CITY COUNCIL STAFF REPORT

November 3, 2010

Consent Calendar

Subject: Update on Greenhouse Gas Emissions Inventory

FROM: David H. Ready, City Manager

BY: Michele Mician, Manager, Office of Sustainability

SUMMARY:

The City of Palm Springs contracted with Michael Brandman and Associates to complete a greenhouse gas emissions (GHG) Inventory and forecasting report. This presentation provides the results of the inventory for government and community sectors.

RECOMMENDATION:

Receive and file.

STAFF ANALYSIS:

The Green House Gas (GHG) Emissions Inventory and report for both the community and government operations has been completed as specified in common climate action protocol. The completion of this project will assist staff to comply with State and National climate change legislation. It will also be utilized for the completion of an Energy and Climate Action Plan (ECAP) for the City of Palm Springs. The public presentation of the community and City of Palm Spring's government operations impact on GHG emissions will be presented on November 4, 2010 at 6 pm at the 3rd Annual Sustainability Summit. During this presentation the public will play a role in the City's energy and climate action planning by voting on specific actions they are willing to take to reduce their environmental impact.

The presentation of data and subsequent collection of data via public input will provide information needed to complete a comprehensive Energy and Climate Action Plan (ECAP) for the City of Palm Springs to be completed by Spring 2012. Data collection will continue for several months after the event. The goal is for the residents in attendance to serve to promote the completion of the survey to others to provide significantly greater survey results over time. The GHG inventory of community-scale and local government operations provides the framework for decisions made in areas such as transportation, waste and land use.

ITEM NO. 2.H.

Forecasting models will be presented and are included as part of the final report. This will ensure the City carries out the mission of the Palm Springs Path to a Sustainable Community in years to come and to ensure compliance with or aid in the implementation of existing climate agreements and legislation including the U.S. Mayor's Climate Protection Agreement and CA Assembly Bill 32: Global Warming Solutions Act.

The Coachella Valley Association of Government's received significant funding from Southern California Edison (SCE) to implement the California Energy Efficiency Strategic Plan (CEESP). The proposed projects to be funded include Energy Action Plans and Climate Action Plans. As a member of the Desert Cities Partnership the City of Palm Springs is eligible to receive funding through this process to complete the plans. Specifically to complete the CEESP Strategic Plan Goal 4: Local governments lead their communities with innovative programs for energy efficiency, sustainability and climate change.

FISCAL IMPACT:

None. A contract for this project was previously approved by City Council on July 21, 2010 and awarded to Michael Brandman and Associates. The inventory was funded through a budget allocation under account 138-1270-43200.

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Attachments: Greenhouse Gas Emissions Inventory Administrative Draft

ADMINISTRATIVE DRAFT
Greenhouse Gas Inventory
City of Palm Springs, California

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October 26, 2010

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SECTION 1: EXECUTIVE SUMMARY

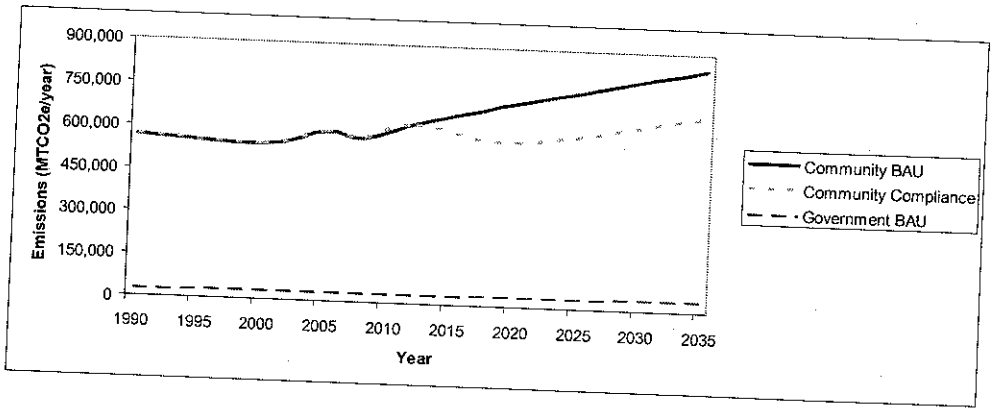
The City of Palm Springs (City) has prepared a greenhouse gas (GHG) emission inventory as an initial step in meeting its Path to Sustainable Communities objectives. GHGs were estimated for community and government sources. Community emissions refer to emissions within the City from sources such as motor vehicles traveling on roads within the City, emissions from power plants to generate the electricity used within the City, and emissions from the combustion of natural gas used within the City. Government emissions refer to emissions within the City government's control, such as methane from the wastewater treatment plant, natural gas from the City's co-generation plants, and from City vehicle fuel combustion. The government emissions are included in the community emissions. Table 1 and Figure 1 display a summary of the GHG emissions.

Table 1: Summary of Greenhouse Gas Emissions

Type	Category	Emissions ($MTCO_2e$ per year)						
		1990	2000	2005	2008	2012	2020	2035
Community	BAU	565,814	540,400	591,892	572,497	626,405	707,197	843,231
	Compliance	—	—	—	—	—	573,760	678,863
Government	BAU	26,812	29,900	30,592	31,227	31,739	33,235	36,096
	Compliance	—	—	—	—	—	31,920	34,664

Notes:
BAU = business as usual; $MTCO_2e$ = metric tons of carbon dioxide equivalents (greenhouse gas emissions)
Note that only compliance scenarios for 2020 and 2035 are provided.
Source: Michael Brandman Associates (Appendix A).

Figure 1: Inventory Growth



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SECTION 2: INTRODUCTION

2.1 - Purpose of the Inventory

This inventory serves the following purposes:

Palm Trees in the City of Palm Springs

- It identifies sectors that would provide the greatest opportunity for reductions.
- In the future, the City may prepare a Climate Action Plan; the greenhouse gas (GHG) inventory would be part of that Climate Action Plan. Climate Action Plans typically contain reduction targets and describe how strategies and policies within the Climate Action Plan will meet the reduction target.
- This inventory fulfills Objective 1.1 in the Palm Springs Path to a Sustainable Community, a document prepared by the City in 2009. A summary of the vision of the document as well as the three climate change objectives is presented below.

The Palm Springs Path to a Sustainable Community
March 25, 2009

Vision

Palm Springs is a thriving community that maximizes its renewable resources and conserves and restores its limited resources, so that residents can be assured of a future that is economically viable and in balance with the local environment.

Palm Springs aspires to be a place where:

- Citizens are engaged and share a vision of a sustainable future.
- Businesses support clean technology, the production of renewable energy and the internationally renowned eco-destination thrives.
- Children learn that sustainability is the local culture early, and this learning continues throughout life.
- Water and materials are recycled and reused.
- Homes, businesses and neighborhoods are built to high green building standards.
- Local businesses are supported and new ideas flourish.

Climate Change

Goal: Palm Springs is carbon neutral.

Objective 1: Establish a baseline inventory and forecast, ongoing tracking and reporting mechanism for GHG emissions.

1. Develop a comprehensive GHG emissions inventory for City government and the City of Palm Springs geographic area in partnership with other area governments.
2. Annually inventory and report GHG emissions so that reductions can be tracked in a transparent, consistent and accurate manner.

Objective 2: Develop strategies to reduce contributions to GHG emissions to 1990 levels by 2020 and carbon neutrality by 2030.

1. Develop a local climate change action plan to reduce GHGs for Palm Springs.
2. Retrofit and install Light-Emitting Diode (LED) energy efficient lighting in all of the City's traffic lights.
3. Improve city-wide traffic signalization, including permission left turn lanes.
4. Lead a valley-wide effort to improve traffic signalization and incorporate permission left turn lanes throughout the Coachella Valley.
5. Review current zoning and building codes to minimize the impact of GHG.
6. Participate in the development and implementation of regional strategies to meet the requirements of AB 32.
7. Establish incentives and disincentives to reduce production of GHGs by sectors in the City (such as energy production, transportation and real estate residential, commercial, and industrial).
8. Participate in a regional carbon offset program, carbon trading or "cap and trade" system to capture funding for local/regional actions to reduce contributions to GHGs.

Objective 3: Pursue energy efficient transportation options that reduce GHG emissions.

1. Reduce employee vehicle miles traveled in city vehicles by promoting teleconferences and the availability of alternative transportation options for business and trips.
2. Encourage telecommuting and flexible hours policies to avoid at least one commuting day per month per employee (average).
3. Work with the building industry to reduce vehicle trips to and from construction sites.

2.2 - About the Inventory

The City of Palm Springs GHG inventory contains GHG emissions from the municipal government and the community. Emissions are reported as a quantity over time, such as in tons per year. This inventory does not report concentrations of pollutants in the air, which is a measure of the total amount of a pollutant, typically measured in parts per million, parts per billion, or micrograms per cubic meter ($\mu g/m^3$) of air.

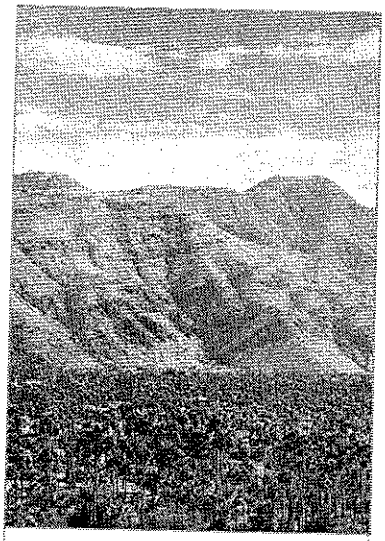
This inventory only estimates GHGs and does not contain an estimate of criteria air pollutants (ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead), nor does it contain an inventory of toxic air pollutants (diesel particulate matter, benzene, etc.).

The inventory incorporates two entities: the community and the municipal government. The community emissions refer to emissions *within* the City, such as emissions from motor vehicle use and from generating electricity to power buildings within the City. The municipal government inventory consists of emissions within the control of the government, such as electricity to power City Hall and City fleet vehicle emissions.

The inventory estimates emissions for the years 1990, 2000, 2005, and 2008. The year 1990 was selected to be consistent with Climate Change Objective 2 in the Palm Springs Path to a Sustainable Community. The year 2000 was selected because data was available. The year 2005 was selected because it was prior to the adoption of Assembly Bill (AB) 32;

thus, reductions from regulations pertaining to AB 32 are not shown. Year 2008 was selected because it is the most recent year for which data is available.

Emissions for 2012, 2020, and 2035 were projected for two scenarios: compliance and business as usual. The compliance scenario incorporates planned regulations that will go into effect by 2012 and 2020, such as the Pavley regulations, which will reduce emissions from new motor vehicles. Business as usual refers to the emissions that do not take into account regulations or any measures of which the City is planning to reduce emissions.


Palm Springs and the San Jacinto Mountains

GHG inventories consider a wide range of human activities. Estimating the amount of GHGs generated by these activities requires using a multiplicity of data sources and a diverse set of methodologies. Emission inventories are by nature the reflection of the best available data and the most applicable methods at the time of their compilation. As data grows and understanding develops, the inventories can be updated and improved. Emissions calculated for this inventory reflect current best estimates; in some cases, however, estimates are based on assumptions and incomplete data. Therefore, this inventory contains uncertainties.

Emissions inventories are organized by source categories or sectors. The State of California organizes its emission inventory by the following sectors:

- Agriculture
- Commercial and residential
- Electricity
- Industry
- High global warming potential gases
- Recycling and waste
- Transportation

This inventory provides emission estimates for all of the sectors except for agriculture and industry. Palm Springs has limited agriculture and industrial sources, and the emissions from energy use (electricity and natural gas) from industrial sources are included in the commercial sector.

2.3 - City of Palm Springs

The City lies within the Coachella Valley desert region at the base of the San Jacinto and Santa Rosa Mountains, approximately 60 miles east of Riverside. The expansive desert terrain contributes to the City's warm climate; the mountains provide a dramatic visual

backdrop and shelter from the winds. Its proximity to metropolitan Los Angeles, Orange, and San Diego counties, combined with the City's superior physical setting, is a primary reason that Palm Springs has become a popular resort destination.

The City's incorporated area encompasses 60,440 acres, or 95 square miles; the City's sphere of influence comprises another 27,160 acres, or 42 square miles. Primary access to the City is provided by Interstate 10 and Highway 111; north–south access to the City is provided via Indian Canyon Drive and Gene Autry Trail (Exhibit 1).

As recommended in the Local Government Operations Protocol, Table 2 presents a profile summary for the City of Palm Springs.

Table 2: City of Palm Springs Profile

Item	Data
Jurisdiction name	City of Palm Springs
Street address (for City Hall)	3200 East Tahquitz Canyon Way
City, State, Zip	Palm Springs, California 92262
County	Riverside
Website	http://ci.palm-springs.ca.us/
Size	95 square miles
Population[1]	2009: 47,601
Annual budget[2]	Total 2010-2011: $146,473,415
Employees (full time equivalent)	2010: 390
Climate zone[3]	15
Annual heating degree days[4]	Base 65: 1000; Base 60: 475
Annual cooling degree days[4]	Base 55: 6715; Base 60: 5196
Contact person Phone Email	Michele Catherine Mician, MS 760-323-8214 Michele.Mician@palmsprings-ca.gov
Services provided	Water treatment and distribution, wastewater treatment and collection, fire protection, police, solid waste collection, airport, street lighting and traffic signals, Angel Stadium, convention center

Sources:
1 Department of Finance, 2009.
2 Palm Springs Resolution No. 22714.
3 California Energy Commission, 2010.
4 Western Regional Climate Center, 2006.

Exhibit 1: Regional Location Map

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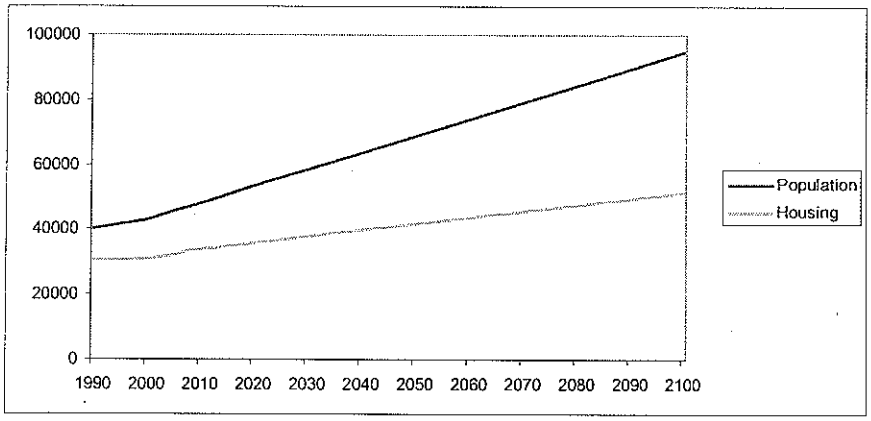
Population and housing trends for the City for the years that this inventory covers are displayed in Figure 2. Year 2035 population and housing estimates are interpolated from buildout of the General Plan. It is assumed for purposes of this analysis that buildout of the General Plan would occur in 2100. This assumption is based on a letter from the Southern California Association of Governments (contained in Appendix C), which contains population projections that were used in Senate Bill (SB) 375. In order to be close to those projections, a General Plan buildout year of 2100 is required.

Figure 2: City of Palm Springs Population and Housing Trends



2.4 - Climate Change Background

Climate Change

Climate change is a change in the average weather of the earth that is measured by alterations in wind patterns, storms, precipitation, and temperature. These changes are assessed using historical records of temperature changes occurring in the past, such as during previous ice ages. Many of the concerns regarding climate change use this data to extrapolate a level of statistical significance specifically focusing on temperature records from the last 150 years (the Industrial Age) that differ from previous climate changes in rate and magnitude.

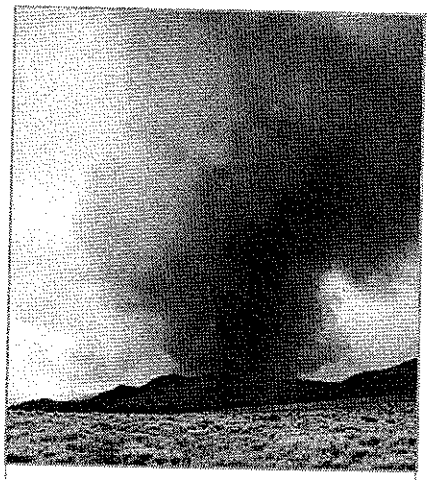
The United Nations Intergovernmental Panel on Climate Change constructed several emission trajectories of GHGs needed to stabilize global temperatures and climate change impacts. The Intergovernmental Panel on Climate Change predicted that global mean temperature change from 1990 to 2100, given six scenarios, could range from 1.1 degrees Celsius (°C) to 6.4°C. Regardless of analytical methodology, global average temperatures and sea levels are expected to rise under all scenarios (Intergovernmental Panel on Climate Change 2007a).

Climate Change Consequences

In California, climate change may result in consequences such as the following:

- A reduction in the quality and supply of water to the State from the Sierra snowpack. If heat-trapping emissions continue unabated, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. This can lead to challenges in securing adequate water supplies. It can also lead to a potential reduction in hydropower.

- Increased risk of large wildfires. If rain increases as temperatures rise, wildfires in the grasslands and chaparral ecosystems of southern California are estimated to increase by approximately 30 percent toward the end of the 21st century because more winter rain will stimulate the growth of more plant "fuel" available to burn in the fall. In contrast, a hotter, drier climate could promote up to 90 percent more northern California fires by the end of the century by drying out and increasing the flammability of forest vegetation.



Wildfire in California

- Reductions in the quality and quantity of certain agricultural products. The crops and products likely to be adversely affected include wine grapes, fruit, nuts, and milk.

- Exacerbation of air quality problems. If temperatures rise to the medium warming range, there could be 75 to 85 percent more days with weather conducive to ozone formation in Los Angeles and the San Joaquin Valley, relative to today's conditions. This is more than twice the increase expected if rising temperatures remain in the lower warming range.

- A rise in sea levels resulting in the displacement of coastal businesses and residences. During the past century, sea levels along California's coast have risen about seven inches. If heat-trapping emissions continue unabated and temperatures rise into the higher anticipated warming range, sea level is expected to rise an additional 22 to 35 inches by the end of the century. Elevations of this magnitude would inundate coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats.

- Damage to marine ecosystems and the natural environment.

- An increase in infections, disease, asthma, and other health-related problems.
- A decrease in the health and productivity of California's forests. [1]

Greenhouse Gases

Gases that trap heat in the atmosphere are referred to as GHGs. The effect is analogous to the way a greenhouse retains heat. As shown in Figure 3, the energy influx is maintained by three main factors: the amount of energy coming in, which depends on the earth's distance from the sun and solar activity; the albedo (the ability of the earth's surface to reflect light); and the chemical composition of the atmosphere. The presence of GHGs in the atmosphere regulates the earth's temperature. Without the natural heat trapping effect of GHGs, the earth's surface would be about 34°C cooler.

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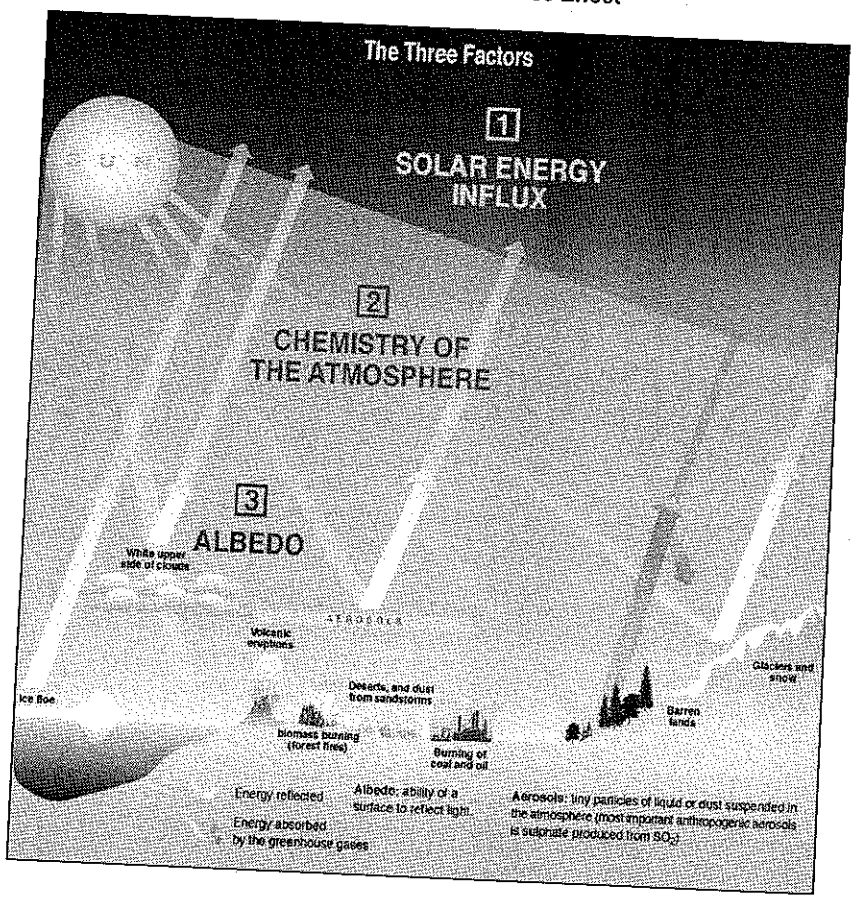
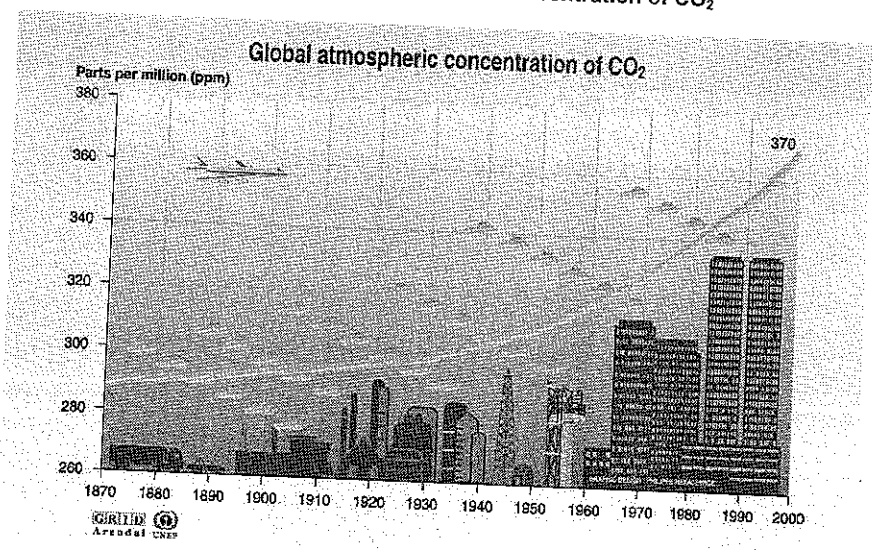
Figure 3: The Greenhouse Effect



[1] California Climate Change Center, 2006; Moser et al. 2009.

The chemical composition of the atmosphere changes over time. Natural processes and human activities emit GHGs. As shown in Figure 4, carbon dioxide concentrations in the atmosphere have steadily increased over time. The global atmospheric concentration of carbon dioxide (CO_2) data in Figure 4 prior to 1958 are from ice core measurements, and post-1958 data are from the Mauna Loa measurement site in Hawaii.

Figure 4: Global Atmospheric Concentration of CO_2



GHGs have varying global warming potential and atmospheric lifetimes. Carbon dioxide, the reference gas for global warming potential, has a global warming potential of 1. The calculation of the carbon dioxide equivalent (CO_2e) is a consistent methodology for comparing GHG emissions, since it normalizes various GHG emissions to a consistent metric. Methane's warming potential of 21 indicates that methane has a 21 times greater warming affect than carbon dioxide on a molecule per molecule basis. A carbon dioxide equivalent is the mass emissions of an individual GHG multiplied by its global warming potential. Emissions are typically shown in metric tons of carbon dioxide equivalents ($MTCO_2e$) or a million times that, million metric tons of carbon dioxide equivalents ($MMTCO_2e$). Global warming potentials used in this inventory are shown in Table 3.

Table 3: Global Warming Potentials

Greenhouse Gas	Global Warming Potential
Carbon dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous oxide (N_2O)	310

Source: Intergovernmental Panel on Climate Change 2007a.

Emissions worldwide were approximately 49,000 $MMTCO_2e$ in 2004 (Intergovernmental Panel on Climate Change, 2007b). As shown in Figure 5, emissions in the United States in 2008 were approximately 6,957 $MMTCO_2e$ (1 teragram (Tg) is equal to 1 MMT). Carbon dioxide is the main contributor to GHG emissions in the United States (water vapor is also a contributor but is not regulated). As shown in Figure 6, GHG emissions in California in 2008 were approximately 477.7 $MMTCO_2e$, which is 6.8 percent of the United States inventory.

Figure 5: United States Greenhouse Gas Emissions Trends

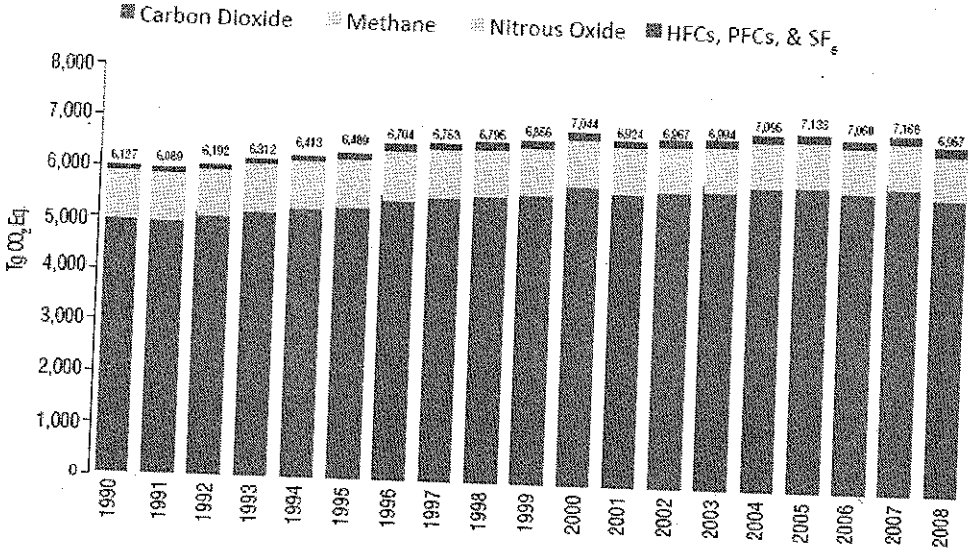
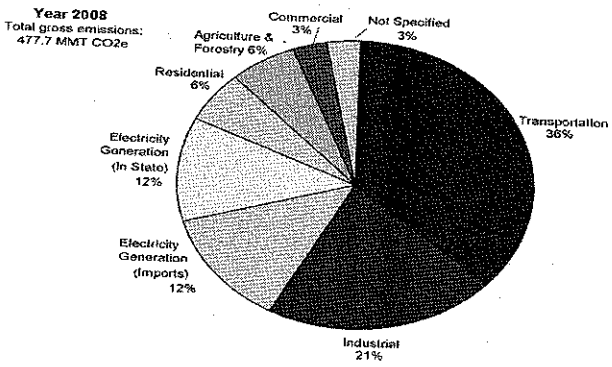
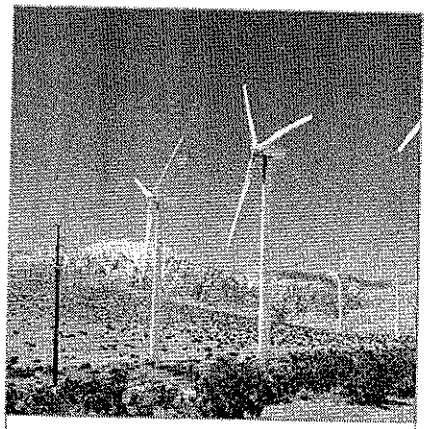


Figure 6: California Greenhouse Gas Emissions in 2008



California Regulatory Context

California has adopted a variety of regulations aimed at reducing the State's GHG emissions. While state actions alone cannot stop climate change, the adoption and implementation of this legislation demonstrates California's leadership in addressing this challenge. Key legislation pertaining to the State's reduction targets are described below.



Wind Turbines in Palm Springs

Executive Order S-3-05. California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S 3-05, the following reduction targets for GHG emissions:

- By 2010, reduce GHG emissions to 2000 levels;
- By 2020, reduce GHG emissions to 1990 levels; and
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

Executive Order S-13-08 directs the Governor's Office of Planning and Research, in cooperation with the California Resources Agency, to provide land use planning guidance related to sea level rise and other climate change impacts. The order also directs the California Resources Agency to develop a State Climate Adaptation Strategy and to convene an independent panel to complete the first California Sea Level Rise Assessment Report.

Senate Bill (SB) 375. SB 375 aligns regional transportation planning efforts, regional GHG reduction targets, and affordable housing allocations. Metropolitan Planning Organizations are required to adopt a Sustainable Communities Strategy, which allocates land uses in the Metropolitan Planning Organization's Regional Transportation Plan. Qualified projects consistent with an approved Sustainable Communities Strategy or Alternative Planning Strategy and categorized as "transit priority projects" would receive incentives under new provisions of CEQA.

AB 32. The California State Legislature enacted AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires that GHGs emitted in California be reduced to 1990 levels by the year 2020. GHGs as defined under AB 32 include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The California Air Resources Board (ARB) is the state agency charged with monitoring and regulating sources of GHGs.

The ARB approved the Climate Change Scoping Plan in December 2008 (California Air Resources Board, 2008). The Scoping Plan contains measures designed to reduce the State's emissions to 1990 levels by the year 2020. Local governments must achieve reductions through land use measures that will be substantially dependent on the General Plan for success. Statewide, the ARB expects to target local governments with reducing GHG emissions by 5 $MMTCO_2e$ by 2020.

Scoping Plan Reductions

The Scoping Plan contains a variety of measures, some of which would not directly reduce emissions in Palm Springs. The measures that could reduce emissions in Palm Springs are presented in Table 4.

Table 4: Scoping Plan Reductions in California

Category	Scoping Plan Measure	Reductions in 2020 ($MMTCO_2e$)
On-road motor vehicles: passenger vehicles	Pavley (AB 1493)	27.7
	Tire Pressure Program	0.74
	Low Carbon Fuel Standard	16
	Advanced Clean Cars	5.1
	Tire Tread Program	0.3
	Subtotal	*49.84*
On-road motor vehicles: heavy duty trucks	Heavy-duty vehicle (Aerodynamic efficiency)	0.93
Ozone-depleting substance substitutes	Limit High GWP Use in Consumer Products	0.23
	High-GWP Refrigerant Management Program for Stationary Sources	8
	Alternative Suppressants in Fire Protection Systems	0.1
	Mitigation Fee on High GWP Gases	5
	Stationary Equipment Refrigerant Management Program – Specifications for Commercial and Industrial Refrigeration	4
	Subtotal	*17.33*
Waste	Landfill Methane Control Measure	1.5
Electricity	Renewable Electricity Standard	13.4
	Renewables Portfolio Standards	7.9
	Subtotal	*21.3*

Notes:
$MMTCO_2e$ = million metric tons of carbon dioxide equivalents; GWP = global warming potential
Source: California Air Resources Board, 2010.

The percent reductions from the measures shown in Table 4 are shown in Table 5. The reductions apply to the California inventory, but similar rates of reduction are expected to occur in Palm Springs. The business as usual emissions for the State's forecast of 2020 emissions is forecast from 3-year average emissions for 2002–2004. The project's business as usual forecast was based on emission factors and values for 2005 and 2008; therefore, reductions are applicable to project emissions.

In 2006 and 2008, Southern California Edison delivered approximately 16 percent of power generated by renewable energy (Southern California Edison, 2006 and 2010). The Renewables Portfolio Standards and the Renewable Electricity Standard require a 33-percent renewable energy mix as an average statewide. If Southern California Edison were to increase its renewable energy mix to 33 percent by 2020, it would need to increase it by 17 percent. Therefore, a 15-percent reduction from electricity is a reasonable assumption.

The percent reductions shown in Table 5 are applied to the business as usual emissions to result in the "compliance" emission scenario. Some measures will be implemented before 2020; however, no reductions from these measures are taken for 2012 emissions because emission reduction data is not available.

Table 5: Scoping Plan Percent Reductions in California

Category	Emissions in 2020 ($MMTCO_2e$)	Reductions in 2020 ($MMTCO_2e$)	Percent Reduction (%)
On-road motor vehicles: passenger vehicles	160.8	49.84	31
On-road motor vehicles: heavy duty trucks	48.3	0.93	2
Ozone-depleting substance substitutes	45.0	17.33	39
Waste	7.7	1.5	19
Electricity (California average)	139.2	21.3	15

Notes:
$MMTCO_2e$ = million metric tons of carbon dioxide equivalents; NA = not available
Sources:
Emissions in 2020: California Air Resources Board, 2008.
Reductions in 2020: Table 4

SECTION 3: GOVERNMENT INVENTORY

3.1 - Methodology

The methodology for the government inventory follows the Local Government Operations Protocol (Protocol) (California Air Resources Board, et al. 2010). The emissions are reported are those within operational control of the City. The City has operational control over an operation if the City has the full authority to introduce and implement its operating policies at the source. Operating policies can include operational, health, safety, and environmental policies.

The Protocol divides GHG emissions into scopes. This inventory will include the following emission categories:

- Scope 1: All direct GHG emissions
- Scope 2: Indirect GHG emissions associated with the consumption of purchased or acquired electricity, steam, heating, or cooling
- Scope 3: Although these emissions are optional, emissions associated with employee commute and business travel are reported.

Estimates of emissions for the "forecast" years, or years 2012, 2020, and 2035 were based on various criteria such as population growth and other factors described below.

Scope 1 Emissions

Palm Springs International Airport

The Palm Springs International Airport is under the City's jurisdiction. The airport was recently renovated in 2009, which added 5,000 square feet for a concessions area, restrooms, and terminal building, including a remodeled courtyard area (Palm Springs 2009).

Palm Springs International Airport equipment

Although emissions are produced by the aircraft that land and take off at the airport, only emissions from the ground equipment fuel use are estimated.

Fuel usage for 2005 and 2008 were provided by the airport. Fuel usage at the airport for the forecast years was estimated based on gallons per total takeoff and landings in 2008. Fuel usage estimates for 1990 and 2000 were based on gallons per passenger in 2005.

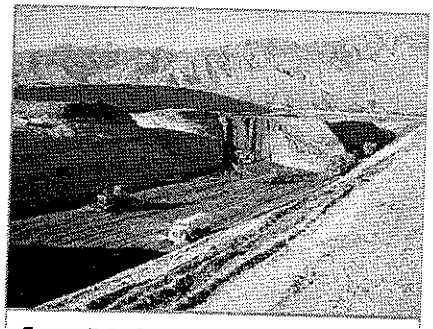
Palm Springs Wastewater Treatment Plant

The Palm Springs Wastewater Treatment Plant was originally constructed in 1960 to treat 4.15 million gallons per day (mgd). Two facility expansions were completed in 1979 and 1983, bringing the total design capacity to 10.9 mgd for average annual flow. The treatment processes consist of preliminary screening, grit removal, primary clarification, trickling filters, and secondary clarification. Treated effluent is disposed of onsite in percolation ponds or is supplied to the Desert Water Agency for further treatment to meet reuse standards for offsite irrigation. Biosolids from the treatment process are thickened, then stabilized by anaerobic digestion and dried with sludge drying beds before final disposal (Palm Springs 2010a).

Emissions from the treatment plant include stationary methane emissions from incomplete combustion of digester gas, process methane emissions from wastewater treatment lagoons, and process emissions from the plant without nitrification/denitrification. Emissions for forecast years were estimated from population growth assumptions.

Former Palm Springs Landfill

The Former Palm Springs Landfill is an inactive landfill that had accepted predominantly household refuse and construction waste from the early 1930s until the mid-1960s. It is estimated that the volume of landfill debris is approximately 545,000 cubic yards, of which approximately 29 percent and 71 percent of the material are construction and household debris, respectively (Source Group 2003).



Former Palm Springs Landfill Remediation, 2004

In 2004, the Former Palm Springs Landfill was remediated, and the landfill material was moved, recompacted, and capped within a proposed central parking area. A monitoring program was installed to determine if methane or other gases are accumulating in the piping. If there is accumulation, low-flow vacuum pumps purge the gases. There is no gas recovery collection system of methane to generate electricity.

Methane emissions from the landfill (for past, current, and future emissions) are estimated using the ARB's Landfill Emissions Tool (California Air Resources Board 2010). There is some uncertainty in the emissions estimates, as the waste in cubic yards was converted to waste in tons.

Co-generation Plants

There are two co-generation plants located within the City and operated by the City: Municipal and Sunrise Plaza. The co-generation plants use natural gas to power engines to generate electricity and heat. When natural gas is burned, it emits GHGs. Natural gas

usage was provided by the City and was entered into the Clean Air and Climate Protection (CACP) model to generate GHG emissions.

The heat byproduct from the co-generation plants is used to produce steam and hot water for the chillers as well as hydronic space heating. A chiller removes heat from a liquid. The liquid is then distributed to heat exchangers or coils, which cool the air in the space where they are located. The liquid is recirculated back to the chiller to be cooled again.

The Municipal co-generation plant provides electricity to the airport, county building, Fire Station #2, the city yard, City Hall, and the police station. Any additional electricity that is required is provided by Southern California Edison (and is shown in the Electricity category of the Government Inventory).

The City is currently conducting a comprehensive energy audit to develop a set of programs that will be combined as a performance-based, single-energy project with the intended purpose to save energy, reduce GHG emissions, and cut the City's energy and maintenance and capital equipment expenditures throughout all of the City's facilities, including the two co-generation plants. The future of the co-generation plants is unknown at this time. Therefore, it is assumed that natural gas use in future years is the same as in 2008.

City Vehicle Fleet

There are emissions from vehicles driven by City employees, such as police vehicles, firefighting vehicles and trucks, passenger vehicles, and trucks. Fuel use from municipal operations was entered into the CACP model. Fuel use per capita in 2008 was used to estimate fuel use for the forecast years using population growth as a surrogate, as it is anticipated that more City employees and services would be required in proportion to the increase in population.

Ozone-Depleting Substance Substitutes

The City of Palm Springs estimated that approximately 90 to 120 pounds of refrigerant (R-22) leaks out of the air conditioning systems used in City facilities, according to City records of replacement of refrigerant required from leakage. These emissions were converted to GHG emissions using the global warming potential for R-22. It is assumed that emissions in forecast years would be the same as current emissions. Even if the type of refrigerant changes in the future, the global warming potential would likely be about the same, as would the leakage.

Scope 2 Emissions

Natural Gas

Natural gas usage was not available through Southern California Gas Company. Therefore, natural gas usage is not included in the City's inventory (with the exception of natural gas used for the co-generation plants).

Electricity

The City purchases electricity from Southern California Edison for its electricity needs not supplied by the co-generation plants. The electricity usage was provided by Southern California Edison and was converted to GHG emissions using emission factors specific to Southern California Edison, published by eGRID. The emissions for 1990 use the emission factors from eGRID for 1996, the emissions for 2000 use emission factors for 2000, and emissions for later years use emission factors for 2005. Forecasts were estimated by assuming that electricity would increase proportionate to population growth in the City.

Scope 3 Emissions

Employee Commute

An employee survey was conducted between August 25, 2010 and October 5, 2010. From a total of 390 employees, 141 surveys, or 36 percent, were completed. The survey was used to obtain the type of vehicle used for employee commutes and the distance to the place of employment from the residence. The average commute was applied to estimate emissions from all the employees. No growth was assumed for the employee commute because, since 1990, the number of employees has declined and is not based on the population within the City.

3.2 - Results

The estimated GHG emissions from government operations are shown in Table 6 and in Figure 7. The fugitive gases (methane and nitrous oxide) from the wastewater treatment plant are the largest source of emissions for all years, followed by the co-generation plants.

Table 6: Government Historical Inventory and Future Business as Usual Inventory

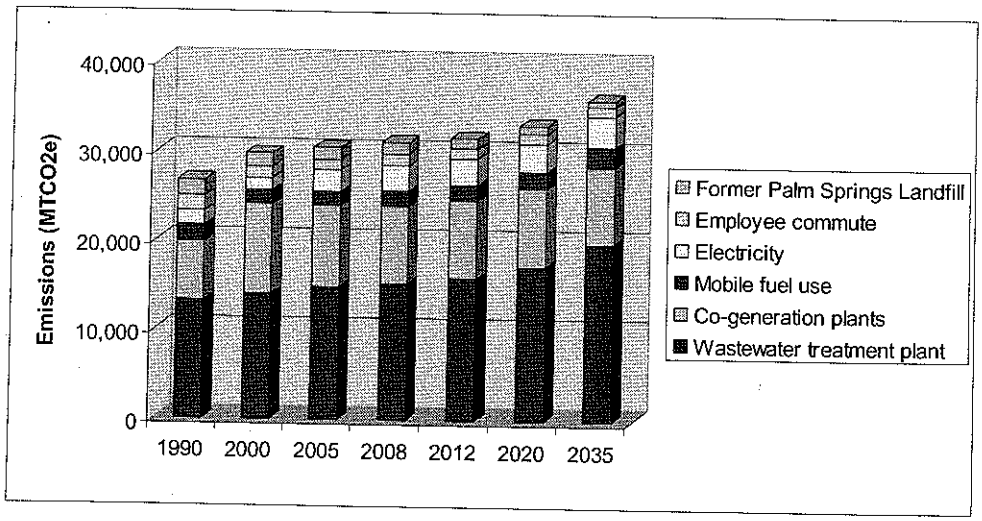
Category	Emissions ($MTCO_2e$ per year)						
	1990	2000	2005	2008	2012	2020	2035
Former Palm Springs Landfill[1]	1,811	1,482	1,341	1,263	1,145	917	632
Wastewater treatment plant (fugitive)[1]	13,236	14,028	14,847	15,282	15,957	17,308	19,841
Co-generation plants[1]	6,646	10,020	9,112	8,746	8,746	8,746	8,746
Airport fuel use[1]	53	79	86	109	115	133	162
City vehicle fleet[1]	1,687	1,495	1,450	1,559	1,628	1,767	2,026
Ozone-depleting substance substitutes[1]	99	99	99	99	99	99	99
Electricity – municipal[2]	834	734	1,809	2,208	2,302	2,467	2,716
Electricity – streetlights[2]	741	652	633	681	710	761	838

Table 6 (cont.): Government Historical Inventory and Future Business as Usual Inventory

Category	Emissions ($MTCO_2e$ per year)						
	1990	2000	2005	2008	2012	2020	2035
Employee commute[3]	1,705	1,312	1,216	1,280	1,036	1,036	1,036
Total	**26,812**	**29,901**	**30,593**	**31,227**	**31,738**	**33,234**	**36,096**

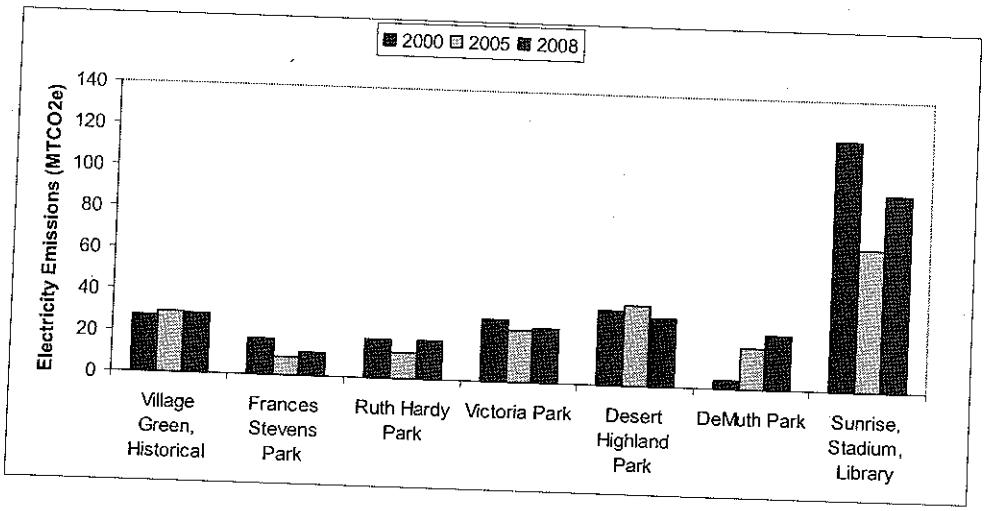
Notes: 2012, 2020, and 2035 are projections based on business as usual.
$MTCO_2e$ = metric tons of carbon dioxide equivalents
[1] Scope 1 emissions
[2] Scope 2 emissions
[3] Scope 3 emissions
Source: Appendix A.

Figure 7: Government Historical and Future Year Business as Usual Inventory



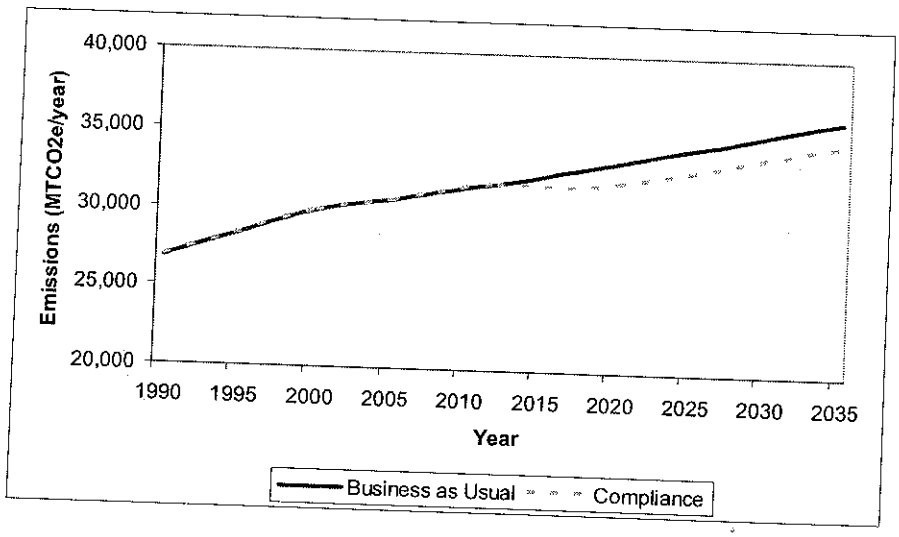
A comparison of the Scope 2 emissions from electricity generation for City parks and associated buildings is shown in Figure 8.

Figure 8: Comparison of Municipal Parks Electricity Use



Incorporation of the reductions in the AB 32 Scoping Plan (see Table 5) is shown in Figure 9.

Figure 9: Government Inventory Growth



Compliance emissions for the years 2020 and 2035 are shown in Table 7. As shown in the table, reductions from AB 32 would result in a 4-percent reduction in 2020 and 2035.

Table 7: Government Compliance Inventory

Source	Emissions ($MTCO_2e$ per year)	
	2020	2035
Former Palm Springs Landfill	917	632
Wastewater treatment plant (fugitive)	17,308	19,841
Co-generation plants	8,746	8,746
Airport fuel use	133	162
City vehicle fleet	1,297	1,486
Ozone-depleting substance substitutes	60	60
Electricity – municipal	2,097	2,309
Electricity – streetlights	647	712
Employee commute	715	715
Total	**31,920**	**34,663**
Reduction from Business as Usual	**4%**	**4%**

Notes: 2020 and 2035 are projections and do not represent targets.
$MTCO_2e$ = metric tons of carbon dioxide equivalents
Source: Appendix A.

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SECTION 4: COMMUNITY INVENTORY

4.1 - Methodology

Detailed information regarding the methodology of the community inventory is contained within Appendix A. There is currently no published guidance regarding methodology for a community inventory. Data was estimated using emission factors in the spreadsheets contained in Appendix A as well as the CACP model.

Mobile Sources

Mobile source emissions are from on-road and off-road vehicles traveling and performing work within the City. A description of these two sources is provided below.

On-Road Vehicles

On-road vehicles include gasoline and diesel passenger vehicles, light-duty trucks (and sports utility vehicles), and heavy-duty vehicles. Vehicle miles traveled within the City for 2000, 2005, and 2008 are from the California Department of Transportation (Caltrans). Caltrans does not have data available for 1990; therefore, vehicle miles traveled within the City in 1990 was backcast from 2000 per capita estimates (17.3 miles per day per person in 2000). The oldest year for which data is available from Caltrans is 1996, which was not used because the per capita rate is greater than in 2000. The vehicle miles traveled does not contain miles traveled outside of the City. In addition, the vehicle miles traveled data includes pass-through trips, which are trips that do not originate or end in the City. The Palm Springs 2007 General Plan contains average daily traffic for buildout of the General Plan on the main roads within the City, which was converted to vehicle miles traveled by multiplying by the road length and adding a percentage to include the local roads. Vehicle miles traveled projections for 2012, 2020, and 2035 were interpolated from 2008 and General Plan buildout estimates. The vehicle miles traveled data was entered into the CACP model to estimate the GHG emissions.

Off-Road Vehicles

Off-road equipment includes construction and mining equipment, generators, industrial equipment, lawn and garden equipment, and recreational equipment (off-road vehicles and all terrain vehicles). Emissions for Riverside County were estimated using the OFFROAD2007 model. Emissions within the City were apportioned from the County emissions on the basis of population. The OFFROAD2007 model also includes forecasts of emissions for future years.

Airport Fuel Use

Airport fuel use is estimated as discussed in the Government Inventory section.

Energy – Residential

Electricity

Residential electricity refers to the indirect emissions associated with generating electricity to be used in households in the City. Southern California Edison provided electricity usage for the entire City for 1990, 2000, 2005, and 2008 (reports are located in Appendix B). Emission factors are from eGRID (1990 uses 1996 factors; 2000 uses 2000 factors; and later years use emission factors for 2005). Electricity for future years was forecast by assuming that household growth was equal to an increase in residential electricity. The electricity usage data was converted to GHG emissions using emission factors specific to Southern California Edison.

Natural Gas

GHGs are emitted when natural gas is burned. Natural gas is used to heat residences, power dryers, heat water, and/or for natural gas kitchen stoves. The Southern California Gas Company provided natural gas usage for 2005 and 2008. Natural gas usage for other years was projected using the therms per year per residential unit in 2005 and was assumed to grow at the same rate as the number of housing units.

Energy – Non-Residential

Electricity

Electricity for the non-residential category includes emissions from power plants used to generate electricity that is used for hotels, restaurants, public buildings and uses (such as streetlights), commercial buildings, and industrial buildings. Southern California Edison provided electricity usage for 1990, 2000, 2005, and 2008. Emission factors are from eGRID (1990 uses 1996 factors; 2000 uses 2000 factors; and later years use emission factors for 2005). Municipal, water, and street lighting growth for future years is correlated to an increase in population. Growth in commercial/industrial is correlated to an increase in commercial/industrial acreage assumed at buildout in the Palm Springs 2007 General Plan. Emissions were estimated using emission factors specific to Southern California Edison.

Natural Gas

Natural gas from the commercial/industrial/public sector is used for space heating, co-generation plants, to heat water, and industrial processes. Southern California Edison provided natural gas usage for the City for the "commercial/industrial" sector for 2005 and 2008. Natural gas for the future years was estimated using the therms per year per acre of commercial/industrial land in 2005. Natural gas for 1990 and 2000 was backcast using therms per capita in 2005. Emissions were estimated using the CACP model.

Waste

Former Palm Springs Landfill

Although this landfill has not been active for many years, methane is still emitted. Emissions are estimated as discussed in the Government Inventory.

Waste Generated

Waste generated by residents, employees, and visitors in the City are sent to a landfill outside of the City, where the trash generates GHG emissions through decomposition processes. The California Department of Resources Recycling and Recovery (2010) maintain records of waste generated by the City.

In 2005, the City expanded its efforts to increase recycling and decrease waste. In 2005, the City's recycling rate was around 54 percent (City of Palm Springs 2010a). The City worked with Palm Springs Disposal Services to tighten the City's waste reporting methods. The City also encouraged businesses to recycle by visiting with businesses and speaking at civic events. The City educated residents by producing recycling brochures, recycling wheels, construction and demolition brochures, fliers, refrigerator magnets, recyclable grocery bags, and other pieces of information available at City Hall, the library, other City facilities, and VillageFest. The City also used its website and closed circuit television (CCTV). The City increased the number of e-waste/shredding events. For the last reportable year, the City's recycling rate was over 69 percent. Between 2005 and 2008, waste decreased in the City by approximately 28,000 tons.

Waste generation for future years was estimated from per capita waste in 2008. The CACP model calculated emissions from waste generation.

Water and Wastewater

Emissions in this category include emissions from the electricity required to pump water and fugitive emissions from the wastewater treatment plant. Electricity data was provided by Southern California Edison. Wastewater treatment plant fugitive emissions are estimated as discussed in the Government Inventory.

Ozone-Depleting Substance Substitutes

In some cases, high global warming potential gases have been substituted for ozone depleting substances (ODS) in refrigeration and manufacturing processes. ODS are being phased out pursuant to the Montreal Protocol because they are gases that cause chemical destruction of the ozone in the stratosphere (a layer of air in the upper atmosphere). Ozone in the stratosphere is good because it absorbs ultraviolet radiation, which can cause skin cancer, cataracts, and other health problems in humans. Stratospheric ozone is not to be confused with ozone in the troposphere (the layer of air that we breathe), which is an air pollutant that results in health effects.

ODS substitutes can be released into the atmosphere when they leak out of refrigeration and air conditioning equipment contained in stationary and mobile applications. ODS substitutes are also used in solvent cleaning, foam production, sterilization, fire suppressants, and aerosols. Emissions of ODS substitutes consisted of 2.9 percent of California's GHG inventory in 2008 and are anticipated to increase to 7.5 percent by 2020.

The United States is forecasting emissions of ODS substitutes to increase by 168 percent between 2005 and 2020 (United States Environmental Protection Agency 2010). The large increase is due to the growing use of ODS substitutes to replace ODS gases.

The ODS substitutes hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) have high global warming potentials. The global warming potential is the potential of a gas or aerosol to trap heat in the atmosphere compared with the reference gas, carbon dioxide, which has a global warming potential of 1.

ODS substitutes are estimated for the City by apportioning California emissions on the basis of population. California has data and projections for the State for 1990, 2000, 2005, 2008, and 2020. Emissions for 2012 are interpolated from 2008 and 2020 data. Emission projections for 2035 are based on per capita emissions in 2020.

Sources Not Included: Indigo Power Plant

The Wildflower Energy Indigo Generation natural gas peaker power plant's emissions are not included within this GHG inventory because indirect emissions from power plants are included within the Electricity sector. Reported emissions from the peaker power plant in 2008 were 69,471 $MTCO_2e$ and in 2009 were 38,406 $MTCO_2e$ (Appendix A).

4.2 - Results

The community business as usual inventory is presented in Figure 10 and Table 8. A series of pie charts that display the percentages of the emissions between 1990 and 2020 is shown in Exhibit 2. ODS substitutes increase from less than 1 percent in 1990 to 7 percent of the emissions in 2035.

Figure 10: Community Historical and Future Business as Usual Inventory

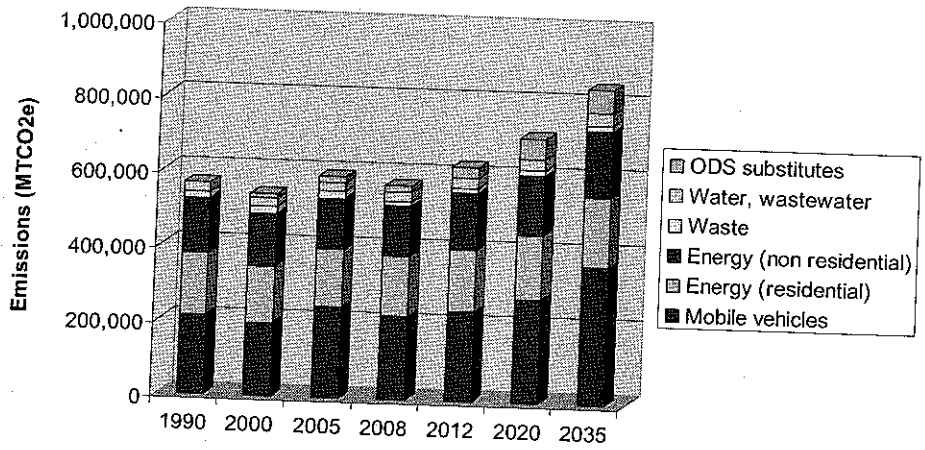

Exhibit 2: Community Business as Usual Emissions

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Table 8: Community Historical and Future Business as Usual Inventory

Category	Source	GHG Emissions ($MTCO_2e$ per year)						
		1990	2000	2005	2008	2012	2020	2035
High GWP gases	ODS substitutes	49	10,805	15,523	17,239	28,690	54,314	62,282
Water, wastewater	Electricity-water	11,879	9,724	10,326	10,913	11,376	12,193	13,426
	Wastewater treatment plant (fugitive)	13,236	14,028	14,847	15,282	15,957	17,308	19,841
Waste	Former Palm Springs Landfill	1,811	1,482	1,341	1,263	1,145	917	632
	Waste generated	14,920	18,367	16,879	11,490	11,999	13,018	14,928
Energy (non residential)	Electricity – commercial/industrial	101,743	91,112	84,047	91,259	93,362	97,568	105,454
	Natural gas – commercial/industrial	43,634	46,527	49,865	38,269	53,980	58,682	67,498
	Electricity – municipal	834	734	1,809	2,208	2,302	2,467	2,716
	Electricity – streetlights	741	652	633	681	710	761	838
Energy (residential)	Electricity	97,594	84,957	84,905	89,656	91,682	95,472	101,761
	Natural gas	66,838	67,566	70,297	70,554	75,265	78,667	85,046
Mobile vehicles	Airport fuel use	53	79	86	109	115	133	162
	Off-road vehicles	123	118	211	207	205	210	250
	On-road passenger vehicles	192,081	179,116	218,483	206,505	221,092	251,733	331,876
	On-road trucks	20,277	15,135	22,640	16,862	18,523	23,754	36,521
Total		**565,813**	**540,402**	**591,892**	**572,497**	**626,403**	**707,197**	**843,231**
Per Capita Emissions		**14.1**	**12.6**	**12.9**	**12.2**	**12.8**	**13.3**	**13.8**

Notes:
GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalents (contains GHGs carbon dioxide, methane, nitrous oxide, and hydrofluorocarbons)
GWP = global warming potential; ODS = ozone depleting substances
Source: Appendix A.

Figure 11 displays the emission percentages for 2035. Mobile vehicles and energy are the largest source of GHG emissions within the City.

Figure 11: 2035 Community Business as Usual Emissions

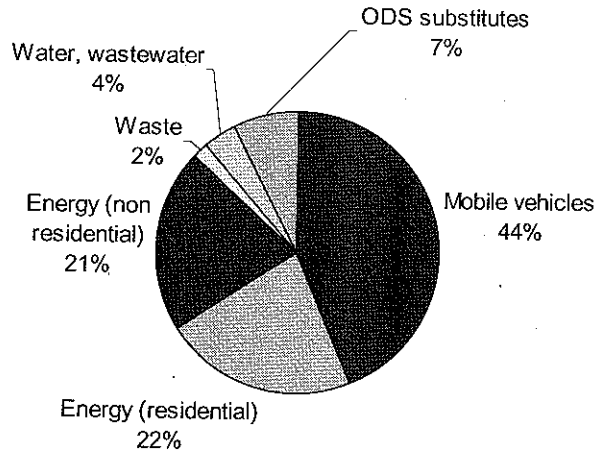

Figure 12 displays the increase over time of the business as usual emissions and the compliance emissions. Compliance emissions are emissions with the reductions from AB 32. Also shown are the 1990 emissions over time.

Figure 12: Community Inventory Growth

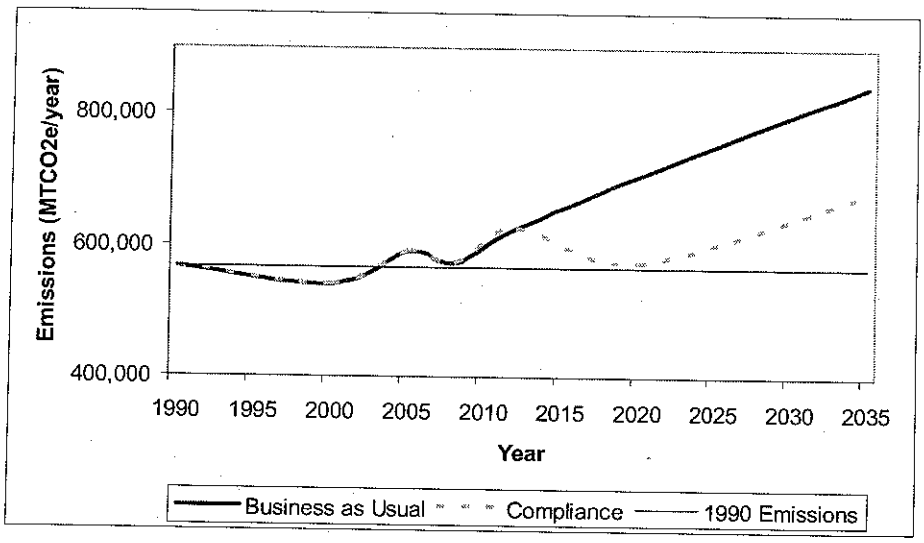

Table 9 displays the GHG emissions inventory of the community emissions with incorporation of reductions afforded by AB 32. As shown in the table, in 2020, the reductions reduce emissions by 18.9 percent from business as usual; in 2035, emissions are reduced by 19.5 percent.

Table 9: Community Future Year Compliance Inventory

Category	Source	Emissions ($MTCO_2e$ per year)	
		2020	2035
High GWP gases	ODS substitutes	33,131	37,992
Water, wastewater	Electricity - water	10,364	11,412
	Wastewater treatment plant (fugitive gases)	17,308	19,841
Waste	Former Palm Springs Landfill	917	632
	Waste generated	10,545	12,091
Energy (other)	Electricity – commercial/industrial	82,933	89,636
	Natural gas – commercial/industrial	58,682	67,498
	Electricity – municipal	2,097	2,309
	Electricity – streetlights	647	712
Energy (residential)	Electricity	81,151	86,497
	Natural gas	78,667	85,046
Motor vehicles	Airport fuel use	133	162
	Off-road vehicles	210	250
	On-road passenger vehicles	173,696	228,994
	On-road trucks	23,279	35,791
Total		**573,760**	**678,863**
Per Capita Emissions		**10.8**	**11.1**
Reduction from Business as Usual		**18.9%**	**19.5%**
Emissions are this percent greater than 1990 emissions		**1%**	**17%**

Notes:
$MTCO_2e$ = metric tons of carbon dioxide equivalents; GWP = global warming potential
ODS = ozone depleting substance
Compliance emissions for the years 1990, 2000, 2005, 2008, and 2012 are assumed to be the same as business as usual (Table 8).
Source: Appendix A.

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SECTION 5: GLOSSARY OF TERMS AND ACRONYMS

AB	Assembly Bill
ARB	The California Air Resources Board is a part of the California Environmental Protection Agency, an organization that reports directly to the Governor's Office in the Executive Branch of California State Government. The mission of the ARB is to promote and protect public health, welfare, and ecological resources through the effective and efficient reduction of air pollutants while recognizing and considering the effects on the economy of the State.
CEQA	The California Environmental Quality Act is a California statute passed in 1970 to institute a statewide policy of environmental protection.
BAU	Business as usual: Emissions that are expected to occur in a future year in the absence of emission reduction regulations and controls.
CO_2	Carbon dioxide: A naturally occurring gas and a by-product of burning fossil fuels and biomass other industrial processes. It is the reference gas against which other GHGs are measured and therefore has a global warming potential of 1.
Climate Change	The statistically significant variation either in the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer).
EPA	United States Environmental Protection Agency. The mission of EPA is to protect human health and to safeguard the natural environment—air, water and land—upon which life depends.
GHG	Greenhouse gas: A gas that absorbs infrared radiation in the atmosphere. GHGs as defined by AB 32 include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.
$MTCO_2e$	Metric tons of carbon dioxide equivalents: a measure of GHG emissions
$MMTCO_2e$	Million metric tons of carbon dioxide equivalents: a measure of GHG emissions
ODS	Ozone depleting substances: compounds that contributes to stratospheric ozone depletion. ODS include chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), halons, methyl bromide, carbon tetrachloride, hydrobromofluorocarbons, chlorobromomethane, and methyl chloroform. ODS are generally very stable in the troposphere and only degrade under intense ultraviolet light in the stratosphere. When they break down, they release chlorine or bromine atoms, which then deplete ozone.
SB	Senate Bill

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SECTION 6: REFERENCES

6.1 - Acknowledgments

The following are individuals who assisted by providing data, peer review, and/or assistance. The names are in alphabetical order.

City of Palm Springs

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Adrina Young, Analyst-Program/Project

Southern California Gas Company

Deborah McGarrey, Public Affairs Manager

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6.3 - Figure References

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Figure 3: The Greenhouse Effect. UNEP/GRID-Arendal. Factors influencing the greenhouse effect [Internet]. UNEP/GRID-Arendal Maps and Graphics Library; 2002 (cited

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6.4 - Photograph References

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Wind Turbines in Palm Springs. iStock photo 12763144. Photo by Lawrence Freytag on April 7, 2010, east of Palm Springs.

Wildfire in California. California desert hills wild fire sparked by lightening. Photo by David Mantel. iStock photo 13790519.

Palm Springs International Airport Equipment. Photo by Michael Brandman Associates.

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6.5 - Exhibit References

Exhibit 1. Michael Brandman Associates.

Exhibit 2. Michael Brandman Associates.

Appendix A:
Spreadsheets and Model Output

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Appendix B:
Southern California Edison Reports

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Appendix C:
Southern California Association of Governments Letter