance.

In the 1990's, scientific tools began to reveal that the concentration of greenhouse gases in the atmosphere has been steadily increasing since the 18th century.[1] There is scientific consensus that human activities are a major contributor to the increase in greenhouse gases. These human caused greenhouse gases are primarily from the burning of fossil fuels for energy, which began during the Industrial Revolution. As concentrations of greenhouse gases exceed ecosystems' capacity to absorb them, they threaten the balance that has been maintained for millennia. The planet's surface temperatures are rising beyond historic records, and unusual changes in climates have already been observed.[2]

Unbalanced ecosystems create chaotic, unpredictable, and dangerous conditions. Climate change will impact water, food, health, and ecosystems in all geographical regions.[3] Specific impacts to California include:[4]

- Sea level rise and permanent flooding of low-lying areas[5],
- Diminished snow packs in the Sierra mountains, and consequent severe water shortage, reduced water quality,
- Changes in salinity of bodies of water,
- Complications to agriculture and fishing,
- Increased heat waves and wildfires.


*Figure 1-1 Pittsburg with 16-55" sea level rise*

Source: Bay Conservation and Development Commission

[1] According to the IPCC, "pre-industrial" concentrations of $CO_2$ were 280 "parts per million" (ppm), and in 2005 were 379 ppm. (Intergovernmental Panel on Climate Change , 2007)

[2] The IPCC AR4 states "Global increases in $CO_2$ concentrations are due primarily to fossil fuel use… There is *very high confidence* that the net effect of human activities since 1750 has been one of warming." (Intergovernmental Panel on Climate Change , 2007) Summary for Policymakers, p. 5

[3] (Intergovernmental Panel on Climate Change , 2007)

[4] (Snover, 2007)

[5] The San Francisco Bay Conservation and Development Commission predicts that parts of Pittsburg will be flooded with just 1 meter of sea level rise.

Without immediate and extensive action, Earth's environment and its ability to support human societies will change drastically.

## 1.2 Governments and Climate Change

Governments protect their people from threats that are beyond individual control. Today's governments fend off many complex threats, including disease and toxicity, economic instability and poverty, violence and military conflict. Climate change looms as an amplifier to all of these dangers. An increase in natural disasters (e.g. extreme weather, wildfires, and massive flooding) threatens human safety and infrastructure. Wide-spread scarcity of basic human needs (e.g. food, water, and natural resources) causes social instability. Climate change is not only an environmental threat; its impacts will potentially disrupt all aspects of society.

Although climate change is a global problem, it is the cumulative consequence of local decisions. An effective solution will require all levels of government to respond to the contributions of their jurisdictions. Some mitigating actions will be best executed by larger scales of government, whereas others will require local leadership.

### 1.2.1 Global Emissions and International Governance

Global annual emissions have been increasing in correspondence with global population and economic growth. In 1990, the global community emitted 39.4 billion metric tons[6] of greenhouse gases (GHGs). In 2004, it emitted 49 billion metric tons, representing a 24% increase since 1990.[7]

**Greenhouse Gas Emissions – How much is a metric ton (tonne)?**

Since *greenhouse gases* are invisible, and are dispersed in the air all around, it may be difficult to visualize what a "metric ton" of greenhouse gases looks like. According to the California Air Resources Board, a *million* metric tons of carbon dioxide would fill 200,000 hot air balloons, or 500 Empire State Buildings.

Global Emissions in 2004: 9.8 *billion* hot air balloons

U.S. Emissions in 2004: 1.4 *billion* hot air balloons

The Average U.S. Resident in One Year: 1.6 hot air balloons

The Average U.S. Resident over 80 Years: 128 hot air balloons

*Data Sources: California Air Resources Board Climate Change conversion of 1MMTCO2 to Familiar Equivalents (www.arb.ca.gov/cc/factsheets/1mmtconversion.pdf)*

[6] Throughout this section, "Metric tons" refers to tons of *carbon dioxide equivalent* ($CO_2e$). See Appendix C for further explanation. The term $CO_2e$ is first introduced under section *2. Methods*. Throughout this report, "tons" or" tonnes" $CO_2e$ indicate metric tons.
[7] All global emissions inventories from IPCC Fourth Assessment, 2007. (Intergovernmental Panel on Climate Change , 2007)

The Kyoto Protocol is an internationally recognized protocol on GHG emissions. It was introduced in 1997 and became effective in 2005. The signatory countries have agreed to reduce their annual emissions to below 1990 levels by 2012. The Kyoto Protocol calls for greater reduction by industrialized nations, because they contribute a disproportionately large percentage of global emissions.

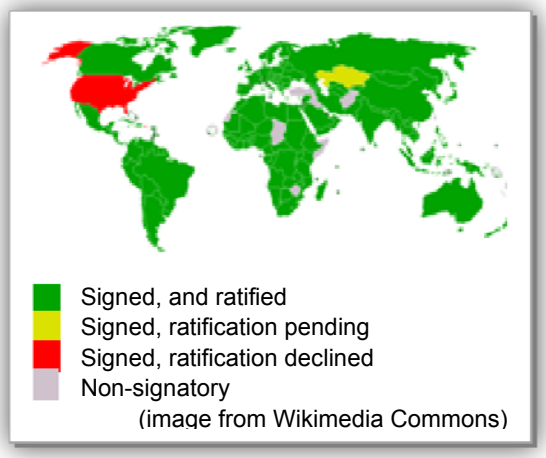


*Figure 1-2 Kyoto Protocol signatories*

The Intergovernmental Panel on Climate Change (IPCC) is the international scientific authority on climate change. They monitor atmospheric changes and model future conditions under various degrees of climate action. Recent IPCC findings urge for reduction efforts beyond the level of the Kyoto Protocol. They project that a reduction of 50 - 85% below year 2000 levels by 2050 is necessary to avoid the most devastating climate change consequences.[8]

### 1.2.2. United States Greenhouse Gas Emissions

The U.S. is one of the largest emitters, emitting over 7 billion metric tons of greenhouse gases in 2005.[9] This equals 15% of global emissions, while representing only 5% of the global population.[10] Compared to the global average of 8 tonnes per capita, the U.S. emits almost 24 tonnes per capita.[11]

As of 2008, there were no formal plans at the federal level to reduce GHG emissions. Vice President Al Gore signed the Kyoto Protocol in 1997, but the U.S. government failed to ratify the agreement. President Obama promises more action on energy and climate issues. He has assigned new advisory roles devoted to this field, and has made energy efficiency and renewable energy key components of the American Recovery and Reinvestment Act in February, 2009.[12]

### 1.2.3. California Greenhouse Gas Emissions and Climate Action

Activities in California emit 469 million metric tons of GHGs annually[13], contributing 6.6% of the U.S. total emissions, while home to 12% of the U.S. population.[14] Per capita emissions are 13 tonnes, which is significantly lower than the national average.[15]

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[8] Examples of consequences at this level include up to 30% of species at risk for extinction, drought in mid-latitudes and semi-arid low latitudes, annual coastal flooding, tendencies for cereal production to decrease in low latitudes. (Intergovernmental Panel on Climate Change , 2007)
[9] Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006; (U.S. EPA, 2008)
[10] Greenhouse gas emissions: 7 $GTCO_2e$ / 49 $GTCO_2e$ globally = 15%. Population: 200 million / 6 billion = 5%
[11] Global per capita: 49 $GTCO_2e$ / 6 billion = 8 $TCO_2e$. U.S. per capita: 7 $GTCO_2e$ / 300 million = 24 $TCO_2e$.
[12] See Appendix A. Preparer's Note on Context for more about President Obama's statements.
[13] 2002 – 2004 average. (CARB, 2008)

California is leading the U.S. in state-level efforts on climate action. *The Global Warming Solutions Act of 2006* (Assembly Bill 32; AB32) requires the state to reduce its annual GHG emissions to 1990 levels by 2020.[16] State Executive Order S-3-05 sets a further target of 80% below 1990 levels by 2050, which agrees with the IPCC recommendation.[17]

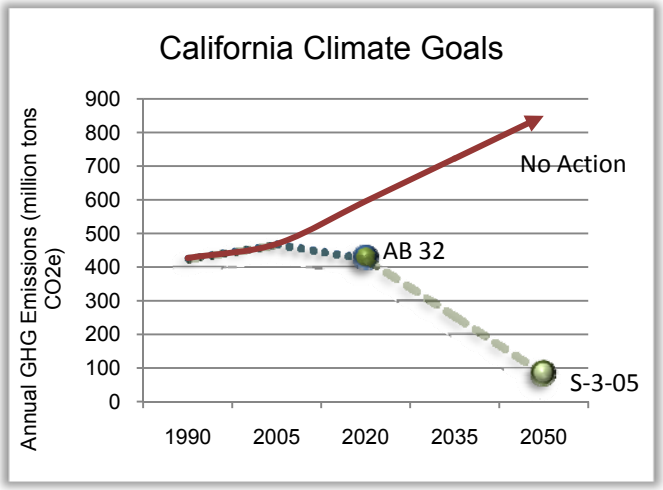


*Figure 1-3 California climate goals: 2020 and 2050*

In 2008, the state Air Resources Board developed an action plan to achieve AB 32's 2020 reduction target. This document, the *Scoping Plan*, outlines state-wide regulations and initiatives that propose to eliminate 174 million tonnes of annual emissions.[18] Many of these strategies will also reduce local emission levels.

Various state-level plans, including the AB 32 Scoping Plan, assume that local governments will play an important role in reducing state-wide emission levels. The AB 32 Scoping Plan specifically recommends that local governments reduce emissions from their municipal operation to 15% below 2005 levels by 2020, and that they develop strategies for similar GHG reductions in their communities.[19] The State[20] has officially adopted a Local Governments Operations Protocol for reporting emissions from municipal operations, and is preparing a protocol for local governments to report emissions from their communities. Although local inventories and action plans are currently voluntary, the emphasis on local governments in these plans suggests that the state may soon mandate local climate action.

## 1.3. Local Governments and Climate Change

Local governments are better equipped to respond to some specific needs of their communities than larger scales of government. They will also likely have the responsibility of managing the immediate damages that result from unmitigated climate change. Particularly in the United States, where federal leadership has been lacking, cities and counties have taken initiative by signing mayors' agreements for GHG reduction, and measuring and planning for their local emissions. [21] A recent survey

[14] Percent of U.S.: 469 $MMTCO_2e$ / 7,000 $MMTCO_2e$ = 6.6%. This calculation assumes that the U.S. and California inventories were prepared with consistent methodologies.
[15] Per capita: 469 $MMTCO_2e$ / 36,500 = 12.8 $TCO_2e$.
[16] www.arb.ca.gov/cc/docs/ab32text.pdf, accessed November, 2008
[17] http://gov.ca.gov/executive-order/1861/, accessed November, 2008
[18] (CARB, 2008)
[19] (CARB, 2008)
[20] California Air Resources Board
[21] On February 16, 2005 the Kyoto Protocol became law for the 141 countries that have ratified it to date. On that day, Seattle Mayor Greg Nickels launched the US Mayors Climate Protection Agreement to advance the goals of the Kyoto Protocol through leadership

shows that 75% of California local governments have completed, or intend to complete, a GHG inventory and climate action plan.[22]

### 1.3.1. Contra Costa County Climate Leaders

In 2007, the Contra Costa County Climate Leaders (4CL) program was formed as a network for the County and its nineteen cities to provide support for measuring and reducing greenhouse gas emissions. As part of the 4CL program, Pittsburg and fifteen other local governments in Contra Costa County joined the Cities for Climate Protection program offered by the ICLEI – Local Governments for Sustainability[23].

### 1.3.2. ICLEI's Cities for Climate Protection Program

ICLEI is an international association of cities and counties initiating climate action and other sustainability efforts. Over five hundred U.S. local governments have joined ICLEI's Cities for Climate Protection (CCP) program. The program consists of five milestones:

1. Conduct an inventory of local GHG emissions
2. Establish a GHG emissions reduction target
3. Develop an action plan for achieving the emissions reduction target
4. Implement the action plan
5. Monitor and report on progress


*Figure 1-4 ICLEI's CCP five milestones*

This report represents the first milestone – completing a GHG inventory. Inventories provide a "snapshot" of current conditions and include details to guide decision making. They also serve as a benchmark against which future GHG reductions can be measured. ICLEI is a leading authority on local GHG reporting, and contributed to the State's Local Government Reporting Protocol. Conducting an inventory through ICLEI's process helps prepare cities for possible State mandated greenhouse gas reporting.

The CCP program includes measuring and planning for both the local community and municipal operations. The community is defined as activities occurring within a municipality's geographic boundaries. Municipal operations include activities that the local government operates or influences directly. Although emissions from municipal operations constitute a small percentage of overall community emissions, their contribution is large for a single entity. Programs and actions implemented by municipal operations can also provide visible examples as models for the larger community.

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and action. Two years later, The U.S.Conference of Mayors launched the Mayors Climate Protection Center to administer and track the agreement, among its other activities. By November 1, 2007, there were more than 710 signatories to the Agreement. Source: www.seattle.gov/Mayor/Climate (accessed Dec. 30, 2008)

[22] (Public Policy Institute of California)

[23] "ICLEI – Local Governments for Sustainability" is the organization's official name. ICLEI stands for International Council for Local Environmental Initiatives. The name was changed in 2003.

# 2. Inventory Methodology

ICLEI identifies a list of community and municipal activities that are considered *key* sources of GHG emissions.[24] Data for these key sources were gathered from various agencies for the purpose of this inventory. Greenhouse gas emissions were then calculated from data about the volume and intensity of these activities. See Appendix B for a detailed account of all activity data gathered.

## 2.1 Community Emission Source Activities

The *community* inventory includes the following activities that *occur within Pittsburg's city limits*:

- **Industrial** emissions (recorded by the Bay Area Air Quality Management District)
- **Transportation** miles driven by cars and trucks within the city limits and their average miles-per-gallon fuel efficiency (mileage data from California Department of Transportation and the Metropolitan Transportation Commission; miles-per-gallon data from the Bay Area Air Quality Management District)
- **Commercial** energy use[25] (electricity and natural gas usage data from PG&E)
- **Residential** energy use (electricity and natural gas usage data from PG&E)
- **Waste** discarded by the community (tonnage from Pittsburg Disposal Service and California Integrated Waste Management Board; composition from CIWMB)

## 2.2 Municipal Operations Emission Source Activities

The *municipal operations* inventory includes data from the following activities that are recorded for City accounts:

- **Water** treatment and pumping energy use (electricity and natural gas data from PG&E bills)
- **Facility** energy use (electricity and natural gas data from PG&E bills)
- **Vehicle fleet** use of gasoline and diesel and miles driven (data from municipal fueling station reports and annual odometer meter readings from City of Pittsburg Public Works Department)
- **Employee commute** miles driven and vehicle types (data collected through an employee survey)
- **Streetlights** electricity use (data from PG&E bills)
- **Waste** disposed of by municipal accounts (tonnage from Garaventa Enterprise; composition from CIWMB)

[24] Key sources are considered essential components in a GHG inventory. Other emissions occurring within the community and municipal operations that do not fall under *key* sources are called *secondary* emission sources. While measuring secondary sources may provide interesting information, it is often impossible, or prohibitively difficult, to gather accurate data, and there may be nothing the local government can do to influence them. See Appendix F for a discussion of secondary sources in Pittsburg.
[25] The *commercial* sector includes emissions from building energy use of small to medium industrial facilities, but do not include large facilities and industrial process emissions.

Natural gas, gasoline, and diesel emit GHGs when they are consumed in a building or by a vehicle. Electricity use emits GHGs when coal or natural gas is used by a power generation facility.[26] Waste emits GHGs as it decomposes in landfill conditions. Although the electricity generation facilities and landfills may not be within a city's geographical boundary, these emissions are included in the inventory because their ultimate causes – electricity demand and waste generation – occur in Pittsburg.

This inventory classifies emissions sources by sector and energy source (or fuel type). Sector and fuel classification provides the most relevant information for legislation and program creation. Many GHG inventories also classify emission sources by *Scopes*.

## 2.3 Emissions by Scopes

Scopes express the directness of the relationship between an activity and the emissions it causes. An emission source's Scope is determined by where the emissions occur (at the activity site or in a remote location), and when the emissions occur (during, before, or after the activity). This inventory includes three Scopes:

***Scope 1:*** All direct emissions from sources located within city limits (community inventory) or under municipal control (municipal inventory). This generally includes fuel combustion (e.g. natural gas) in buildings, vehicle emissions, and industrial process emissions.

***Scope 2:*** Indirect emissions associated with the consumption of purchased or acquired electricity, steam, heating, and cooling. Scope 2 emissions occur as a result of activities that take place within city limits or municipal control, but that occur at sources located outside of these boundaries.

***Scope 3:*** All other indirect or embodied emissions not covered in Scopes 1 and 2, which occur as a result of activity within the city limit or municipal control. Under current reporting protocols, these sources are optional. This inventory includes the significant and reliably quantifiable Scope 3 emissions of waste (both inventories) and employee commute (municipal inventory).

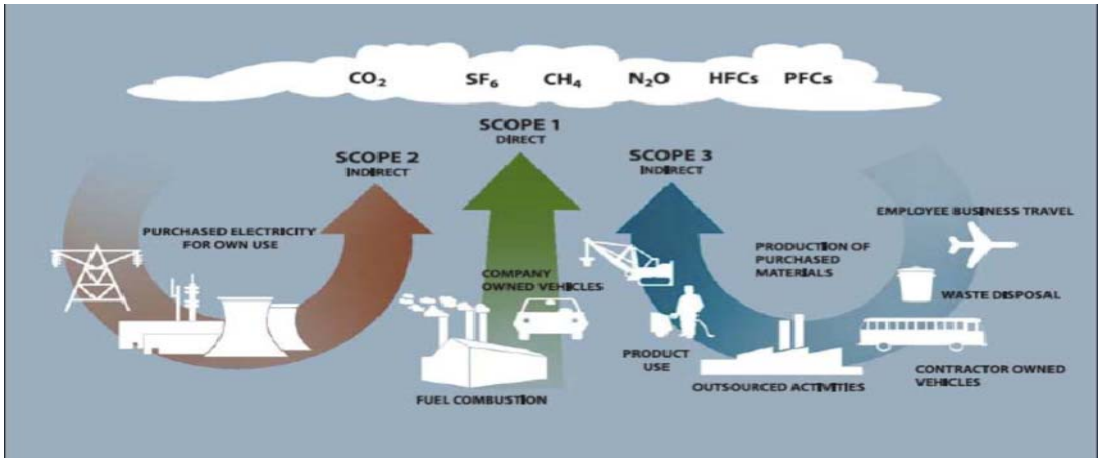
Scopes offer a method to prevent double counting for major categories such as electricity use and waste disposal. This differentiation is critical for a community like Pittsburg, which hosts a major power generation sector. Emissions from the burning of fuel at power plants in Pittsburg are considered a Scope 1 emission source for Pittsburg, but also a Scope 2 emission source for the jurisdictions that use the electricity that is generated.

As most community inventories include at least Scope 1 and Scope 2 emission sources, the same source of emissions from electricity generation will be reported twice – by the

[26] PG&E's "power mix" has much more "clean" sources of electricity than the U.S. Average. See Appendix D for a comparison.

generating jurisdiction and the consuming jurisdiction. Labeling by Scopes allows cross-jurisdictional analyses to avoid double-counting emissions. See Appendix E for a scopes-based classification of the emission sources included in this inventory.

*Figure 2-1 Emissions scopes*




Source: WRI/WBCSD GHG Protocol Corporate Accounting and Reporting Standard (Revised Edition), Chapter 4.

## 2.4 Baseline Year

Data for both inventories reflect calendar year 2005, which is the baseline year used by most participating cities in the Contra Costa County Climate Leaders group. [27] 2005 is recent enough for data to still be maintained and accessible, and often available in electronic formats. At the same time, 2005 allows trend analyses to show the GHG reduction impacts of conservation actions taken in recent years.

## 2.5 Clean Air and Climate Protection Software

ICLEI provides its members with the Clean Air and Climate Protection (CACP) software package.[28] This software converts activity data from various sectors into tonnes of *carbon dioxide equivalent* ($CO_2e$), the common unit used in GHG inventories.[29] It inventories emissions for the three most common greenhouse gases: Carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$). These three gases make up over 98% of global GHG emissions.[30] See Appendix C for an explanation of how the software translates activity data into tonnes of $CO_2e$.

[27] CIWMB waste composition data were taken from a 2004 report (CIWMB, 2004), and are the most recent data available.
[28] See Appendix C – *Calculating $CO_2e$* for more information about the CACP software.
[29] "Carbon Dioxide Equivalent" is used to compare different mixes of greenhouse gases based on their impact on global warming, as compared to carbon dioxide. Each greenhouse gas is calculated to express how much global warming impact it will have compared to one ton of carbon dioxide. See Appendix C for a full discussion of this calculation method.
[30] The United Nations Framework Convention on Climate Change recognizes three (groups of) other greenhouse gases: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6) that are included in national GHG inventories, and the ozone-depleting substances (CFCs, HCFCs, and halons), which are not included in national GHG inventories because they are already regulated by the Montreal Protocol. These groups of gases are synthetic compounds that are created during industrial processes or are used in refrigeration systems. These gases occur in very small amounts but have a high impact on global warming, earning the name High GWP (global warming potential). (U.S. EPA, 2008)

# 3. City of Pittsburg Greenhouse Gas Emissions Inventory

Pittsburg has a unique mix of community sectors, with correspondingly unique emission sources. While the purpose of this inventory is to count all GHG emission sources within Pittsburg, it is also intended to provide useful information for the community so that emissions reductions can be accomplished through local actions. Therefore, this inventory is presented in multiple layers. The first layer includes *all* emission sources, including industrial emissions and regional transportation emissions. These emission sources are best addressed by regional and higher levels of government. The second layer limits the scope to include emissions caused by activities of the *local community*, which includes local businesses, residents, and local transportation. The local community and government have greater influence over these emission sources. A third layer shows emissions from municipal operations, which are the activities of the local government.

## 3.1 2005 Pittsburg GHG Emissions *with* Regional Sources

In the baseline year 2005, activities in Pittsburg caused approximately 4.4 million metric tons $CO_2e$ of greenhouse gases. As Figure 3-1 and Table 3-1 show, 91% of these emissions are attributable to Pittsburg's large industrial sector, and 4% are caused by highway traffic. This section discusses these two regional sources of emissions.

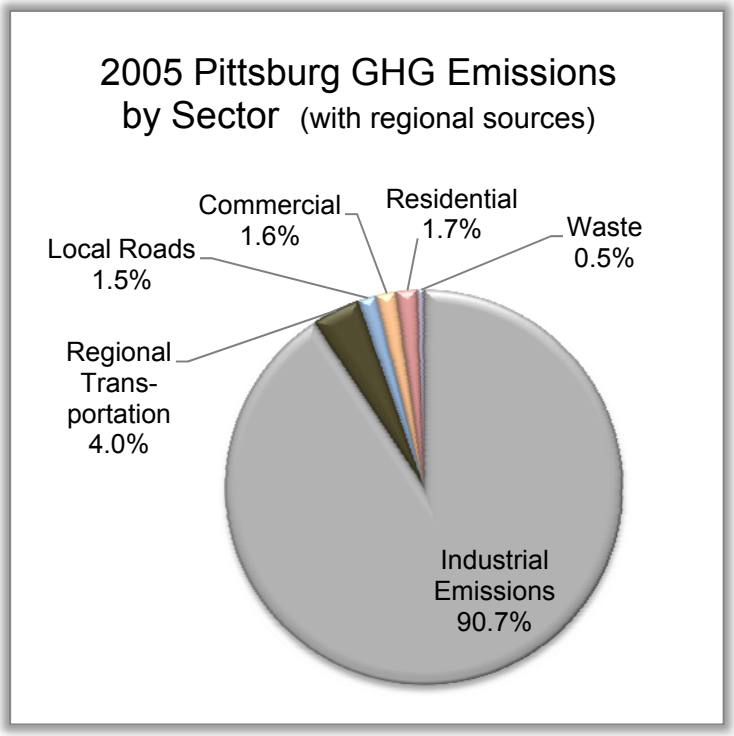



*Figure 3-1 2005 Pittsburg community GHG emissions, including regional sources*

*Table 3-1 Pittsburg community GHG emissions, including industrial sector emissions*

| Sector | GHG Emissions (Tonnes $CO_2e$) | Percent of Total Emissions |
|---|---|---|
| **Industrial** | 3,984,457 | 90.7% |
| **Regional Transportation** | 174,088 | 4.0% |
| **Local Road Transportation** | 65,695 | 1.5% |
| **Commercial** | 71,775 | 1.6% |
| **Residential** | 74,458 | 1.7% |
| **Waste** | 23,741 | 0.5% |
| **Total** | **4,394,214** | **100%** |

Note: Items may not sum up to total due to independent rounding.

### 3.1.1. Industrial Emissions

The emissions included in this sector include those resulting from combustion of fuels (such as natural gas, petroleum coke, diesel), and gas-emitting chemical processes. These emissions were reported to BAAQMD as measured by Pittsburg's largest emitters: five power plants and three manufacturing facilities.[31] As Figure 3-2 and Table 3-12 show, natural gas power plants (three plants[32]) account for 88% of Pittsburg's industrial GHG emissions, coke power plants (two plants) account for 10%, and manufacturing sites account for the remaining 2%.[33]

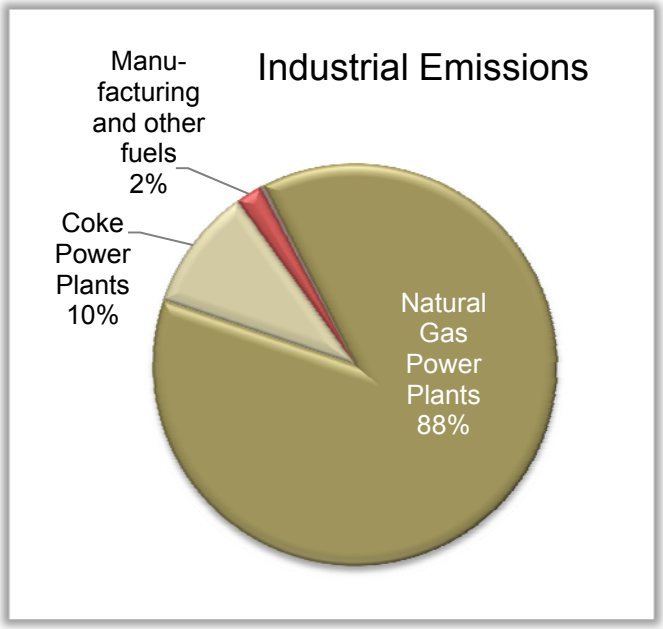



*Figure 3-2 Distribution of industrial sector emissions*

*Table 3-2 Distribution of industrial sector emissions*

| Industrial Type | GHG Emissions (Tonness $CO_2e$) | Percent of Industrial Emissions |
|---|---|---|
| **Gas Power Plants** | 3,502,755 | 88% |
| **Coke Power Plants** | 396,860 | 10% |
| **Manufacturing/other** | 84,843 | 2% |
| **Total** | **3,984,457** | **100%** |

The electricity generated by the power plants is distributed over the regional power grid, and used by other jurisdictions. As explained in Section 0 *Emissions by Scopes*, this emission source will also be reported by the communities that are the end users of the electricity.

The products of industrial processes (goods or energy) are part of regional or global networks, and respond to market forces and regulations beyond their locality. As such, local governments have limited influence over industrial processes. Federal and state governments can form more appropriately scaled policies, mandates, and incentive programs. The AB 32 plan specifies the creation of a maximum emission threshold from large industrial sources. Industrial facilities can also strive to meet standards set by international organizations.[34] Environmentally and socially responsibility has also become a powerful marketing tool. Competition may drive companies with large industrial facilities to achieve GHG reductions and promote their efforts to reduce their environmental impacts as a strategy to gain market share and increase profits.

[31] Other, smaller industrial facilities reported emissions related to natural gas, which are included in the commercial sector, and non-natural gas emissions that were less than 20 tons $CO_2e$. See Appendix G for a full explanation of Industrial Emissions data.
[32] This inventory excludes Mirant Power Plant, which was annexed into Pittsburg in 2008. In 2005, it was in unincorporated County, and therefore beyond Pittsburg city limits.
[33] The emissions from marine vessels docked in the ports of the industrial facilities is not included. See Appendix F for a discussion about excluded emission sources.
[34] For example, the International Organization for Standards (ISO) standard for GHG emissions reporting, the ISO 14065:2007.

### 3.1.2. Regional Transportation

Regional transportation is addressed in this GHG inventory because they occur within the city limits. They do not, however, reflect the activities of only Pittsburg residents or businesses, and are therefore discussed separately from community-based emissions sources. Emissions from regional transportation systems are quantified and presented here if data were available. Although climate action efforts to reduce these emissions are limited at the City level, efforts like advocacy and participation in regional dialogues can contribute to emissions reductions in this sector.

*Highway 4 Looking West from Railroad Avenue*

There are four regional transportation systems that pass through Pittsburg (Table 3-3). Although rail and BART emissions are not quantified here, it can safely be concluded that highway emissions are the greatest source of regional transportation emissions.

*Table 3-3 Regional transportation systems and their emissions*

| Emissions Source | Metric Tons $CO_2e$ | Percent of Regional Transportation Emissions |
|---|---|---|
| **Highway** | 171,952 | 99% |
| **Marine** | 2,136 | 1% |
| **Rail** | *Unavailable* | -- |
| **BART** | *Included in Commercial Electricity* | -- |
| **Total** | **174,088** | 100% |

**Highway:** State Route 4 connects East Contra Costa County and rural areas to the Bay Area's urban centers. Approximately 200 thousand vehicles passed through this four mile segment on an average day in 2005.[35] Emissions from this traffic account for 4% of Pittsburg's total inventoried emissions.

As Table 3-4 shows, gasoline powered passenger vehicles caused 91% of these emissions; diesel trucks transporting goods caused only 9%. Reducing this sector's emissions will require regional strategies for better systems of transporting people, and to a lesser degree for transporting goods.

[35] Total of both East and Westbound traffic. Estimated as 330 million annual vehicle miles traveled ÷ 365 days ÷ 4.04 miles of Hwy 4. AVMT provided by MTC and ICLEI. Length of highway provided by Paul Reinder, City of Pittsburg

Extension of regional public transit and improved regional transportation planning are necessary to alleviate highway emissions. The local government of Pittsburg can urge regional, state, or federal authorities to prioritize these projects. Other than regional advocacy, there are no local government initiatives that will significantly reduce this largest source of community emissions. However, local citizens can reduce these emissions by using the alternative modes of public transit as they are available to demonstrate that there is a demand for public transit.

*Table 3-4 Highway emissions by fuel type*

| Fuel Type | GHG Emissions (Tonness CO2e) | Percent of Highway Emissions |
|---|---|---|
| **Gasoline** | 151,867 | 91% |
| **Diesel** | 20,085 | 9% |
| **Total** | **174,646** | **100%** |

Local citizen support is also effective in regional advocacy. Individuals in the region can also reduce or nearly eliminate these emissions by choosing alternative fuel vehicles like plug-in electric vehicles as they become available. Even incremental increases in fuel efficiency of vehicles results in significant emissions reductions.

**Marine:** There are about two nautical miles of vessel lanes that pass through Pittsburg's waterways, and two commercial ports where large marine vessels enter and dock.

Emissions from marine vessels contribute about 1% of regional transportation emissions. The majority of these emissions are caused at the ports, when vessels idle their engines for energy while they are docked (hotelling). One of the two commercial ports in Pittsburg has been providing electricity to the ships that dock there (shore power) since the 1990's, thereby eliminating this emission source. The emissions caused by the electricity use by the ships are included in the electricity data for the commercial sector.[36]

*Table 3-5 Marine emissions sources*

| Fuel Type | GHG Emissions (Tonness CO2e) | Percent of Marine Emissions |
|---|---|---|
| **Hotelling** | 1,863 | 87% |
| **Manuevering** | 98 | 5% |
| **Transit** | 175 | 8% |
| **Total** | **2,136** | **100%** |

**Rail:** 4-5 miles of railway passes through Pittsburg. Approximately four cargo trains pass through this segment daily. Data sources for rail emissions are unavailable.[37]

**BART:** 2 miles of BART tracks run within or along Pittsburg's city limit. The emissions related to BART travel are caused mainly by electricity use, which is included in the commercial energy use sector.

[36] See Appendix F for a discussion on marine emissions.
[37] See Appendix F for a discussion on rail emissions.

## 3.2 2005 Pittsburg Community GHG Emissions without Regional Sources

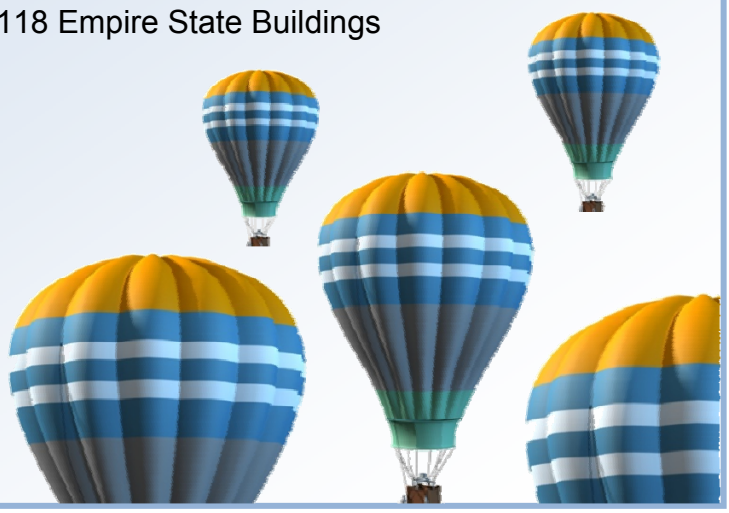
Local governments are best suited to engage with localized sectors of the community – residents, local businesses, and traffic on local roads. Recognizing the need to focus on community-based emissions, the discussion from this point forward excludes emissions from industrial sources and regional transportation.

The local community activities in Pittsburg emitted approximately 236 thousand metric tons $CO_2e$. As Figure 3-3 and Table 3-6 show, emissions were distributed almost equally among energy types (natural gas, electricity, and transportation fuels), each contributing about 30% of total emissions. The remaining 10% of community emissions resulted from waste decomposition.

By sector, the residential sector emitted the most, followed by the commercial sector, transportation, and finally the waste from the whole community. Each sector and energy source reflects a distinct need of the community. Some emission sources can be addressed by various levels of government, but emissions caused by individual residences, businesses, and vehicles can ultimately only be changed by individuals.

### Pittsburg GHG Emissions in Hot Air Balloons

The amount of greenhouse gases emitted by Pittsburg in 2005, if quantified as carbon dioxide, could have filled 47 thousand hot air balloons, or 118 Empire State Buildings



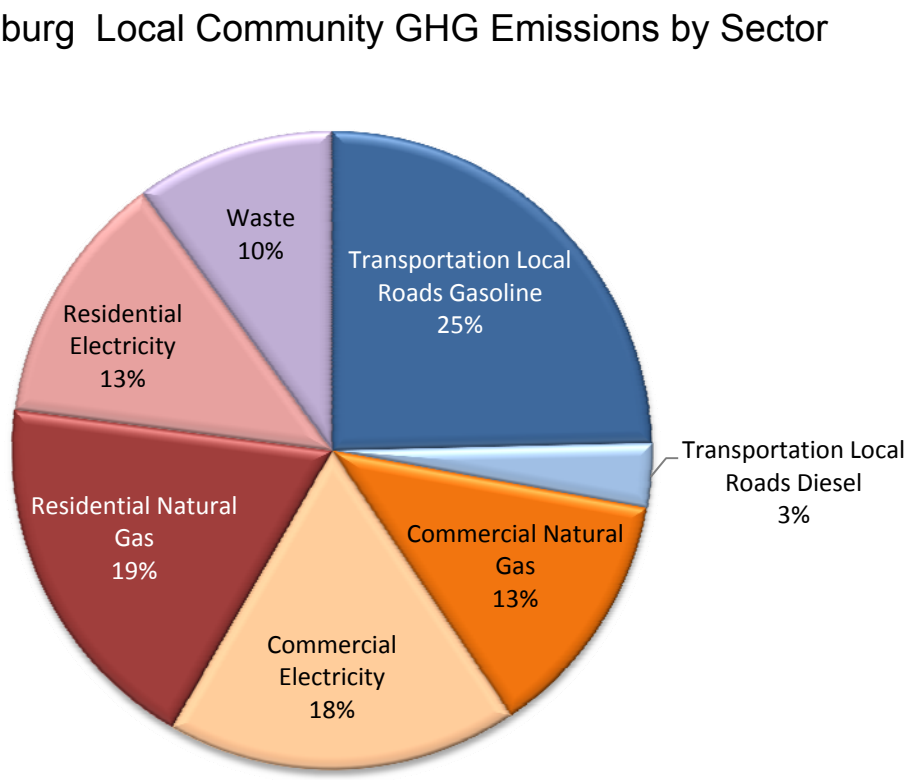



*Figure 3-3 2005 community GHG emissions, by sector and energy source.*

*Table 3-6 2005 community GHG emissions by sector and energy source*

| Sector | Energy Type | Percent of Community GHG Emissions | Greenhouse Gases (Metric Tons $CO_2e$) | Energy (million Btu) |
|---|---|---|---|---|
| **Transportation** | **Local Roads Gasoline** | 25% | 58,021 | 805,112 |
| | **Local Roads Diesel** | 3% | 7,674 | 92,518 |
| ***Transportation Total*** | | ***28%*** | ***65,695*** | ***897,631*** |
| **Commercial** | **Natural Gas** | 13% | 29,873 | 395,409 |
| | **Electricity** | 18% | 41,901 | 639,698 |
| ***Commercial Total*** | | ***30%*** | ***71,775*** | ***1,035,107*** |
| **Residential** | **Natural Gas** | 19% | 44,110 | 824,736 |
| | **Electricity** | 13% | 30,348 | 463,315 |
| ***Residential Total*** | | ***32%*** | ***74,458*** | ***1,288,051*** |
| **Waste** | | 10% | 23,741 | - |
| **Total** | | **100%** | **235,668** | **3,383,929** |

Note: Items may not sum up to total due to independent rounding.

### 3.2.1 Local Transportation

Transportation on local roads emitted 66 thousand tonnes $CO_2e$ of GHGs, equal to 28% of total community GHG emissions. The majority of these emissions were generated by passenger vehicles.

*Railroad Avenue Near Bliss Avenue*

City planning that supports walkable communities and improved pedestrian and bicycle plans offer a viable and convenient alternative to automobile travel for local and routine trips. In addition to greenhouse gases, local transportation emissions contain smog-causing gases and particulate matter that cause asthma and other health problems. Reducing cars and traffic will also improve public health.

Stronger fuel economy standards and cleaner fuels will reduce the emissions per mile driven, even if the volume of traffic does not decrease. These standards can be set by the federal government or the state. Locally, behavioral changes toward carpooling, vehicle maintenance, and driving speeds can significantly increase fuel efficiency and reduce transportation emissions.[38]

### 3.2.2. Commercial Energy Use

The commercial emissions included in this inventory refer to emissions related to energy consumption by non-residential buildings, including retail, office, food service, schools and other institutions, and small to medium industrial facilities. This sector emitted 72 thousand tonnes $CO_2e$, equal to 30% of total community GHG emissions. Electricity use accounts for 58% of commercial emissions; natural gas combustion accounts for the other 42%.

*Shopping Plaza on Railroad Avenue*

[38] The GHG reduction benefits from these measures will be difficult to measure, however, because fuel efficiency data is recorded at a county-wide scale, and will not reflect adjustments made solely in Pittsburg.

Commercial buildings use natural gas for space heating, water heating, and cooking in commercial kitchens. They use electricity for lighting, cooling, and computer and electronic equipment. Figure 3-4 shows the sources of GHG emissions from a typical commercial building in California.[39]

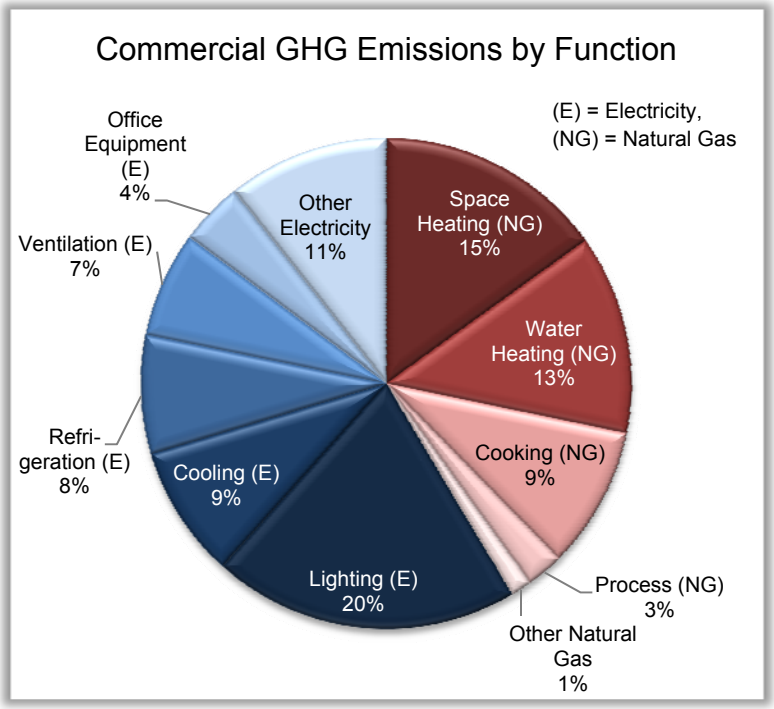



*Figure 3-4 GHG emissions by commercial energy use*

Businesses can reduce their emissions by conserving energy. Typically, energy efficiency upgrades to lighting, equipment, and heating and cooling system offer the most energy and cost savings for commercial buildings. PG&E and other agencies provide audits and rebates to facilitate such upgrades. New web tools are also emerging that allow businesses to monitor and track their energy usage, and make energy-saving decisions.[40]

PG&E or other large-scale electricity providers can host large-scale renewable energy projects, while individual commercial and residential sites can host small-scale generation equipment on-site, such as rooftop solar photovoltaic panels or wind turbines. Introducing more renewable, non-emitting sources of electricity generation reduces electricity-related emissions. Clean energy supplies reduce the amount of electricity generated by burning natural gas or other petroleum based fuels, such as coal or petroleum coke.

[39] This distribution is based on data in the CPUC's California Long Term Energy Efficiency Strategic Plan, September 2008, which states that commercial buildings consume 38% of the state's total "power" use and 25% of the state's total natural gas use. State totals were tallied from by-county use data for 2006 on the CEC's Energy Consumption Data Management System (accessed Dec. 18, 2008). Emissions factors used for Pittsburg's inventories were applied to commercial energy use – 0.000224 tons $CO_2e$ per kWh and 0.005348 tons $CO_2e$ per Therm.

[40] Energy Star rates energy efficiency of appliances and commercial facilities. Their online portfolio manager tracks businesses' energy usage (businesses enter their utility bill information) and GHG emissions, and ranks them compared to other similar businesses. This tool helps businesses make decisions that will save energy and money. Other tools are discussed as part of the California Air Resources Board small business toolkit.

### 3.2.3. Residential Energy Use

The residential sector emitted 74 thousand tonnes $CO_2e$, equal to 32% of total community GHG emissions. Natural gas use accounts for almost two thirds of residential emissions; electricity use accounts for the other third. In 2005, the average residence in Pittsburg used 36 Therms of natural gas and 579 kWh of electricity per month, emitting 3.9 tonnes $CO_2e$.

*Parkside Neighborhood*

Homes in California use natural gas for space heating, water heating, cooking, and dryers. They use electricity for lighting, refrigeration, TVs and computers, air conditioning, and other appliances. Figure 3-5 shows how a typical home's electricity and natural gas use translates into GHG emission.[41]

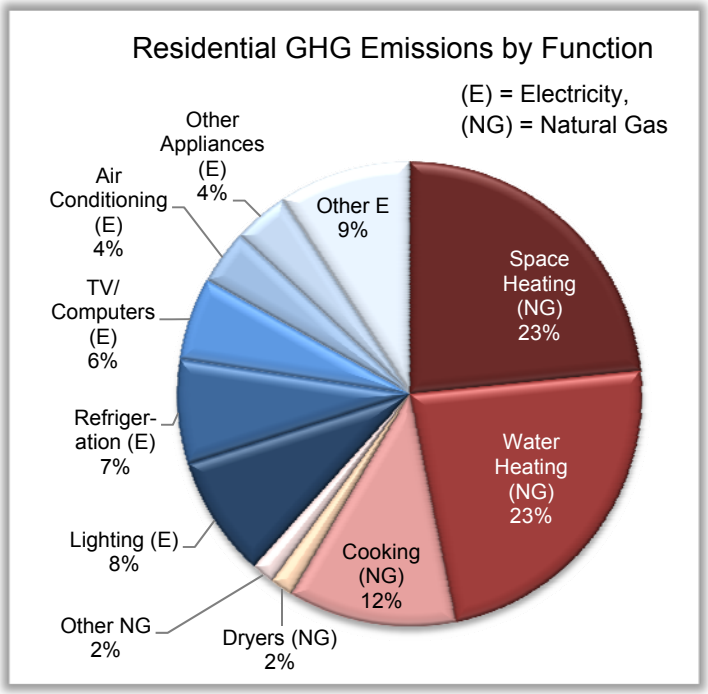



*Figure 3-5 GHG emissions by residential energy use*

Local government can encourage and assist residences with energy efficiency upgrades and renewable energy options. Energy efficient appliances and home improvements that improve insulation can reduce home energy use (and thereby GHG emissions) by over 30%. Local utilities, such as PG&E, offer rebates for purchases of appliances that are energy efficient (e.g. certified by ENERGY STAR).

[41] Total residential energy use in Pittsburg was multiplied by the CA average percentages by function from the CPUC plan. (CPUC, 2008). Emissions factors used for Pittsburg's inventories were applied to residential energy use – 0.000224 tons $CO_2e$ per kWh and 0.005348 tons $CO_2e$ per Therm.

### 3.2.4. Waste

Community waste emitted 24 thousand tonnes $CO_2e$, equal to 10% of total community GHG emissions.

After recycling and source separation efforts, the community sent 77 thousand tons of waste to landfills. Of the 77 thousand tons, 50 thousand tons are estimated to be organic matter (paper, food, plants). Organic matter sent to landfills slowly decomposes and emits methane over many years. Paper products account for over half of these emissions (56%). Food waste, construction lumber/textiles, and plant debris account for the rest (22%, 16%, and 6% respectively).[42]

Waste emissions occur beyond the city limits, and over a long period of time. These emissions are included in the inventory of the community that generates the waste, however, because waste generation is the ultimate cause of the emissions.[43]

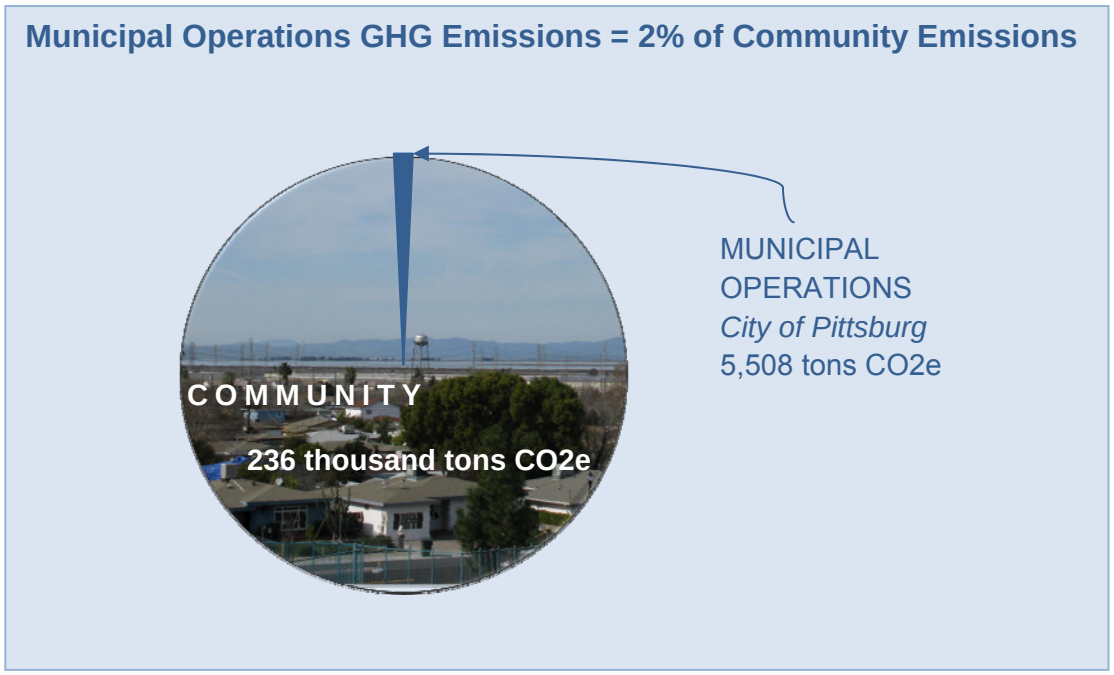
[42] The percentage in waste stream of each type of organic matter was derived from a state-wide waste characterization study (CIWMB, 2004).
[43] The emissions from hauling and processing the waste are not counted in this sector, but in the transportation and industrial sectors of the communities in which the hauling and processing occur.

## 3.3 2005 Pittsburg Municipal Operations Greenhouse Gas Emissions Inventory

In the baseline year 2005, City of Pittsburg municipal operations emitted 5.5 thousand metric tons $CO_2e$ of greenhouse gases. The municipal operations inventory is a subset of the community inventory, and represents 2% of emissions from the local community in 2005. For municipal operations, cost data are presented when available, and total over $2 million. Many GHG reduction measures will provide savings to the City's operating expenses.

Figure 3-6 and Table 3-7 show that electricity use – by the Water Treatment Plant, City facilities, and streetlights – accounted for half of municipal operations emissions. Gasoline combustion – by vehicle fleet and employee commute – emitted an additional third of municipal operations emissions. Natural gas, diesel, and waste decomposition emitted the rest.

By sector, energy used for water management and City facilities contributed the most emissions. Vehicle fleet and employee commute emissions were also significant sectors. Waste from all municipal operations was a minimal source of emissions, constituting 1% of municipal operations emissions.



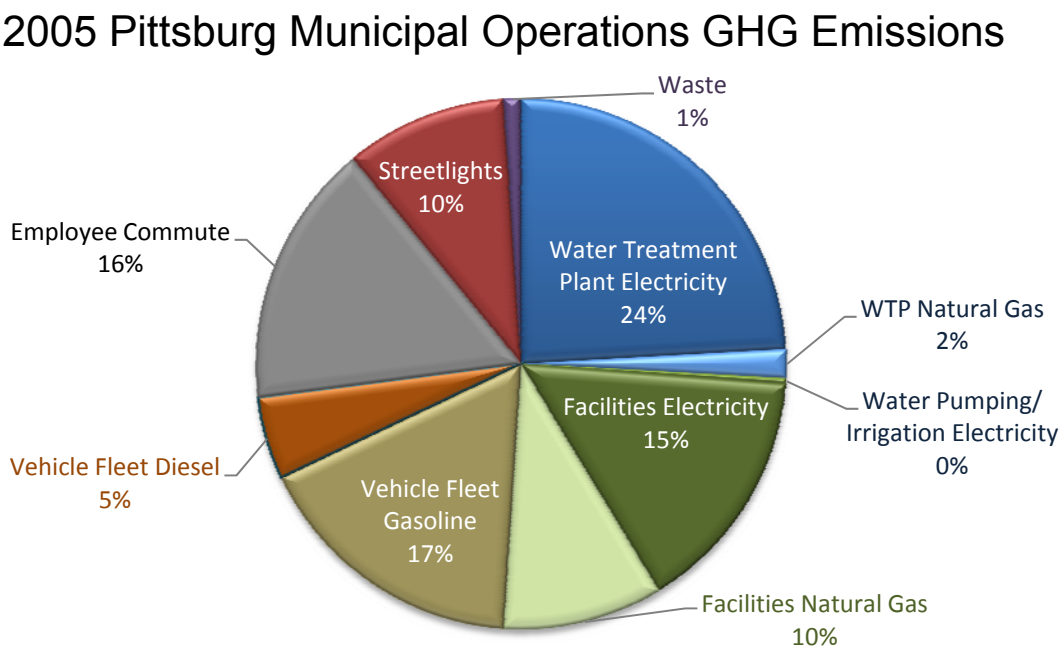



*Figure 3-6 2005 municipal operations GHG emissions by sector and energy source.*

*Table 3-7 2005 municipal operations GHG emissions by sector and energy source.*

| Sector | Energy Type | % of Total GHG Emissions | Greenhouse Gases (Metric Tons $CO_2e$) | Energy (million Btu) | Cost (1,000 Dollars)[44] |
|---|---|---|---|---|---|
| **Water Management** | **WTP Electricity** | 24% | 1,328 | 20,271 | **747** |
| | **WTP Natural Gas** | 2% | 96 | 1,789 | **19** |
| | **Irrigation Electricity** | 0.30% | 19 | 291 | **15** |
| ***Water Management Total*** | | ***26.3%*** | ***1,442*** | ***22351*** | ***782*** |
| **Facilities** | **Electricity** | 15% | 832 | 12,704 | **506** |
| | **Natural Gas** | 10% | 538 | 10,050 | **115** |
| ***Facilities Total*** | | ***25%*** | ***1,370*** | ***22,754*** | ***621*** |
| **Vehicle Fleet** | **Gasoline** | 17% | 932 | 13,132 | **261** |
| | **Diesel** | 5% | 274 | 3,312 | **67** |
| ***Vehicle Fleet Total*** | | ***22%*** | ***1,207*** | ***16,444*** | ***329*** |
| **Employee Commute** | **Gasoline / Diesel** | 16% | 887 | 12,084 | **-** |
| **Street Lighting** | **Electricity** | 10% | 545 | 8,318 | **461** |
| **Waste** | | 1% | 58 | - | - |
| **Total** | | **100%** | **5,508** | **81,950** | **2,195** |

Note: Items may not sum up to total due to independent rounding.

[44] Cost of electricity and natural gas from PG&E bills, gasoline and diesel assumed to be $2.50 per gallon in 2005.

### 3.3.1. Water Management

Water management operations emitted 1,442 tonnes $CO_2e$, equal to 26% of emissions from municipal operations. Water management by the City of Pittsburg includes the treatment and distribution of water to residences and businesses in the community, as well as operating the City's irrigation system.


The Pittsburg Water Treatment Plant accounts for 99% of the energy used for water management; the rest was used for pumping and irrigation. Energy costs for water management operations totaled $782 thousand. In 2009, the Water Treatment Plant is installing a new energy system to reduce these costs and emissions.

*Table 3-8 Emissions from water management*

| Emission Source | Metric Tons CO2e | Percent of Water Emissions |
|---|---|---|
| **WTP - Electricity** | 1,328 | 92% |
| **WTP - Natural Gas** | 96 | 7% |
| **Pumps, Irrigation, etc.** | 19 | 1% |
| **Total** | **1,442** | **100%** |

Water conservation by both the community and City irrigation systems will reduce the amount of energy used for water treatment. The City is currently installing a central irrigation system that will minimize excessive water use. Energy efficiency infrastructure upgrades may also reduce the Water Treatment Plant's energy use and emissions. In 2006, a pipeline carrying reclaimed water for irrigation was installed. Starting in 2008, half of the City's irrigation needs will be supplied with reclaimed water, which significantly reduces the need to treat fresh water. The pipeline provides the infrastructure for future irrigation projects to use reclaimed water.

*Pittsburg City Hall*

### 3.3.2. Municipal Facilities

Energy used by municipal facilities emitted 1,370 tonnes $CO_2e$, equal to 25% of total emissions from municipal operations. Municipal facilities used 3.7 GWh of electricity and 100 thousand Therms of natural gas, costing $620 thousand in 2005.

As Figure 3-7 shows, City Hall used the most energy among municipal facilities. Buchanan Pool and "other", which includes rental buildings, also used significant amounts of natural gas. The Marina, which supplies

shore power to boats that dock there, and the parks, which include park-specific lighting (not counted under the streetlights sector), used significant amounts of electricity.

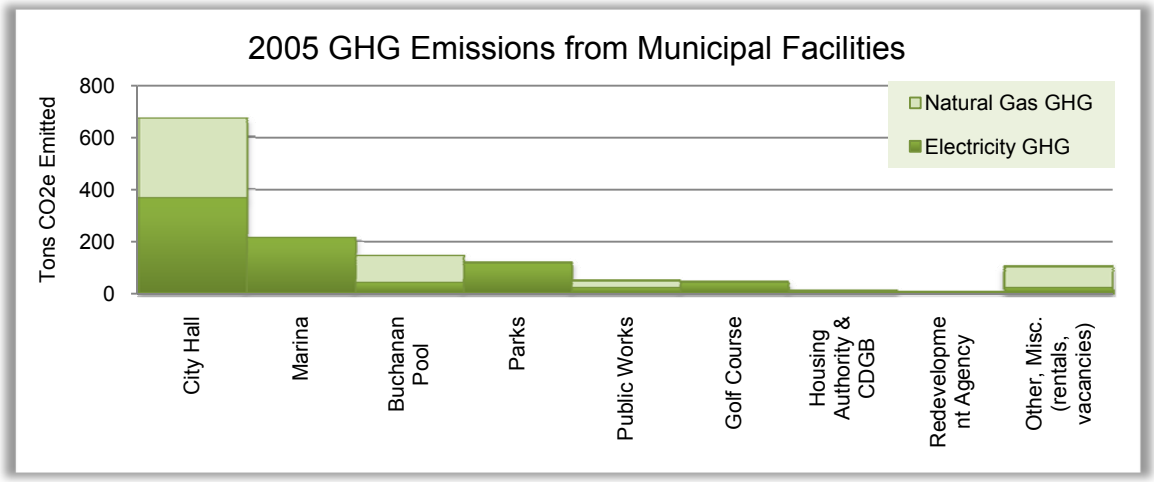



*Figure 3-7 Municipal facilities sources of emission*

In 2006, City Hall underwent an extensive heating and cooling system retrofit. The retrofit reduced electricity consumption by 20%, natural gas consumption by 77%, and GHG emissions by 341 tonnes, a 46% reduction. The investment was paid back within a year and continues to save the City over $85 thousand per year.

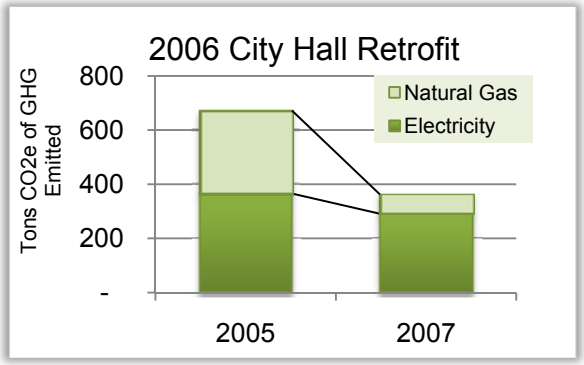



*Figure 3-8 Pittsburg City Hall emissions*

*Table 3-9. Pittsburg City Hall retrofit project: Energy, GHG, and cost savings*

| | 2005 | 2007 | Savings | |
|---|---|---|---|---|
| **Electricity (kWh)** | 1,562,880 | 1,244,640 | 318,240 | 20% |
| Electricity Cost ($) | $210,026 | $169,540 | $40,486 | 19% |
| **Natural Gas (Therms)** | 57,293 | 13,342 | 43,951 | 77% |
| Natural Gas Cost ($) | $65,639 | $19,735 | $45,904 | 70% |
| **GHG Emiss. (Tonnes $CO_2e$)** | **741** | **400** | **341** | **46%** |

Similar energy audits and upgrades in other facilities can further reduce municipal operations costs and emissions. Renewable electricity generation systems (such as solar photovoltaic panels and wind turbines) would also yield significant emissions reductions, particularly since 60% of facility related emissions result from electricity use.

### 3.3.3. Vehicle Fleet

The municipal vehicle fleet emitted 1,207 tonnes $CO_2e$, equal to 22% of municipal operations emissions. The fleet consumed a total of 105 thousand gallons of gasoline and 27 thousand gallons of diesel in 2005. Assuming an average of $2.50 per gallon of vehicle fuel in 2005, powering the fleet cost approximately $329 thousand.

Police and public works vehicles consumed the most gasoline. The diesel vehicles in the Public Works Department include heavy equipment used for City maintenance.

Purchasing policies that prioritize fuel efficient vehicles lower fuel consumption over time as older, inefficient vehicles are replaced by newer models. Use policies that minimize unnecessary idling also reduce fuel consumption.

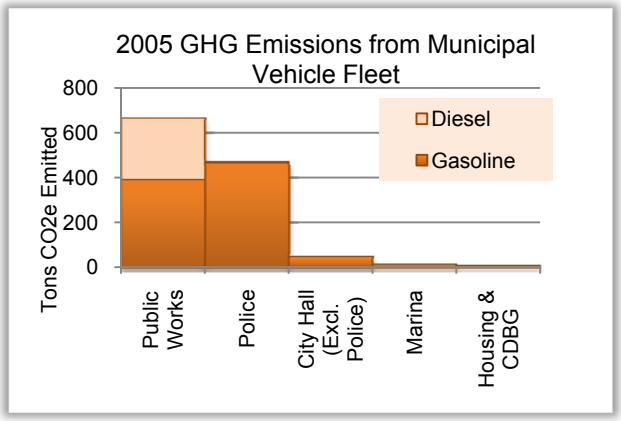



*Figure 3-9 Municipal vehicle fleet emissions by department*

### 3.3.4. Employee Commute

Employee commutes emitted 887 tonnes $CO_2e$, equal to 16% of emissions from municipal operations. Although commutes are not under the City's direct control, they are included in some municipal operations inventories because the City can address this emission source by implementing programs like carpools or incentives for public transit.

Commute patterns for 2005 were assessed through an employee survey. Most respondents commuted five days a week, and drove alone. About five percent of respondents reported routinely carpooling, walking, or taking public transit. The average round-trip daily commute was 22 miles.

The City can offer incentives like discounted public transit tickets or passes, or tax-related savings (e.g. Commuter Check). It can set up an employee carpool matching program. Work arrangements that reduce the number of commute days also reduce commute emissions. Such work arrangements include offering telecommuting options or flexible hours that allow some staff positions (where appropriate) to work longer hours per day, for less days in a month.

### 3.3.5. Streetlights

Municipal street lighting operations in 2005 emitted 545 tonnes $CO_2e$, equal to 10% of municipal emissions, and cost $461 thousand. Streetlights used 90% of this electricity; traffic signals used the other 10%.

Street light energy use can be reduce by replacing energy inefficient streetlights with more efficient models, assessing and adjusting excessive street light intensity without compromising safety, and installing sensors that detect available light and turn on as appropriate, or manually modifying streetlight hours to minimize excessive usage. All traffic signals have been retrofitted with LED (light emitting diodes), which use half as much energy as older style light fixtures.

### 3.3.6. Waste

Waste from municipal operations emitted 58 tonnes $CO_2e$, equal to 1% of emissions from municipal operations. Municipal operations disposed of 198 tons of waste in landfills in 2005. The organic matter in this amount of waste will release methane as it decomposes in landfills.

Approximately half of the municipal waste stream was generated by direct municipal operations, from City Hall and the community centers. The other half was generated by the public or non-municipal operations and collected through the City's waste services. This includes the contents of public waste receptacles at parks and Delta View Golf Course, waste from Marina tenants, and a significant amount of illegally dumped waste.

# 4. 2020 Projections

If no action is taken to reduce GHG emissions, Pittsburg's community and municipal operations emissions are expected to increase with population and economic growth. This section projects how many tonnes of GHG will be emitted in the year 2020 under a "business-as-usual" scenario.

Projected emissions levels are important to consider when establishing a target for reduction. In addition to eliminating a percentage of 2005's annual emission level, climate action plans must also address the additional emissions associated with growth.

## 4.1 2020 Community Greenhouse Gas Emissions Projections

Growth in population and number of jobs means new buildings will be constructed to house residences and workplaces, more transportation activity, and more waste generation. Between 2005 and 2020, Pittsburg's residential population is projected to increase by 22%. The number of commercial jobs are expected to grow 53%.[45] The number of miles traveled by automobiles is expected to grow by 31% on SR 4 and 38% on local roads.[46] Based on these projections, Figure 4-1 and Table 4-1 show that community emissions will increase by 36% from 236 thousand tonnes $CO_2e$ to 325 tonnes $CO_2e$. See Appendix G for details on the growth indicators used.

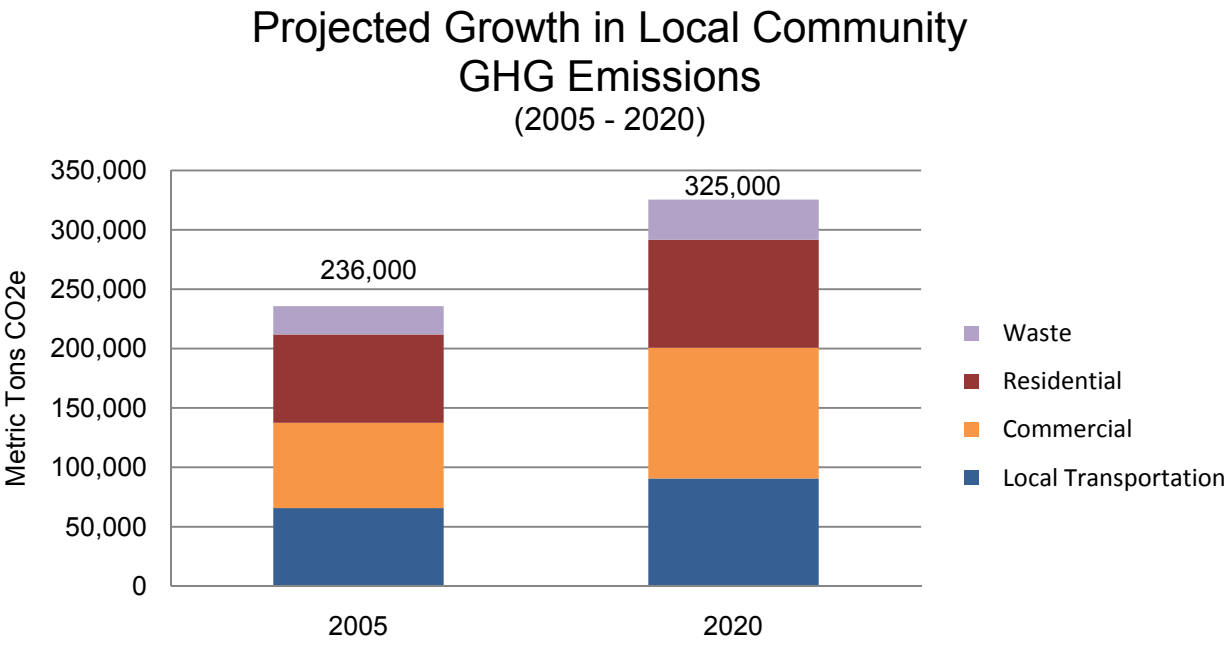



*Figure 4-1 Projected increase in community GHG emissions*

[45] Association of Bay Area Governments, 2009, see Appendix H.
[46] Contra Costa Transportation Authority

*Table 4-1 Projected community GHG emissions by sector*

| Local Community Emissions | 2005 Emissions (tonnes $CO_2e$) | 2020 Emissions (tonnes $CO_2e$) | Percent Growth |
|---|---|---|---|
| Local Transportation | 65,695 | 90,693 | 38% |
| Commercial | 71,775 | 110,020 | 53% |
| Residential | 74,458 | 90,925 | 22% |
| Waste | 23,741 | 33,801 | 42% |
| **Total Local Community** | **235,668** | **325,438** | **38%** |
| **Regional Emission Sources** | **2005 Emissions** | **2020 Emissions** | **Growth** |
| Industrial | 3,984,457 | 4,749,138 | 19% |
| Regional Transportation | 174,088 | 227,849 | 31% |

As Table 4.1 shows, this projected growth will increase GHG emission levels from each sector. The various sectors will grow at different rates. The commercial sector is projected to grow most quickly, followed by the waste, transportation, and finally residential sectors. The different growth rates will alter the proportion of emissions by sector. Compared to the distribution in 2005, commercial emissions will account for a larger portion of community emissions, while transportation and residential emissions will account for a smaller proportion of emissions than they did in 2005.

The industrial sector's emissions are projected to grow in relation to industrial jobs, which are expected to grow 19% between 2005 and 2020. If new industrial uses are the same as existing uses, and the same technologies are utilized, the industrial emissions in Pittsburg could grow from 3.9 to 4.7 million tonnes $CO_2e$ (Figure 4-2). Changes in the types of industrial use, as well as the application of updated technological systems will affect, and likely reduce, future emissions levels.

Regional transportation on SR 4 is expected to grow significantly. The expansion in number of lanes, as well as the population growth in communities east of Pittsburg will cause the volume of traffic to grow 31% by 2020 (Figure 4-3). However, eBART through Pittsburg will improve access to the BART systems, allowing people from Pittsburg and communities to the east to drive shorter distances to access the BART system.

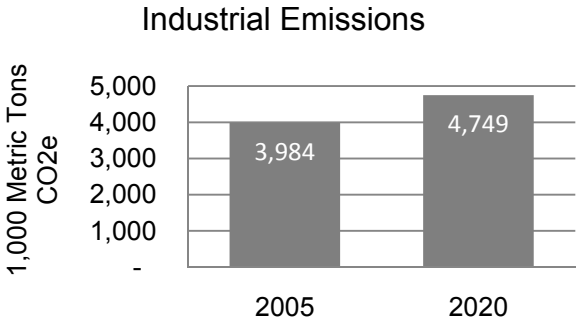



*Figure 4-2 Projected increase in industrial emissions*

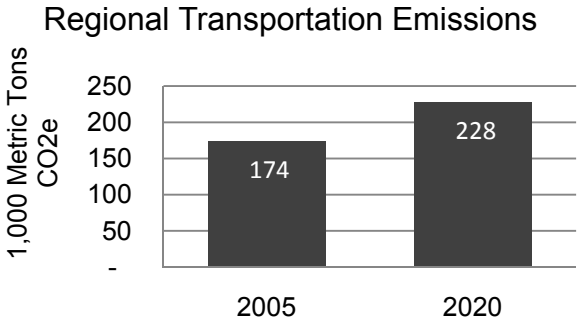



*Figure 4-3 Projected increase in regional transportation*

## 4.2 2020 Municipal Operations Greenhouse Gas Emissions Projections

Between 2003 and 2008, Pittsburg City staff grew an average of 0.85% per year. This growth rate will result in 13.3% increase in number of employees between 2005 and 2020. The employee growth rate was applied as a growth indicator for GHG emissions from the municipal operations areas of facility energy use, employee commute, vehicle fleet, and waste. The residential population growth rate was used as the indicator for the streetlight and water sectors, because needs for these services grow with the community. Figure 4.4 and Table 4.2 show an overall increase of 13.5% from 5,508 tonnes $CO_2e$ to 6,418 tonnes $CO_2e$. Each sector's emissions as a percentage of total municipal operations emissions remains about the same.

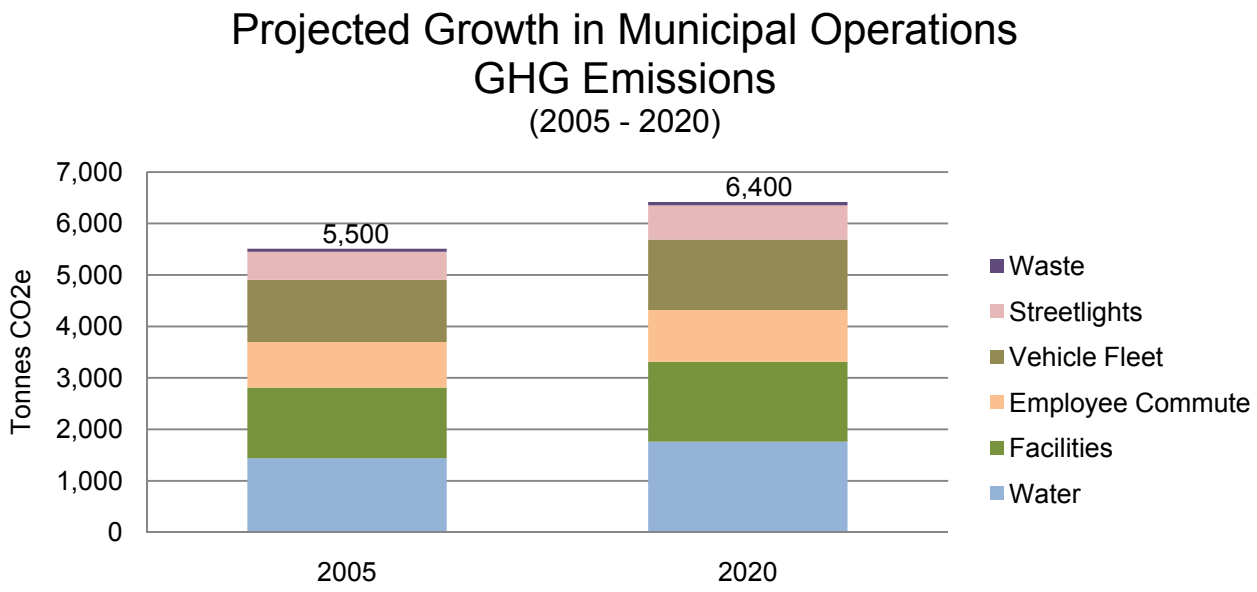



*Figure 4-4 Projected increase in GHG emissions from municipal operations*

*Table 4-2 Projected municipal operations GHG emissions by sector*

| Sector | 2005 Emissions (tonnes $CO_2e$) | 2020 Emissions (tonnes $CO_2e$) | Percent Growth |
|---|---|---|---|
| **Water** | 1,442 | 1,761 | 22% |
| **Facilities** | 1,370 | 1,553 | 13% |
| **Employee Commute** | 887 | 1,005 | 13% |
| **Vehicle Fleet** | 1,207 | 1,368 | 13% |
| **Streetlights** | 545 | 666 | 22% |
| **Waste** | 58 | 66 | 13% |
| **Total** | 5,508 | 6,418 | 16.5% |

Note: Totals may not sum up due to independent rounding.

# 5. Next Steps

In accordance with ICLEI's Cities for Climate Protection program's second and third milestones, the City of Pittsburg will next establish a reduction target and develop a Climate Action Plan. The two milestones will likely be completed concurrently. As key climate action strategies are assessed during the development of the Action Plan, they will suggest what degree of reduction is an appropriate target. Setting a target that is challenging while still feasible is important to motivate action.

## 5.1 Community Climate Action Plan and Target

Local government has varying degrees of influence over community emission sources. Processes that require community interaction with the City, such as for building permits and recycling services, create an opportunity for influence. In other areas where no such protocol exists, the City may need to initiate new programs or educate the community about existing programs offered by other agencies. The Community Climate Action Plan will include a spectrum of strategies that the City may use to target community emissions, as well as actions that residents and businesses can take. Community leaders' support of implementing these strategies will be key to successfully reducing GHG emissions in Pittsburg.

In sectors where local government has little or no influence, the plan may suggest regional or state-level advocacy. The two largest sources of emissions in the community inventory are electricity generation and regional passenger vehicle transportation (highway gasoline emissions). As discussed throughout this inventory, much of these two emission sources will only be reduced through actions and regulations from state and regional levels. While the Climate Action Plan may include reductions from state and regional measures, it will emphasize the importance of the local action and advocacy by the City and the community.

## 5.2 Municipal Operations Climate Action Plan and Target

Local government has greater control over its municipal operations. The actions in the municipal operations Climate Action Plan will be very specific, and also show each action's financial benefits. The City Hall retrofit described in Section 3.3.2 provides an excellent example of cost saving measures that also reduce GHG emissions.

Some municipal operations reduction targets coincide with the local community targets, whereas others specify a different target. The State's AB 32 Scoping Plan recommends a 15% reduction below 2005 by 2020. Aiming for this target will prepare Pittsburg's municipal operations for possible state mandates.

## 5.3 Looking Ahead

In many ways, today's world is accelerating. Due to technological advances and economic expansion, GHG-emitting activities in today's societies are faster and more intense than in previous eras, and are increasing exponentially.

As the world realizes the reality and magnitude of climate change, leaders in all sectors are rapidly initating efforts to mitigate the impacts as much as possible. Governmental initiatives, new business models, and committed personal actions are emerging and spreading. This means that in addition to unprecedented changes in the ecological climate, economic and political climates may shift in response. Pittsburg is preparing itself to weather unpredicability in the future by being watchful of upcoming changes and planning in advance. This inventory identifies and examines the problem. The next steps are to develop solutions.

# Appendices

# Appendix A. Preparer's Note on Context

At the time that this inventory was prepared between 2008 and 2009, the U.S. faced particular uncertainty about its direction. The second half 2008 saw a severe economic downturn. Stock markets dropped 40 percent in the last quarter (50 percent in the year), to a 13 year low, with single trading days seeing changes of over 10 percent.[47]

The federal government instituted a $700 billion "bail-out" for the financial sector in an attempt to shield the nation from this economic crisis. The auto manufacturing industry threatened bankruptcy before year's end, and U.S. Congress could not agree to pass a bail-out package. Among financial stability concerns, the debate included discussions on vehicle efficiency standards, and whether the American car industry will be competitive in this regard with foreign companies.

The housing market crashed. Home values in the Bay Area fell 40% within a year to a median price of $375,000.[48] In the Bay Area, one fifth of homeowners found that their mortgages are larger than the equity of their homes. Foreclosure rates were up 11 percent in Contra Costa County, and housing and commercial property development projects were halted by the developers.

National unemployment in October, 2008 was at 6.5 percent. California was one of the worst hit states, with an unemployment rate of 8.2 percent in October, up 2.5 points over the past year. Pittsburg has seen the large layoffs, as several major employers closed their doors. Small business owners and individuals are experiencing difficulty obtaining loans as a consequence of the damaged financial sector.

Oil prices fluctuated during 2008 between $ 145 a barrel in July to $ 49.62 a barrel in December.[49] National average gas prices fell below two dollars in December, when only four months earlier, they were between $4.00 and $4.50.[50]

The price of food was rising earlier in the year as transportation and fuel costs increased. The cost of maintaining electricity and heating in homes has also fluctuated dramatically. Natural gas prices in California rose 14% within one week (November 2008).

BART ridership increased during 2008. An article in the San Francisco Chronicle reported that ridership was nearing capacity during peak hours, sending the system into

[47] New York Stock Exchange http://www.nyse.com/ accessed December 2008
[48] *Home Prices in California Down 40 Percent*, by L.A. Times and Associated Press, 11/22/2008
[49] *Oil Falls Below $50 a Barrel,* Brian Baskin, WSJ, 11/21/2008
http://online.wsj.com/article/SB122719508911344363.html?mod=googlenews_wsj, accessed November 2008
[50] *Oil Prices Up but Decline for the Month,* Associated Press, http://www.msnbc.msn.com/id/12400801/, accessed November 2008

alarm and raising the possibility of a peak-hour rate-hike. Usage of the Pittsburg/Bay Point station has increased 12 percent in the past five years.

People can expect that prices, though having dropped in the recent weeks, will increase, particularly for energy. If so, energy efficiency will become a cost-saving decision, especially if the economy does not recover at a comparable rate as energy cost increase.

The California Air Resource Board finalized the Scoping Plan in December. Much public comment was made that state funds will be necessary for local and regional entities to carry out the projects outlined in the plan.

President-elect Obama has declared a commitment to solve the energy and climate crisis. He has appointed scientific experts to advise him, and has created a new advisory position dedicated to climate issues. He promises a set of new government projects that will create 2.5 million jobs, and will be focused on growing the "green" economy, creating an infrastructure of energy independence. Gov. Schwarzenegger held a conference in December 2008 focused on the issue of climate action. At this conference, a video was shown of President-elect Obama recognizing California's AB 32 as a model for the rest of the nation.

With state and federal support, specifically in the form of funding, a new set of initiatives may become possible. Regional planning will likely focus populations into the urban hubs. Pittsburg's location may become a reason for less growth rather than the high growth it would have expected under business-as-usual. ABAG's 2009 projections are less aggressive for the outlying Contra Costa areas. A recent conversation with an ABAG researcher indicated that this is because areas not around a transit corridor will experience discouragement for development in regional planning. On the other hand, if newly funded projects allow a transit extension to East County, Pittsburg may be included in the "smart growth" corridor, and experience larger, more concentrated growth around transit centers.

Pittsburg is proud of its industrial heritage, and may be a prime location to host part of the "green tech" wave of industrial development. If so, the industrial sector will continue to grow, and will emit more GHGs as they produce pieces of an infrastructure that will overall reduce GHG emissions. An increase for this reason should not be resisted just because it does not cooperate with a reduction target. This is another reason to keep the industrial point source emissions separate from the community inventory. The goods that would be produced will serve the larger economy, and the larger scope of GHG reduction plans.

# Appendix B. Data Sources

This appendix details the data and data sources used for the calculations. Tables that combine the data and show the calculations are available in Appendix C.

## Emissions Factors

These emission factors were used in both the community and municipal operations inventories, unless otherwise noted under a specific sector's activity data.

### Electricity and Natural Gas

1. **Emission coefficient for electricity and natural gas** were provided in ICLEI's CACPS software.

| | |
|---|---|
| **Electricity (PG&E)** | 0.000224 Tonnes $CO_2e$/kWh |
| **Electricity (DA)** | 0.000311 Tonnes $CO_2e$/kWh |

Electricity data provided by PG&E, as 0.4928 lbs $CO_2e$/kWh, reported to Pittsburg by ICLEI. The $CO_2e$ factor was used in absence of specific $CH_4$ and $N_2O$ emission factors. $CO_2$ only emissions certified as 0.489155 lbs/kWh by the Climate Registry is publicly available at http://www.climateregistry.org/CarrotDocs/19/2005/2005_PUP_Report_V2_Rev1_PGE_rev2_Dec_1.xls

For Direct Access Electricity, see DA emissions factor data under Commercial & Industrial

| **Natural Gas Emission Tonnes / Therm** | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$ |
|---|---|---|---|---|
| | 0.005305 | 0.00000059 | 0.0000001 | 0.005348 |

Natural gas data provided by ICLEI. $CO_2$ emission factor was derived from: California Energy Commission, Inventory of California Greenhouse Gas Emissions and Sinks: 1990-1999 (November 2002); and Energy Information Administration, Emissions of Greenhouse Gases in the United States 2000 (2001), Table B1, page 140. $CH_4$ and $N_2O$ Emission factors are derived from: U.S. EPA, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2000" (2002), Table C-2, page C-2. EPA obtained original emission factors from the Intergovernmental Panel on Climate Change, Revised IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual (1996), Tables 1-15 through 1-19, pages 1.53-1.57.

### Transportation/Vehicles

1. **Vehicle type mix**, expressed as percent of vehicle-miles-traveled( VMT), and emissions factors per vehicle type provided by Ana Sandoval, BAAQMD [asandoval@baaqmd.gov; 415/749-4667], using the EMFAC2007 software and data from the California Air Resources Board. File name: tablesanddesc.xls. EMFAC2007 available at: www.arb.ca.gov/msei/onroad/latest_version.htm (accessed Nov. 2008)

| Fuel Type | Percent of Total VMT | Avg. MPG | $CO_2$ Emissions Factor | $CH_4$ Emissions Factor | $N_2O$ Emissions Factor |
|---|---|---|---|---|---|
| **Gasoline** | 95.2% | 18.4 miles/gal | 8,630 grams/gal | 0.061 grams/mi | 0.070 grams/mi |
| **Diesel** | 4.8% | 7.9 miles/gal | 9,994 grams/gal | 0.022 grams/mi | 0.050 grams/mi |

### Waste

1. **Content of MSW** derived from CIWMB Statewide Waste Characterization Study, Dec. 2004. File location: http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097 (accessed Oct. 2008)

| Waste Type | Percent of Total Waste Stream |
|---|---|
| **Paper** | 20.99% |
| **Food waste** | 14.55% |
| **Plant debris** | 6.89% |
| **Wood and textile** | 21.79% |
| **Other materials** | 35.77% |

2. **Methane emissions factors** for each type of waste disposed in Managed Landfill, Compost, or Controlled Incineration, provided in ICLEI's CACPS software (units below are tonnes of methane per tonne of disposed waste).

| Waste Type | Emissions Factor in Managed Landfill | Tonnes sequestered in Compost | Emissions Factor in Controlled Incineration |
|---|---|---|---|
| **Paper** | 2.138 | (0.202) | |
| **Food waste** | 1.210 | (0.202) | |
| **Plant debris** | 0.686 | (0.202) | |
| **Wood and textile** | 0.605 | (0.202) | 0.081 |
| **Other materials** | -- | -- | |

3. **Methane recovery rate** at Managed Landfills based on IPCC recommendation of 60%. (However, some landfills in this region report a recovery rate of 85%. Data provided by Contra Costa County Climate Planner Dana Riley, citing inquiries of Keller Canyon Landfill, and WCCSL.)

## Community Inventory – Activity Data

### Industrial

1. **Point source emissions** data were provided by Rochelle Henderson, Public Records Coordinator, BAAQMD (publicrecords@baaqmd.gov) to Miya Kitahara on 10/07/08. File name: TOPGREENHOUSEGASCOMPANIES.xls.

| Plant Name | Plant Address | $CO_2$ | $CH_4$ | $N_2O$ | Tonnes GHG ($CO_2e$) |
|---|---|---|---|---|---|
| **Delta Energy Center** | Arcy Lane | 1,993,155 | 46.28 | 3.31 | **1,995,152** |
| **Los Medanos Energy Center** | 750 E 3rd Street | 1,385,245 | 144.73 | 2.30 | **1,388,997** |
| **GWF Power Systems,LP (Site 1)** | 895 E 3rd Street | 199,215 | 13.22 | 3.13 | **200,462** |
| **GWF Power Systems,LP (Site 2)** | 1600 Loveridge Road | 195,176 | 12.95 | 3.06 | **196,398** |
| **Calpine Pittsburg LLC** | Loveridge Road | 118,494 | 2.75 | 0.20 | **118,613** |
| **USS-POSCO Industries** | 900 Loveridge Road | 55,057 | 1.28 | 0.09 | **55,112** |
| **Dow Chemical Company** | 901 Loveridge Road | 21,690 | 0.48 | 0.03 | **21,711** |
| **Total** | | | | | **3,976,444** |

2. **Manufacturing facilities** data in the BAAQMD records for 2007 show that the emissions at USS-POSCO was all caused by **natural gas** combustion, and that emissions from Dow Chemical was 88% natural gas. According to PG&E's classification system, both of these facilities' natural gas consumption would be included in the total Commercial/industrial category. To avoid double counting this portion of natural gas combustion, the corresponding amount of emissions were subtracted from the commercial natural gas sector.

| Plant Name | Total Emissions (BAAQMD) | 2007 Percent of Emissions that is Natural Gas (BAAQMD) | Natural Gas Emissions (2005) |
|---|---|---|---|
| **USS-POSCO Industries** | 55,112 | 100% | 55,103 |
| **Dow Chemical Company** | 21,711 | 88% | 19,138 |
| | 3,976,444 | | 74,241 |

The natural gas usage that would have resulted in these emissions was estimated based on the natural gas emissions coefficient, and subtracted from the commercial natural gas use data.

| Emissions | Coefficient | Natural Gas Usage |
|---|---|---|
| 74,241 tonnes | 0.005348 tonnes / therm | 13,881,052 therms |

3. **Direct access electricity** in Contra Costa County is estimated at 12.07% of total electricity consumed through PG&E (data from ICLEI; Xico Manarolla). To find amount of Direct Access used by non-residential accounts, the non-Direct Access non-governmental electricity use was divided by 100% - 12.07% to yield the total amount (DA and non-DA). Non-DA was backed out of the total to leave DA amount.

| | Non-DA Amount | Percent DA/Tot | Total (DA and Non-DA) | DA Amount |
|---|---|---|---|---|
| **Ind/Com** | 187,429,876 | 12.07% | 213,158,053 | 25,728,177 |

Direct Access electricity is assumed to emit the average California grid energy mix. This mix has a higher emissions factor than PG&E. Emissions factor provided by ICLEI (Xico Manarolla) at 2/6/08 meeting, as 0.686625 lbs $CO_2e$/kWh. However, other emission factors have been recommended since the initial compilation of this inventory. Direct Access emissions may need to be readjusted to more accurately reflect reality.

| Direct Access Emissions Factor |
|---|
| 0.000311 tonnes $CO_2e$/kWh |

## Regional Transportation

1. **Highway daily vehicle-miles-traveled** (VMT) for average weekday provided by Matt Kelly, Associate Transportation Planner, Contra Costa Transportation Authority. The daily VMT was multiplied by 365 to roughly obtain annual VMT.

| Highway Daily VMT | Highway Annual VMT |
|---|---|
| 887,172 vehicle-miles | 323,817,780 vehicle-miles |

2. **Marine emissions** data for the Bay Area and Contra Costa County provided by Andy Alexis, California Air Resources Board. This was used to count transit emissions. County average berthing and hotelling emissions per vessel call were estimated based on Carquinez and Richmond port data. Number of calls to the two commercial ports in Pittsburg were provided by David Allen, USS-POSCO, and Ed Koerperich, Koch Carbon.

**Transit Emissions**

| Transit Segment | Metric Tons: | | | Total |
|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$ |
| **S761** | 47 | 0.1 | 0.5 | 47 |
| **S762** | 70 | 0.2 | 0.7 | 71 |
| **S763** | 25 | 0.1 | 0.3 | 26 |
| **S764** | 31 | 0.1 | 0.3 | 32 |
| **Total** | **173** | **0.5** | **1.9** | 175 |

**Hotelling** (idling while docked)

| Port | Calls | $CO_2$ | $CH_4$ | $N_2O$ | Total Would Be w/o cold iron ($CO_2e$) | Less Cold Ironing ($CO_2$) |
|---|---|---|---|---|---|---|
| *CCC Avg per Call* | | *92.08* | *0.11* | *0.95* | | |
| **USS POSCO** | 25 | 2,302 | 3 | 24 | 2,328 | - |
| **KOCH CARBON** | 20 | 1,842 | 2 | 19 | 1,863 | 1,863 |
| **Total** | **45** | **4,144** | **5** | **43** | **4,191** | **1,863** |

Data shown in metric tons $CO_2e$

**Manuevering**

| Port | Calls | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$ |
|---|---|---|---|---|---|
| *CCC Avg per Call* | | *2.16* | *0.01* | *0.05* | |
| **USS POSCO** | 25 | 54 | 0 | 0 | 54 |
| **KOCH CARBON** | 20 | 43 | 0 | 0 | 44 |
| **Total** | **45** | **97** | **0.81** | **0.04** | **98** |

Data shown in metric tons $CO_2e$

See more discussion on marine emissions in Appendix F.

## Local Transportation

1. **Local road daily vehicle-miles-traveled** (VMT) for average weekday provided by Matt Kelly, Associate Transportation Planner, Contra Costa Transportation Authority. The daily VMT was multiplied by 365 to roughly obtain annual VMT.

| Local Road Daily VMT | Local Road Annual VMT |
|---|---|
| 338,947 vehicle-miles | 123,715,473 vehicle-miles |

### Commercial Energy Use

1. **Electricity and natural gas use** data were provided by Jasmin Ansar, PG&E [jxa2@pge.com, 415/973-4570] to Laura Wright on 1/3/08. File name: pittsburg2005.xls.

| | |
|---|---|
| **Electricity Use** | 187,429,876 kWh |
| **Natural Gas Use - Total** | 19,466,537 Therms |
| **Natural Gas Use – Less Industrial** | 5,585,485 Therms |

The natural gas consumption discussed in the Industrial sector data notes were subtracted from the commercial natural gas usage.

### Residential Energy Use

1. **Electricity and natural gas use** data were provided by Jasmin Ansar, PG&E [jxa2@pge.com, 415/973-4570] to Laura Wright on 1/3/08. File name: pittsburg2005.xls.

| | |
|---|---|
| **Electricity Use** | 135,750,067 kWh |
| **Natural Gas Use** | 8,247,362 Therms |

### Waste

1. **Volume of waste** and disposal methods and sites provided by Laura Wright, City of Pittsburg [lwright@ci.pittsburg.ca.us; 925/252-4350] File name: 97-08_curbside tonnage.xls

| | |
|---|---|
| **Total Solid Waste** | 77,480 Tons |
| **Total Alternate Daily Cover (ADC)** | 11,383 Tons |
| **Percent ADC Green Material** | 16.90% |
| **Composted** | 1,975.90 Tons |
| **Recycled** | 3,660.48 Tons |
| **Special Waste** | 9,354.12 Tons |
| **Biomass, controlled incineration** | 13,594.35 Tons |

## Municipal Operations Inventory

1. **PG&E records** of overall municipal operations electricity and natural gas use were provided by Corie Cheeseman, PG&E [C3CL@pge.com; 415-973-4999] to Miya Kitahara on 10/13/08. File name: PITTSBURG_2005_DTL.xls. This data set was used for facilities for which no City of Pittsburg records were available: Marina, Golf Course, Redevelopment District, the Housing Authority and CBDG.

| | |
|---|---|
| **Total City Electricity Use** | 12,255,677 kWh |
| **Total City Natural Gas Use** | 117,488 Therms |

### Water Management

1. **Electricity and natural gas use** data for irrigation, pumps, and water and Water Treatment Plant provided by Christy Terry, City of Pittsburg [cterry@ci.pittsburg.ca.us; 925/252-4001] to Miya Kitahara on 10/06/08. File names: Data Source: WTP_2005_PG&E.xls, Sewer_Maintenance_2005_PG&E.xls, Streetlights_2005_PG&E.xls, Landscaping_2005_PG&E.xls
   Identification of meters measuring water management energy use performed by Miya Kitahara, using Business Activity names for reference.

| | |
|---|---|
| **Water Management Electricity use** | 6,024,421 kWh |
| **Water Management Natural gas use** | 17,889 Therms |

### Municipal Facilities

1. **Electricity and natural gas use** data were provided by Christy Terry, City of Pittsburg [cterry@ci.pittsburg.ca.us; 925/252-4001] on 10/06/08. File names: Buchanan_Pool_2005_PG&E.xls; Buildings_2005_PG&E.xls; Landscaping_2005_PG&E.xls. For Facilities sector data, Christy Terry files were used for all but Marina, Golf Course, Redevelopment District, and the Housing Authority and CBDG, which are not recorded by the Public Works Department. Identification of meters measuring Building and Facility energy use performed by Miya Kitahara, using Business Activity names for reference. Meters not clearly identifiable by name were identified by location by Laura Wright.

| | |
|---|---|
| **Municipal Facilities Electricity Use** | 3,717,996 kWh |
| **Municipal Facilities Natural Gas Use** | 100,174 Therms |

| Facility Type | Electricity Use (kWh) | Electricity Cost ($) | Natural Gas Use (therms) | Natural Gas Cost ($) |
|---|---|---|---|---|
| **City Hall** | 1,562,880 | 210,026 | 57,293 | 65,639 |
| **Community Centers** | 200,164 | 42,397 | 2,949 | 4,001 |
| **Public Works** | 97,963 | 14,952 | 4,861 | 6,368 |
| **Housing Authority & CDBG** | 36,658 | 4,756 | 851 | 1,406 |
| **Redevelopment District** | 15,880 | 2,741 | 0 | 0 |
| **Parks** | 454,744 | 58,616 | 666 | 249 |
| **Pool** | 163,560 | 22,780 | 19,119 | 20,173 |
| **Other (Misc, Rentals, Vacant, etc.)** | 94,760 | 15,255 | 15,280 | 16,844 |
| **Marina** | 912,124 | 134,699 | 0 | 0 |
| **Golf Course** | 183,506 | 0 | 131 | 0 |
| **Totals** | 3,722,239 | 506,223 | 101,150 | 114,680 |

### Streetlights

1. **Streetlight electricity use** data provided by Christy Terry, City of Pittsburg [cterry@ci.pittsburg.ca.us; 925/252-4001] to Miya Kitahara on 10/06/08. File names: Streetlights_2005_PG&E.xls, Oakhills_St_Lights_2005_PG&E.xls, Main_Streetlights_2005_PG&E.xls Identification of meters measuring Streetlight electricity use performed by Miya Kitahara, using Business Activity names for reference.

| Streetlights Electricity Use |
|---|
| 2,437,026 kWh |

### Vehicle Fleet

1. **Lists of fleet vehicles**, identifying make/model, 2005 VMT, and gas/diesel purchases for each vehicle provided by Christy Terry [cterry@ci.pittsburg.ca.us; 925/252-4001] to Miya Kitahara on 10/20/08. File names: Vehicle Miles Driven Log - FY 05-06.xls. Identification of energy source for each vehicle provided by Russell Tank, City of Pittsburg, on 10/23/08.

| Fuel Type | Gallons | Miles |
|---|---|---|
| Gasoline | 85,689 | 1,311,258 |
| Diesel | 27,148 | 178,025 |

| Department | Gasoline Consumption (gal) | Gasoline Fleet (miles) | Diesel Consumption (gal) | Diesel Fleet (miles) |
|---|---|---|---|---|
| Public Works | 44,446 | 334,505 | 27,148 | 178,025 |
| Police | 52,127 | 878,488 | 0 | 0 |
| City Hall (Excl. Police) | 5,453 | 62,305 | 0 | 0 |
| Marina | 1,694 | 22,926 | 0 | 0 |
| Housing & CDBG | 831 | 13,034 | 0 | 0 |
| **TOTAL** | **104,551** | **1,311,258** | **27,148** | **178,025** |

### Employee Commute

1. **An employee survey** was distributed to employees via email through surveymonkey.com, and in a paper survey to an additional 70 employees. A total of 125 respondents were included in the result analysis, to include regular employees that reported commute patterns for 2005, and seasonal employees' data for 2008 as a proxy for seasonal employee commutes in 2005. See Appendix I for the survey questions. Data was collected and analyzed on 11/13/08 by Miya Kitahara, to assess total miles driven by respondents on their commutes in 2005. Respondents who did not specify their vehicle's energy

source were assumed to use gasoline; those who did not specify their vehicle type were assumed to drive an average automobile. The mileages below have been multiplied out to represent the total employee body. The fuel type is gasoline except “Heavy truck (diesel)”.

| Vehicle Type | Miles Traveled |
|---|---|
| **Auto (all sizes)** | 1,537,943 |
| **Hybrid** | 5,472 |
| **Motorcycle** | 320,107 |
| **Van** | 5,472 |
| **Light truck** | 212,024 |
| **Heavy truck** | 1,368 |
| **Heavy truck (diesel)** | 34,199 |

2. **Number of employees** was 291 regular and 263 seasonal employees worked in 2005, as reported by Sandra Navarro in an email on 10/29/08. Respondent totals for regular employees were divided by 38% (111 participants / 291 employees), to find the commute total for all regular employees. Seasonal employees were divided by 11% [14 respondents / (263 employees x 50% FTE)]. We assume that “Seasonal” positions consist of an average 1,000 hours, or approximately 50% of one year’s full-time position.

3. **Fuel economy** for each vehicle type was derived from EMFAC2007 output by Miya Kitahara.

| | |
|---|---|
| **Gas auto** | 21.3 MPG |
| **Gas light truck** | 16.4 MPG |
| **Gas heavy truck** | 8.9 MPG |
| **Diesel heavy truck** | 6.9 MPG |

Other fuel economy figures used:

| | |
|---|---|
| **Gas hybrid** | 43 MPG -Estimated average for 2001 – 2005 Toyota Prius models, MPG data from fueleconomy.gov |
| **Gas motorscooter/motorcycle** | 60.4 MPG - (reported by survey respondent) |

## Waste

1. **Volume of waste** serviced for each City building or facility was provided by Sal Coniglio of Garaventa Enterprise [sal@garaventaent.com] to Laura Wright on 10/24/08. File name: City_of_Pitsburg_Office_Bins_Report.xls

| Total City Waste Disposed |
|---|
| **198.208 Tons** |

# Appendix C. Calculating $CO_2e$

The activity data input into the CACP software is multiplied by emissions factors and Global Warming Potential values to yield total GHG emissions in the unit of tonnes $CO_2e$.

*( Activity Data x Emissions Factor $CO_2$ ) +*
*( Activity Data x Emissions Factor $CH_4$ x GWP $CH_4$ ) +*
*( Activity Data x Emissions Factor $N_2O$ x GWP $N_2O$ ) =*
*Tonnes $CO_2e$ of GHG Emissions*

## Clean Air and Climate Protection Software

ICLEI developed the CACP software package in partnership with the State and Territorial Air Pollution Program Administrators (STAPPA), the Association of Local Air Pollution Control Officials (ALAPCO), and Torrie Smith Associates.

## Emissions Factors

The activity data are input into the CACP software, which multiplies each unit of activity by its corresponding emissions factor. Emissions factors have been determined through scientific measurement and research, and express the amount of greenhouse gases that are emitted as a result of a unit of activity. Activity data were multiplied by emissions factors for three major greenhouse gases: Carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$).[51]

ICLEI reports that the emissions factors used in the CACP software are consistent with national and international inventory standards established by the IPCC and U.S. Voluntary Greenhouse Gas Reporting Guidelines (EIA form 1605). Some emissions factors were adjusted to more accurately represent local conditions. See Appendix A for the emissions factors used in this inventory.

## Global Warming Potential

Methane and nitrous oxide have greater Global Warming Potential (GWP) than carbon dioxide. This means that a ton of methane or nitrous oxide has multiple time the impact on climate change than a ton of carbon dioxide (21 times for methane; 310 for nitrous oxide).[52] The software multiplies each gas by its GWP, then outputs an emissions total in tonnes of *carbon dioxide equivalent* ($CO_2e$), which includes the emissions of all three

[51] The Kyoto Protocol identifies a total of six gases and gas-groups. The three measured by CACP are the most common. The other three are not naturally occurring, and result mostly from chemical processes and leakage in refrigerants.
[52] Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report published in 1995.

gases. The $CO_2e$ unit allows comparisons between emission sources with different proportions of the gases.

## Table of GHG Calculations

The Tonnes $CO_2e$ per Unit of Activity emissions factor already incorporates the three greenhouse gases and their Global Warming Potentials. For Industrial point source and marine transportation emissions, the data were already presented in tonnes $CO_2e$ in their respective data sources.

| *Sector* | *Emission Source* | *Activity Volume* | *Activity Unit* | *Tonnes $CO_2e$ per Unit of Activity* | *Total Tonnes $CO_2e$* |
|---|---|---|---|---|---|
| **Industrial** | Point Source | 3,976,444 | Tonnes $CO_2e$ | | |
| | Direct Access Electricity | 25,728,177 | kWh | 0.000311 | 8,013 |
| **Regional Transportation** | **Highway Gasoline** | 308,210,590 | VMT | 0.000023 | 7,083 |
| | | 16,777,729 | gallons | 0.008630 | 144,784 |
| | **Highway Diesel** | 15,607,190 | VMT | 0.000016 | 249 |
| | | 1,984,702 | gallons | 0.009994 | 19,836 |
| | **Marine** | 2,136 | Tonnes $CO_2e$ | | |
| **Local Transportation** | **Local Roads Gasoline** | 117,752,703 | VMT | 0.000023 | 2,706 |
| | | 6,409,978 | gallons | 0.008630 | 55,315 |
| | **Local Roads Diesel** | 5,962,770 | VMT | 0.000016 | 95 |
| | | 758,261 | gallons | 0.009994 | 7,578 |
| **Commercial** | **Natural Gas** | 5,585,485 | therms | 0.005348 | 29,873 |
| | **Electricity** | 187,429,876 | kWh | 0.000224 | 41,901 |
| **Residential** | **Natural Gas** | 8,247,362 | therms | 0.005348 | 44,110 |
| | **Electricity** | 135,750,067 | kWh | 0.000224 | 30,348 |
| **Waste** | **Total MSW** | 77,480 | short tons | | |
| | **Paper** | 16,271 | | 1.9398 | 31,562 |
| | **Food Waste** | 11,273 | | 1.0992 | 12,392 |
| | **Plant Debris** | 5,338 | | 0.6232 | 3,327 |
| | **Wood/Textile** | 16,883 | | 0.5496 | 9,279 |
| | **ADC Green** | 1,924 | | 0.6232 | 1,199 |
| | **Biomass** | 13,594 | | 0.0736 | 1,000 |
| | **Compost** | 1,976 | | (0.1835) | (363) |
| | **Gross Total** | | | | 58,396 |
| | **Methane Recovery Rate (for MSW + ADC)** | | | | 60% |
| | **Waste - Net Total** | | | | 23,741 |

## Appendix D. PG&E Power Mix

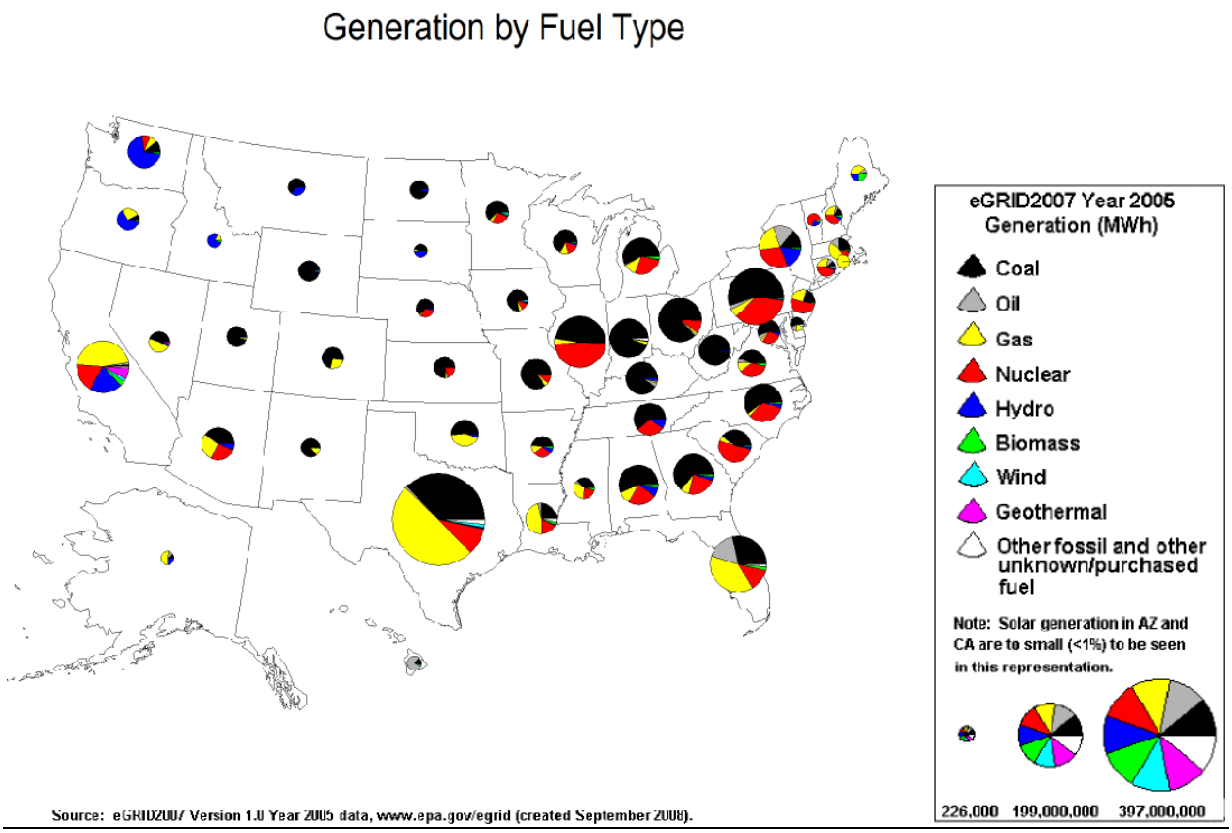
No data were available for 2005 PG&E power mix data. The 2008 power mix was available on the PG&E Website (www.pge.com) and indicated the following mix. The national average percentages were taken from the U.S. EPA 2005 eGrid report (U.S. EPA, 2008 )

| Fuel Type | PG&E | National Avg. |
|---|---|---|
| Natural Gas | 44% | 19% |
| Coal | 2% | 50% |
| Nuclear* | 22% | 19% |
| Large Hydro* | 17% | 7% |
| Renewable* | 14% | <1% |
| Other | 1% | 5% |

Note: Percentages may not add up to 100% due to individual rounding

* "These resources are climate neutral and/or renewable" – PG&E Website

Below is a visual representation of the various power mixes across the U.S. (U.S. EPA, 2008 eGrid)



# Appendix E. Scopes

Both the community-wide and government operations inventories report emissions of GHGs that occur as a direct or indirect result of its activities. Greenhouse gas reporting protocols at the international, national, and state levels categorize emission sources by "Scopes" that correspond to the directness of relationship between the activity and the resulting emissions, and the economic "Sectors" in which the activities occur.

## Definition of Scopes

**Scope 1** emissions occur within the organizational boundary, as a direct result of on-site fuel combustion (gasoline, diesel, natural gas).

**Scope 2** emissions occur beyond the boundary, but are a direct result of energy consumption by the community or municipal operations.

**Scope 3** or *informational items* occur as an indirect result of community activities, beyond the organizational boundary, and often over a longer period of time. Scope 3 can at best be quantified as an estimate.

Although the actual emissions of Scope 2 and Scope 3 sources can occur in a distant location, the activities that directly or indirectly cause them can be influenced by the community. Therefore, this inventory includes emissions in all three scopes.

In most protocols, an organization's boundaries are defined by financial or operational control. For this community inventory, the boundary is defined as the city limits. In the government operations inventory, the boundary is generally operational control.

Applied to the sectors in the community and municipal operations inventories, the scopes include the following emission sources:

- **Scope 1:** Natural gas, gasoline, diesel, and other fuel combustion
- **Scope 2:** Electricity consumption
- **Scope 3/Informational Items:** Waste disposed, employee commute

The following tables show how each source of emissions can be classified by its scope and sector. The scopes of the emissions sources from municipal operations are similar to the community inventory, with the addition of a Scope 3 source of gasoline and diesel usage by employee commutes. The sectors are more specific than in the community inventory.

Industrial emissions from power plants fall under Scope 1, because natural gas and petroleum coke are combusted on site, releasing the GHG emissions. This same set of emissions will also appear in other jurisdictions' inventories, as Scope 2 emissions.

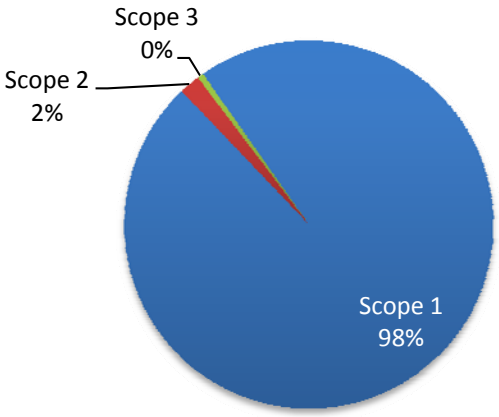
**Community Emissions Classified by Scopes**

| Sector | Scope 1 | Scope 2 | Scope 3 |
|---|---|---|---|
| **Industrial** | *Natural Gas & Process Emissions* | *Electricity* | |
| **Transportation** | *Gasoline & Diesel* | | |
| **Commercial** | *Natural Gas* | *Electricity* | |
| **Residential** | *Natural Gas* | *Electricity* | |
| **Waste** | | | *Methane from Decomposition* |

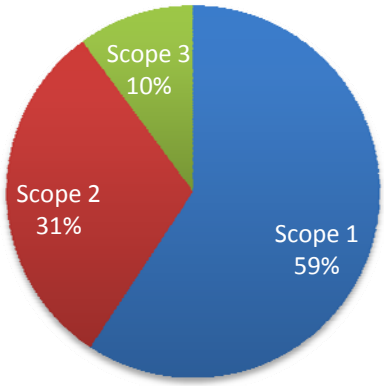
**Community Emissions Quantified by Scope**

| Sector | Scope 1 | Scope 2 | Scope 3 |
|---|---|---|---|
| **Industrial** | 3,976,444 | 8,013 | |
| **Transportation (Regional)** | 174,087 | | |
| *Transportation (Local)* | 65,695 | | |
| *Commercial* | 29,873 | 41,901 | |
| *Residential* | 44,110 | 30,348 | |
| *Waste* | | | 23,741 |
| **Total Local Community** | **139,678** | **72,249** | **23,741** |
| **Total of All** | **4,290,210** | **80,262** | **23,741** |

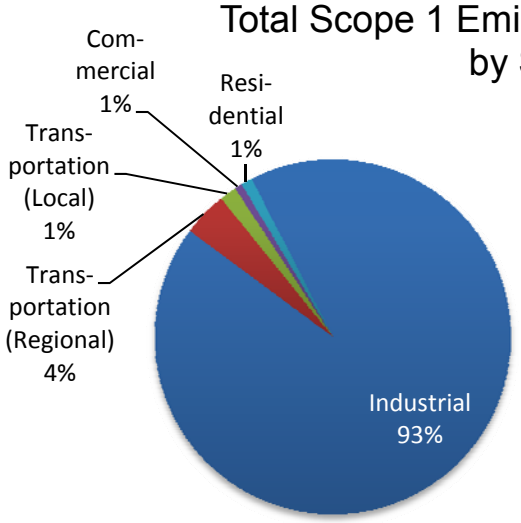
## Total Emissions by Scope



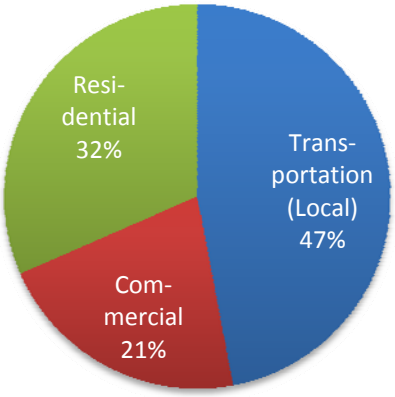

## "Local Community" Emissions by Scope



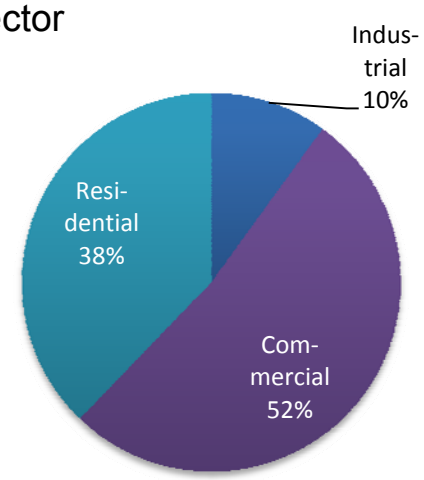

## Total Scope 1 Emissions by Sector



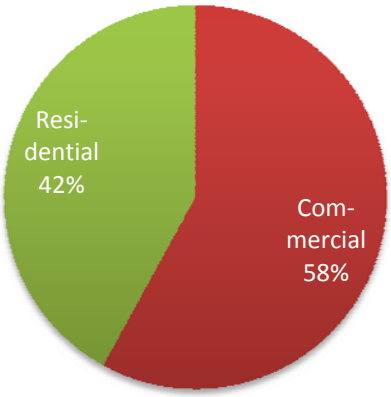

## Local Community Scope 1 Emissions by Sector




## Total Scope 2 Emissions by Sector




## Local Community Scope 2 Emissions by Sector



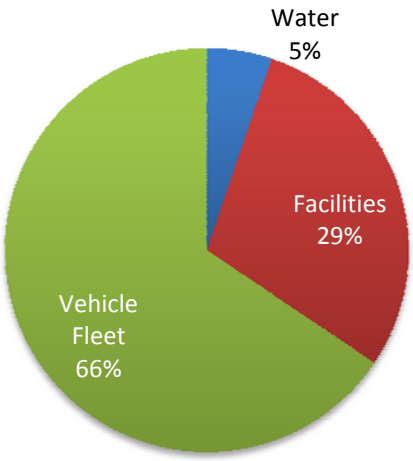
**Municipal Operations Emissions Classified by Scopes**

| Sector | Scope 1 | Scope 2 | Scope 3 |
|---|---|---|---|
| Water | *Natural Gas* | *Electricity* | |
| Facilities | *Natural Gas* | *Electricity* | |
| Vehicle Fleet | *Gas & Diesel* | | |
| Employee Commute | | | *Gas & Diesel* |
| Streetlights | | *Electricity* | |
| Waste | | | *Methane* |

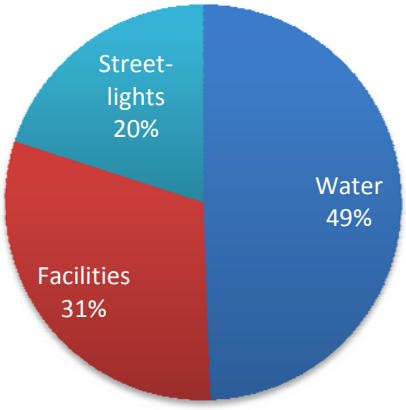
**Municipal Operations Emissions Quantified by Scopes**

| Sector | Scope 1 | Scope 2 | Scope 3 |
|---|---|---|---|
| Water | 96 | 1,347 | |
| Facilities | 538 | 832 | |
| Vehicle Fleet | 1,207 | | |
| Employee Commute | | | 887 |
| Streetlights | | 545 | |
| Waste | | | 58 |
| **Total** | **1,840** | **2,724** | **944** |

Municipal Operations
Scope 1 Emissions by Sector




Municipal Operations
Scope 2 Emissions by Sector



## Appendix F. Secondary Emission Sources

ICLEI classifies some emissions sources as *secondary*, due to the difficulty of gathering data, the irrelevance to local government action plans, and the negligible emissions quantity in relation to the whole.

Emissions from some sources are currently impossible to quantify. The data necessary to calculate the emissions are not available or were never measured. Specifically, emission sources excluded due to inadequate data are rail and marine transportation. After consulting several government departments, these data were concluded to be unavailable at this time. These sectors are rarely included in GHG inventories for local governments. Since rail and marine transportation is typically intended for long-distance travel across regions, these sectors are best monitored by regional governing bodies. ICLEI staff agreed that the emissions from rail and marine can be prohibitively difficult to obtain. If and when data become available, these sectors may be added to an amended inventory. Also included in this appendix are explanations regarding large industrial process emissions and Pittsburg Power Company.

### Marine Transportation

Marine emissions were estimated based on modeling data from the California Air Resources Board. The transit emissions attributed to the vessel lane segments within Pittsburg's waterways totaled approximately 175 metric tons annually.

| Segment | $CO_2$ | $CH_4$ | $N_2O$ | Total |
|---|---|---|---|---|
| **S761** | 47 | 0.1 | 0.5 | 47 |
| **S762** | 70 | 0.2 | 0.7 | 71 |
| **S763** | 25 | 0.1 | 0.3 | 26 |
| **S764** | 31 | 0.1 | 0.3 | 32 |
| Total | 173 | 0.5 | 1.9 | 175 |

All GHGs shown in tonnes $CO_2e$.

Marine emissions for idling vessels in berths was initially estimated by applying the average per port call emissions for the Contra Costa County ports of Carquinez and Richmond (93 tonnes $CO_2e$ / call) to the number of calls per year to the two ports in Pittsburg. This would have totaled 6,800 tonnes $CO_2e$. However, discussion with the private companies operating these ports revealed that they provide shore power to the berthing vessels, and therefore minimize idling emissions by marine vessels.

**Hotelling** (idling while docked)

| Port | Total $CO_2e$ | Calls | $CO_2e$ / Call |
|---|---|---|---|
| **Carquinez** | 42,530 | 460 | 92.46 |
| **Richmond** | 42,411 | 452 | 93.83 |
| **Total / Avg** | **84,942** | **912** | **93.14** |

**Manuevering**

| Port | Total $CO_2e$ | Calls | $CO_2e$ / Call |
|---|---|---|---|
| **Carquinez** | 1,026 | 460 | 2.23 |
| **Richmond** | 996 | 452 | 2.20 |
| **Total / Avg** | **2,021** | **912** | **2.22** |

The chart below identifies other methods of estimating marine vessel emissions. It shows what activity indicators are necessary to attempt an estimate at marine transportation GHG emissions. There is some data possibly available regarding fuel purchasing behaviors within Pittsburg, but a calculation based on this data would not be consistent with the measurements made for the other transportation sectors.

| Measurement Method | Data Needed | Examples of Possible Calculations |
|---|---|---|
| Direct measurement | Tailpipe emissions measured by an air quality monitoring authority | |
| Fuel usage X<br><br>emissions factor for fuel | Vessel Miles Traveled within Pittsburg | Miles of waterways in Pittsburg X Number of vessels that travel through Pittsburg annually or daily |
| | | Direct measurement |
| | Fuel Economy of Vessels | Average fuel economy of all vessels that travel through Pittsburg |
| | | Use percentage detail of what types of vessels travel through Pittsburg AND fuel economy of each of these types to calculated weighted average fuel economy |
| | Emissions Factors | This data, expressed as $CO_2$/gallon, are available from emission factor tables, and $CH_4$/mile and $N_2O$/mile is available for the average motor technology, though specificity of vessel technology types may be impossible to account for. |

Inquiries for these or any similar sets of data were made to BAAQMD and the United States Coast Guard. Both authorities reported that no data of this sort is maintained by their offices.

**Contacts**

BAAQMD: Rochelle Henderson, Public Records 415/749-4784
publicrecords@baaqmd.gov

UCSG: Gary Johnson, 510-437-3148

## Rail Transportation

CalTrans Division of Rail
*Voicemail notes 10/17/08 10:00 AM*
From Alan Miller (916) 651-8476

### Locomotive Types & Emissions

There are several different types of locomotives, any of which could have been on any given train, with emissions rates varying between locomotive types.

- Tier 0, 1, and 2 with 2 being the most modern.
- Under Tier 0, there are also 0 non compliant and 0 compliant [emissions standards].

There is a fuel that has changed, to a low sulfur diesel, [apparently since 2005].

They are rebuilding old locomotives to Tier 2 standards, which is a reduction of 25% of the NOx.

### VMT Estimation

Looking on an online map that does not have the city limits identified, Alan Miller judged there to be about 7 miles of rail that pass through Pittsburg, from Bay Point to Antioch.

On any given day, there are four trains each direction that pass through that portion of the route, and also in 2005.

### Varying Conditions

The other thing that makes it difficult to quantify something like this is that a train accelerating coming out of Anitoch depot would put out significantly more than one coming in. Without a model, this is difficult to measure.

Wind conditions could blow it out of town, or it could blow it in. [This is probably referring to the exhaust emissions. This is irrelevant as we are not measuring the impact on the local community's air, but total emissions into *any* atmosphere.]

### Comments on Necessity and Feasibility

The difficulty with measuring emissions from rail in a jurisdiction is that they do not have specific emissions information.

Alan Miller reports not ever receiving this request (that he knows of at least) from other towns. He wonders if this is something that is really needed as such.

There really is no way of putting a number on what is being emitted as it passes through.

He is unconvinced the data even exists in a form that is meaningful [for our analysis].

### Pittsburg Power Company

Pittsburg Power Company (PPC) operates Island Energy, which supplies natural gas and electricity to Mare Island in Vallejo. Because the natural gas and electricity are not generated, processed, nor consumed within Pittsburg city limits (and not transmitted by the City) the emissions from this energy transaction can only be classified as a Scope 3 informational item.

PPC's 2007 power content matches the California average power mix (see below). There is no WAPA power content label for 2005, so 2007's correspondence to 2007 CA average will be used as a proxy to indicate a correspondence in 2005. The grid average for California's power mix emitted 0.000437 tonnes $CO_2e$ per kWh consumed in 2004. The most recent data are for 2004.

In 2005, customers served by PPC consumed 18,060,588 kWh of electricity. With the CA grid average emissions factor, this electricity consumption emitted 7,892 tonnes $CO_2e$.

| POWER CONTENT LABEL | | |
|---|---|---|
| ENERGY RESOURCES | WAPA* (projected) | 2007 CA POWER MIX** (for Comparison) |
| **Eligible Renewable** | 10% | 10% |
| --Biomass & waste | 0% | 0% |
| --Geothermal | 2% | 2% |
| --Small Hydroelectric | 6% | 6% |
| --Solar | 0% | 0% |
| --Wind | 2% | 2% |
| **Coal** | 32% | 32% |
| **Large Hydroelectric** | 24% | 24% |
| **Natural Gas** | 31% | 31% |
| **Nuclear** | 3% | 3% |
| **Other** | 0% | 0% |
| **Total** | 100% | 100% |

* 0% of Product Name is specifically purchased from individual suppliers.
** Percentages are estimated annually by the California Energy Commission based on electricity sold to California consumers during the previous period.
For specific information about this electricity product, contact The Pittsburg Power Company. For general information about the Power Content Label, contact the California Energy Commission at 1-800-555-7794 or energy.ca.gov/consumer.

The 2007 CA Power Mix represents the Net System power which is a mix of electricity without a direct tie between electric consumers and generators. The Total System Power label represents all of the generation consumed by customers in California. Net System Power is the component of Total System Power that is not directly generated for electric consumption.

Net system power estimates are not representative of the actual power mix in California, they cannot be used to monitor the progress of the California Renewable Portfolio Standard or establish a representative greenhouse gas profile of electricity imports.

## Appendix G. Industrial Emissions

BAAQMD provided public records for the 200 top emitters in the Bay Area in 2005. Among them were several Pittsburg facilities, including power plants and manufacturing facilities. Most of the emissions reported in the BAAQMD record occur from natural gas emissions. This causes potential for double-counting, because PG&E also reports natural gas usage in the commercial gas usage data. Some assumptions were made in order to correctly assign the portion of emissions resulting from *industrial* uses of natural gas to the industrial sector.

BAAQMD identified the emission source fuels for each of the facilities. Those identified to have natural gas emissions are listed below.

| Facility | Tonnes $CO_2e$ | Coke | Diesel | Fuel Oil | Liquid waste | Natural Gas | Process Gas | Propane |
|---|---|---|---|---|---|---|---|---|
| **NATURAL GAS POWER PLANTS** | | | | | | | | |
| Calpine Pittsburg LLC | 118,613 | | | | | X | | |
| Delta Energy Center | 1,995,152 | | X | | | X | | |
| Los Medanos Energy Center | 1,388,997 | | X | | | X | | |
| **COKE POWER PLANTS** | | | | | | | | |
| GWF Power,LP (Site 1) | 200,462 | X | X | X | | X | | |
| GWF Power,LP (Site 2) | 196,398 | X | X | X | | X | | |
| **MANUFACTURING** | | | | | | | | |
| USS-POSCO Industries | 55,112 | | X | | | X | | |
| Dow Chemical Company | 21,711 | | X | | X | X | X | X |
| **Total** | **3,976,445** | | | | | | | |

### Assumptions

1. All natural gas use except for those used by heavy power plants ARE included in PG&E data.
2. Natural gas consumed by gas powered generators are NOT included in PG&E data.
3. Natural gas consumed by large industrial manufacturing sites and coke powered power plants ARE included in PG&E data.
4. Separation of total GHG emissions, identifying what portion of the total resulted from natural gas combustion. This was based on a proxy year data (2007) for which emissions data were available for totals with and without natural gas emissions.

| Industrial Facility Name | Proxy Year Data for % Nat Gas | | |
|---|---|---|---|
| | 2007 GHG Emissions | 2007 GHG Emissions from Nat Gas | % Emissions from Nat Gas |
| Calpine Pittsburg LLC | 116,440 | 116,440 | 100% |
| Delta Energy Center | 1,895,320 | 1,895,318 | 100% |
| Los Medanos Energy Center | 1,368,588 | 1,368,583 | 100% |
| GWF Power Systems,LP (Site 1) | 200,700 | 0 | 0% |
| GWF Power Systems,LP (Site 2) | 196,800 | 0 | 0% |
| USS-POSCO Industries | 68,215 | 68,204 | 100% |
| Dow Chemical Company | 22,900 | 20,187 | 88% |

5. All non-natural gas emission sources that did not come from the top 200 GHG emitters list are excluded for lack of data availability.

### Conclusions

Following the above assumptions, the BAAQMD emissions data for the top 200 GHG emitters in 2005 were classified as follows:

1. 3,976 thousand tonnes $CO_2e$ from 3 natural gas power plants, 2 coke power plants, and 2 industrial facilities were included in the “industrial” sector.
2. 100% of USS-POSCO emissions and 88% of Dow Chemical emissions, totaling 74,241 tonnes $CO_2e$ were subtracted from the commercial sector natural gas emissions.

### Reason for Excluding Industrial Emissions from “Local Community” Emissions

1. There is little that the City of Pittsburg can do to influence industrial sector processes or business decisions.
2. These emissions are tracked and regulated through permitting processes by regional agencies, such as the Bay Area Air Quality Management District (BAAQMD). The largest of these industrial facilities fall under the AB 32 regulation for large industry, and will be regulated directly by the State.
3. BAAQMD reports that the top 11 emitters in Pittsburg emit 4.6 million metric tons of $CO_2e$. If this amount were included in the Inventory, it would account for 84% of the total community emissions. It would dwarf all other activities in comparison. This would diminish the importance of reduction actions in all other sectors, and would be counter-productive to purpose of climate action.

4. One benefit of the inventory process is to have some basis for comparison with other cities and regions. Comparison facilitates the exchange of GHG reduction measures and strategies. Case studies are more meaningful when their impacts can be translated to other jurisdictions. Including these large industrial emission sources would prohibit comparison with cities in neighboring counties that may not have heavy industry, but do share many other conditions, and with whom collaboration and exchange would be valuable.
5. The vast majority of the industrial emissions are Scope 1 emissions related to electricity generation. These will be counted in the GHG inventories of the jurisdictions hosting the end-users of the generated electricity. Therefore the industrial emissions will be accounted for through other inventories, and would also result in double-counting if all jurisdictions do report Scope 1 and 2 emissions.

# Appendix H. Growth Indicators 2005 – 2020

## Community GHG Emissions Growth

### Growth Indicators

| Sector | Indicator | 2005 | 2020 | 2005-2020 | % per Year | Projection Authority | Data Source |
|---|---|---|---|---|---|---|---|
| **Industrial Emissions** | Industrial Jobs | 3,030 | 3,611 | 19.2% | 1.18% | ABAG | More detail below |
| **Transportation (SR4)** | 1,000 VMT | 323,817 | 425,060 | 31.3% | 1.83% | CCTA | Matt Kelly, Associate Transportation Planner |
| **Transportation (Local)** | 1,000 VMT | 123,715 | 170,791 | 38.1% | 2.17% | CCTA | |
| **Commercial Energy** | Commer. Jobs | 12,740 | 19,529 | 53.3% | 2.89% | ABAG | More detail below |
| **Residential Energy** | Population | 62,400 | 76,200 | 22.1% | 1.34% | ABAG | 2009 ABAG Projections |
| **Waste (residential)** | Population | 62,400 | 76,200 | 22.1% | 1.34% | ABAG | |
| **Waste (commercial)** | Total Jobs | 15,770 | 23,140 | 46.7% | 2.59% | ABAG | |
| **Waste Total** | Tons | 77,480 | 107,014 | 38.1% | 2.18% | ABAG | More detail below |

### Commercial / Industrial Jobs

The ABAG 2009 growth projections indicate the number of *total* jobs. In order to distribute these job projections to the industrial and commercial sectors, data from the most recent General Plan was used. Based on the land use designations in the General Plan, projected jobs for industrial and commercial facilities were as follows:

| | 2005 | 2020 | Rate of Growth |
|---|---|---|---|
| **Jobs** | | | |
| Commercial | 17,450 | 52,240 | 199% |
| Industrial | 4,150 | 7,130 | 72% |
| **Total Jobs** | **21,600** | **59,370** | **175%** |
| **Square Feet** | | | |
| Commercial | 4,799,330 | 14,367,150 | |
| Industrial | 3,735,620 | 6,419,860 | |
| **Total SF** | **8,534,950** | **20,787,010** | |

The General Plan growth projections show a ratio between commercial to industrial growth rate (expressed as a percentage, 199% for commercial and 72% for industrial) to be 2.8:1. That is, for every one percent increase in industrial jobs, the City expects a 2.8% increase in commercial jobs. Although the actual growth projections have changed since the General Plan, the ratio of distribution of the growth is expected to remain about the same as in the General Plan. Applying this ratio between commercial growth

and industrial growth to the overall 47% growth projected by ABAG, the following sector-specific growth projections were established for the GHG Inventory.

| | 2005 | 2020 | % Growth |
|---|---|---|---|
| Commercial Jobs | 12,740 | 19,529 | 53.3% |
| Industrial Jobs | 3,030 | 3,611 | 19.2% |
| **Total** | **15,770** | **23,140** | **46.7%** |

### Waste

**Waste Total**

Notes: The projected growth rate of the commercial sector (indicated by jobs) is greater than that of residential sector (indicated by population).
The 2004 CIWMB Waste Composition report indicates that residential waste accounts for 35.6% of the waste stream; commercial waste accounts for 64.3%.

| Sector | 2005 Tons of Waste | 2005 Percent of Total Waste | Sector Growth | 2020 Tons of Waste |
|---|---|---|---|---|
| **Residential** | 27,583 | 35.6% | 13.8% | 31,384 |
| **Commercial** | 49,820 | 64.3% | 60.7% | 80,084 |
| **Waste Total** | **77,480** | **100%** | **48.0%** | **111,469** |

## Municipal Operations GHG Emissions Growth

### Growth Indicators

| Sector | Indicator | 2005 | 2020 | Percent 2005-2020 | Projection Data |
|---|---|---|---|---|---|
| **Water/Sewage** | Population growth | 62,400 | 76,200 | 22.1% | 2009 ABAG |
| **Facilities** | Employee growth | 554 | 628 | 13.3% | See below |
| **Vehicle Fleet** | Employee growth | 554 | 628 | 13.3% | See below |
| **Employee Commute** | Employee growth | 554 | 628 | 13.3% | See below |
| **Streetlights** | Population growth | 62,400 | 76,200 | 22.1% | 2009 ABAG |
| **Waste** | Employee growth | 554 | 628 | 13.3% | See below |

### Employee Growth

| YEAR | REGULAR | SEASONAL | TOTAL FTE | PERCENT CHANGE |
|---|---|---|---|---|
| **2008** | 326 | 254 | 453 | 0.2% |
| **2007** | 317 | 270 | 452 | 4.9% |
| **2006** | 298 | 266 | 431 | 2.0% |
| **2005** | 291 | 263 | 423 | 1.6% |
| **2004** | 295 | 242 | 416 | -4.5% |
| **2003** | 302 | 267 | 436 | - |
| | **Average annual growth:** | | | 0.84% |

## Appendix I. Employee Commute Survey

This information is being gathered as part of Pittsburg's participation in the ICLEI Cities for Climate Protection program. All information will be kept confidential. This survey should only take five minutes. Thank you in advance for your participation!

1. First and Last Name
2. Department
3. Type of Employment Status
   - Regular
   - Seasonal

**Please give us your best estimates about your commuting pattern IN THE CURRENT YEAR: 2008.**

1. On average, how many DAYS PER WEEK do you work?

2. On an average day, how many MILES DO YOU TRAVEL to work round-trip?

3. Please mark the number of days that you use a particular mode of transit during an average week of commuting?

Drive alone
Carpool (I drive)
Carpool (someone else drives)
Take public transit (BART, bus)
Bike
Walk
Combination of two or more means
Other(please specify)

4. If you carpool, how many other Pittsburg employees travel with you on average?

5. If you drive or carpool, what type of vehicle do you take most often?
   - Auto-full size
   - Auto-mid size
   - Auto-compact
   - Hybrid
   - Heavy truck
   - Light truck/SUV
   - Motorcycle
   - Van
   - Other (please specify)

6. What type of fuel does this vehicle use?

- Gasoline
- Diesel
- Ultra-low sulfur diesel
- Bio-diesel B20
- Bio-diesel B100
- Ethanol
- Electric
- LPG
- CNG
- Other (please specify)

**Which special commuting events have you participated in? (Check all that apply.)**

- Spare the Air
- Bike to Work Day
- Walk In Lunch

How often have you participated in these events? Please describe your participation in these or any other special commuting
events.

**Now please think back to the year 2005. Were you a City of Pittsburg employee in 2005? Y/N**

Have you changed your commute pattern IN ANY WAY since 2005? This includes changes like moving to a new place, buying a new car, taking BART more often, etc. Y/N

If Yes, please describe what you have changed.

**Please give us your best estimates about your commute pattern in the year 2005.**

1. On average, how many DAYS PER WEEK did you work in 2005?

2. On an average commute day in 2005, how many MILES DID YOU TRAVEL to work round-trip?

3. Please mark the number of days that you use a particular mode of transit during an average week of commuting?

| | |
|---|---|
| Drove alone | Biked |
| Carpooled (I drove) | Walked |
| Carpooled (someone else drove) | Combination of two or more means |
| Took public transit (BART, bus) | Other |
| (please specify) | |

4. If you carpooled in 2005, how many other City of Pittsburg employees traveled with you on average?

5. If you drove or carpooled, what type of vehicle did you take most often?

- Auto-full size
- Auto-mid size
- Auto-compact
- Hybrid
- Heavy truck
- Light truck/SUV
- Motorcycle
- Van
- Other (please specify)

6. What type of fuel did this vehicle use?

- Gasoline
- Diesel
- Ultra-low sulfur diesel
- Bio-diesel B20
- Bio-diesel B100
- Ethanol
- Electric
- LPG
- CNG
- Other (please specify)

## Acronyms and Glossary

**4CL –** Contra Costa County Climate Leaders: a network assisting the county and its 19 cities to inform, support and encourage the measurement and reduction of greenhouse gas emissions. Through education and sharing of best practices we will ensure sustainable, healthy and livable cities.

**AB 32 –** Assembly Bill 32: Also known as the *Global Warming Solutions Act of 2006*, passed by the California State Assembly in 2006, calls for a reduction in GHG emissions to 1990 levels by 2020 and commissioned the development of a plan on how to achieve this target. This plan, published in December 2008, is called the AB 32 Scoping Plan.

**ABAG –** Association of Bay Area Governments: a regional planning agency incorporating various local governments in the San Francisco Bay Area in California. It deals with land use, housing, environmental quality, and economic development. Non-profit organizations as well as governmental organizations can be members. All nine counties and 101 cities within the Bay Area are voluntary members of ABAG.

**ADC –** Alternate Daily Cover: cover material other than earthen material placed on the surface of the active face of a municipal solid waste landfill at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging.

**AVMT –** Annual vehicle miles traveled. *See VMT.*

**BAAQMD –** Bay Area Air Quality Management District: public agency that regulates the stationary sources of air pollution in the nine counties of California's San Francisco Bay Area: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, southwestern Solano, and southern Sonoma. The BAAQMD is governed by a Board of Directors composed of 22 elected officials from each of the nine Bay Area counties, and the board has the duty of adopting air pollution regulations for the district.

**CACP –** Clean Air and Climate Protection Software: a software developed and provided by ICLEI for calculating greenhouse gas and criteria air pollutants from a given set of activities.

**CCCCL –** Contra Costa County Climate Leaders. *See 4CL*

**CCP –** Cities for Climate Protection: a program of ICLEI for local governments to inventory and reduce their GHG emissions. *See ICLEI*

**CCTA –** Contra Costa Transportation Authority: a public agency formed by Contra Costa voters in 1988 to manage the county's transportation sales tax program and to do countywide transportation planning. The Authority is also the county's designated

Congestion Management Agency, responsible for putting programs in place to keep traffic levels manageable.

**CEC –** California Energy Commission: California's primary energy policy and planning agency.

**$CH_4$ –** Chemical formula for Methane, a greenhouse gas with 21 times the global warming potential (*see GWP*) as carbon dioxide. Main sources of methane are agriculture (mainly livestock), sewage, and decomposition or organic matter.

**CIWMB –** California Integrated Waste Management Board: the state's leading authority on recycling and waste reduction, was created by legislation (AB 939) adopted in 1989 by the California Legislature.

**$CO_2$ –** Chemical formula for Carbon Dioxide: the most abundant greenhouse gas. The main source of human-created carbon dioxide is the burning of carbon-intense fuels for energy (gasoline, diesel, natural gas, coal, etc.)

**$CO_2e$ –** Carbon Dioxide Equivalents: unit of measurement that describes, for a given mixture and amount of greenhouse gas, the amount of $CO_2$ that would have the same global warming potential (GWP)

**CPUC –** California Public Utilities Commission: regulates privately-owned utilities in the state of California, including electric power, telecommunications, natural gas and water companies.

**DA –** Direct Access: allows customers to purchase their electricity directly from competitive Energy Service Providers (ESP) rather than from Pacific Gas and Electric Company. Under DA, PG&E will continue to transport and deliver electricity to your home or business. The State regulates whether direct access is allowable or not.

**DVMT –** Daily Vehicle Miles Traveled. *See VMT.*

**EIA –** Energy Information Administration: independent statistical agency within the U.S. Department of Energy. EIA's mission is to provide policy-independent data, forecasts, and analyses to promote sound policy making, efficient markets, and public understanding regarding energy and its interaction with the economy and the environment.

**Energy Star:** A federal governmental program that rates the energy efficiency of certain appliances and equipment and labels those that meet certain minimum efficiency criteria for their type and class of equipment.

**EPA –** Environmental Protection Agency: an agency of the federal government of the United States charged to protect human health by safeguarding the natural environment: air, water, and land.

**FTE –** Full-time equivalent: a way to measure a worker's involvement in a project, or a student's enrollment at an educational institution. An FTE of 1.0 indicates a staff position of one full time worker.

**GHG –** Greenhouse gas: gases in an atmosphere that absorb and emit radiation within the thermal infrared range.

**GWh –** Giga-watt-hours: one million kilo-watt-hours (kWh)

**GWP –** Global Warming Potential: a measure of how much a given mass of greenhouse gas is estimated to contribute to global warming. It is a relative scale which compares the gas in question to that of the same mass of carbon dioxide. In this GHG inventory, a 100 year horizon is used, for which the GWP for carbon dioxide is 1, the GWP for methane is 21, and the GWP for nitrous oxide is 310. The synthetic (man-made) greenhouse gases (hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) have extremely high GWPs, in the thousands. The synthetic GHGs occur in very small quantities and are difficult to track at the local government level, and are therefore left out of this GHG inventory.

**ICLEI –** Local Governments for Sustainability: an international association of local governments and national and regional local government organizations that have made a commitment to sustainable development. More than 1000 cities, towns, counties, and their associations in 68 countries comprise ICLEI's growing membership. It was originally named 'International Council for Local Environmental Initiatives' (ICLEI), and was officially renamed in 2003.

**IPCC –** Intergovernmental Panel for Climate Change: a scientific intergovernmental body[1][2] tasked to evaluate the risk of climate change caused by human activity. The panel was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), two organizations of the United Nations.

**kWh –** kilo-watt-hour: a unit of energy equal to 3,600,000 joules. Energy in watt-hours is the multiplication of power in watts and time in hours. A kilo-watt-hour is equivalent to one thousand watt-hours.

**MMTCO$_2$e** – Million metric tons in carbon dioxide equivalent. *See CO$_2$e.*

**MSW –** Municipal solid waste: a waste type that includes predominantly household waste (domestic waste) with sometimes the addition of commercial wastes collected by a municipality within a given area.

**MTC –** Metropolitan Transportation Commission: a regional planning, financing, and funding government agency in the San Francisco Bay Area.

**MTCO$_2$e –** Metric tons carbon dioxide equivalent. *See CO$_2$e.*

**MWh –** Mega-watt-hour: one thousand kilo-watt-hours (kWh)

**$N_2O$ –** Chemical formula for Nitrous Oxide, a greenhouse gas with 310 times the global warming potential (*see GWP*) of carbon dioxide. Main sources of nitrous oxide are industrial and agricultural processes.

**PG&E –** Pacific Gas and Electric Company: the utility that provides natural gas and electricity to most of the northern two-thirds of California, from the Oregon border to Bakersfield.

**S-3-05 –** State Executive Order signed by Governer Arnold Schwarzenegger that set a reduction target for state-wide GHG emissions for 80% below 1990 levels by 2050.

**Scope –** method of categorizing emission sources. The intention of the use of scopes is to improve transparency, and to provide utility for different types of climate policies and goals. The Scopes used in this GH ginventory follow those of the World Resources Institute/World

**Scoping Plan –** The California Air Resources developed strategic plan to reduce greenhouse gas emissions in compliance with Assembly Bill 32, the *Global Warming Solutions Act of 2006*. *See AB 32.*

**SR4 –** State Route 4: the freeway passing through Pittsburg in the East-West direction.

**VMT –** Vehicle miles traveled: the total number of miles traveled by vehicles on a given segment of roadway, within a given period of duration.

**WRI/WBCBG –** World Resources Institute: an independent, non-partisan and nonprofit organization with a staff of more than 100 scientists, economists, policy experts, business analysts, statistical analysts, mapmakers, and communicators developing and promoting policies with the intention of protecting the Earth and improving people's lives.

World Business Council for Sustainable Development: a CEO-led, global association of some 200 international companies dealing exclusively with business and sustainable development.

**WTP –** Water Treatment Plant, operated by the City of Pittsburg, treats 32 million gallons per day for use by the Pittsburg community.

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