CITY OF BRAWLEY

CLIMATE ACTION PLAN

A Plan to Reduce Greenhouse Gas Emissions

November 2019

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City of Brawley Climate Action Plan

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A. INTRODUCTION

1. Sustainable Communities Planning Grant

CA.GOV THE Strategic Growth Council awarded the City of Brawley a Sustainable Communities Planning Grant. The voter-approved Proposition 84 bond allocations authorize the State Legislature to appropriate funds to support urban greening projects and sustainable community planning.

The Sustainable Communities Planning Grants fund climate action plans, infill development plans, sustainable community strategies, and other planning efforts, all specifically aimed at reducing greenhouse gas emissions consistent with State climate goals. Funded planning activities achieve the following Program Objectives:

- ❒ Improve air and water quality
- ❒ Promote public health
- ❒ Promote equity
- ❒ Increase housing affordability
- ❒ Promote infill and compact development
- ❒ Revitalize urban and community centers
- ❒ Protect natural resources and agricultural lands
- ❒ Reduce automobile usage and fuel consumption
- ❒ Improve infrastructure systems
- ❒ Promote water conservation
- ❒ Promote energy efficiency and conservation
- ❒ Strengthen the economy

Brawley's Sustainable Communities Planning Grant is dedicated to the completion of two major Tasks:

- ❒ Task 1 Preparation of a Climate Action Plan (CAP)
- ❒ Task 2 Preparation of General Plan Amendments (that support the CAP)

The California Air Resources Board (CARB) encourages cities to be proactive:

> There is a need for local government climate action planning to adopt mid-term and long-term reduction targets that are consistent with scientific assessments and the statewide goal of reducing emissions 80 percent below 1990 levels by 2050. Local government reduction targets should chart a reduction trajectory that is consistent with, or exceeds, the trajectory created by statewide goals.

Climate Action Planning involves five milestones:

- ❒ *Milestone 1*: Conduct a baseline emissions inventory and forecast
- ❒ *Milestone 2*: Adopt a GHG emissions reduction target
- ❒ *Milestone 3*: Develop a Plan to reduce GHG emissions
- ❒ *Milestone 4*: Implement policies and measures
- ❒ *Milestone 5*: Monitor and verify results

The Planning Grant enables the City to complete Milestones 1, 2 and 3. After the City Council adopts the *Plan to Reduce GHG Emissions*, the City Departments and other public and private entities will implement the GHG emission reduction strategies. The City Council will ensure that the Planning Department and other City departments monitor the progress made on implementing the adopted policies and measures.

2. Purpose

According to the General Plan *Resources Management Element*, the City will seek to reduce greenhouse gas emissions and to prepare and adopt a Climate Action Plan. The *Resource Management Element* explains:

> The policies and actions [of the Climate Action Plan] will include incentives and regulatory requirements to reduce levels of generation by the private sector, actions to reduce the City's level of generation, and actions that the City will take in concert with other public agencies to reduce greenhouse gas generation.

This Plan:

- ❒ Summarizes Brawley's 2005 and 2012 greenhouse gas emissions inventories
- ❒ Summarizes the GHG emissions forecasts for 2020 and 2030
- ❒ Estimates the GHG emissions reductions due to statewide measures
- ❒ Estimates the GHG emissions reductions due to City initiatives
- ❒ Provides a roadmap for the City to contribute to statewide and regional efforts to reduce greenhouse gas emissions
- ❒ Describes resources and procedures that contribute to monitoring implementation progress

B. CALIFORNIA'S REGULATORY FRAMEWORK FOR REDUCING GHG EMISSIONS

California contributes significantly to human caused greenhouse gas emissions. As reported by the California Energy Commission (CEC), California contributes 1.4% of global and 6.2% of national GHG emissions. The transportation sector is the largest source of California's greenhouse gas emissions, responsible for 41% of the State's total emissions. California periodically adopts key regulations to reduce GHG emissions. The paragraphs below demonstrate the state's leadership in addressing the adverse impacts of climate change.

1. CA Executive Order S-03-05

An Executive Order was signed by Governor Swartznegger in 2005 to reduce statewide greenhouse gas (GHG) emissions as follows:

- ❒ Reduce emissions to 2000 levels by 2010
- ❒ Reduce emissions to 1990 levels by 2020 (1990 levels are roughly equivalent to a 25% reduction in GHG compared to current levels)
- ❒ Reduce emissions to 80% below 1990 levels by 2050

2. CA Executive Order B-30-15

Governor Brown on April 29, 2015 signed an Executive Order that establishes –

> A new interim statewide greenhouse gas emissions reduction target to reduce greenhouse gas emissions to 40 percent below 1990 levels by 2030…to ensure that California meets its target of reducing greenhouse gas emissions to 80 percent below 1990 levels by 2050.

3. Assembly Bill 32 – Global Warming Act of 2006

Assembly Bill (AB) 32, the Global Warming Act of 2006, requires statewide greenhouse gas reduction targets of 15% by 2020 in order to reach 1990 emissions levels and to reduce emissions to 80% below 1990 levels by 2050. Reporting of greenhouse gases by major sources is mandated by the Act, which went into effect January 2009.

AB 32 requires CARB to:

- Prepare and approve a Scoping Plan for achieving the maximum technologically feasible and cost-effective reductions in GHG emissions from sources or categories of sources of GHGs by 2020, and update the Scoping Plan every five years.
- Maintain and continue reductions in emissions of GHG beyond 2020.
- Identify the statewide level of GHG emissions in 1990 to serve as the emissions limit to be achieved by 2020.
- Identify and adopt regulations for discrete early actions that could be enforceable on or before January 1, 2010.
- Adopt a regulation that establishes a system of market-based declining annual aggregate emission limits for sources or categories of sources that emit GHG emissions.
- Convene an Environmental Justice Advisory Committee to advise the Board in developing and updating the Scoping Plan and any other pertinent matter in implementing AB 32.
- Appoint an Economic and Technology Advancement Advisory Committee to provide recommendations for technologies, research and GHG emission reduction measures.

4. Other Key Bills that Address Climate Change

According to CARB other key bills and policies include:

- Assembly Bill 1493 (Pavley, Chapter 200, Statutes of 2002) – GHG Standards for Passenger Vehicles
- Senate Bill 375 (Steinberg, Chapter 728, Statutes of 2008) – Sustainable Communities
- Senate Bill X1-2 (Simitian, Chapter 1, Statutes of 2011) – Renewables Portfolio Standard
- Assembly Bill 341 (Chesbro, Chapter 476, Statutes of 2011) – Commercial Recycling

a. Assembly Bill 1493 (Pavley Regulations)

AB 1493 (referred to as Pavley I) (2002) directed CARB to develop and adopt standards for vehicle manufacturers to reduce GHG emissions coming from passenger vehicles and light-duty trucks at a "maximum feasible and cost effective reduction" by January 1, 2005. Pavley I took effect for model years starting in 2009 to 2016 and Pavley II covers 2017 to 2025. Fleet average emission standards reach a 22% and 30% reduction by 2012 and 2016, respectively.

b. Senate Bill 375

SB 375 (2008) supports implementation of AB 32 by aligning regional transportation planning efforts with land use and housing allocations in order to reduce transportation-related GHG emissions. Specifically, SB 375 directed CARB to set regional GHG emissions targets for passenger vehicles and light trucks for the years 2020 and 2035 for each Metropolitan Planning Organization (MPO) region, which were adopted in February 2011.

On April 4, 2012, the Regional Council of the Southern California Association of Governments (SCAG) adopted the *2012-2035 Regional Transportation Plan/Sustainable Communities Strategy* (RTP/SCS). The RTP/SCS exceeds the GHG emission-reduction target set by CARB for the SCAG region by achieving a 9% reduction by 2020 and 16% reduction by 2035.

SCAG Region

c. Senate Bill 1078, Senate Bill 107, and Senate Bill X1-2 (Renewables Portfolio Standard)

Established in 2002 under SB 1078, and accelerated in 2006 under SB 107, California's Renewables Portfolio Standard required investor-owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources by at least 1% of their retail sales annually, until they achieved 20% by 2010. SB X1-2 raises the target from the current 20% to 33% of their electricity from renewable energy sources by 2020. In his inaugural address in January 2015, Governor Brown announced that within the next 15 years California will increase from one-third to 50% the electricity that is derived from renewable sources.

d. Assembly Bill 341

This bill directs CalRecycle to develop and adopt regulations for mandatory commercial recycling. AB 341 requires businesses to recycle and jurisdictions to implement education, outreach and monitoring. AB 341 requires jurisdictions to report in their 2012 Electronic Annual Report (due August 1, 2013) on their initial education, outreach, and monitoring efforts, and, if applicable, on any enforcement activities or exemptions implemented by the jurisdiction.

C. GLOBAL WARMING

1. Greenhouse Gases and the Greenhouse Effect

If it were not for greenhouse gases trapping heat in the atmosphere, the Earth would be a very cold place. Greenhouse gases keep the Earth warm through the greenhouse effect. The greenhouse effect is a natural phenomenon that regulates the temperature of the lowest layer of the atmosphere, known as the troposphere. When stable, the greenhouse effect maintains Earth's average surface temperature at a life-sustaining 14 degrees C (57.2 degrees F).

Source: United States Environmental Protection Agency, *A Student's Guide to Global Climate Change*, The Greenhouse Effect

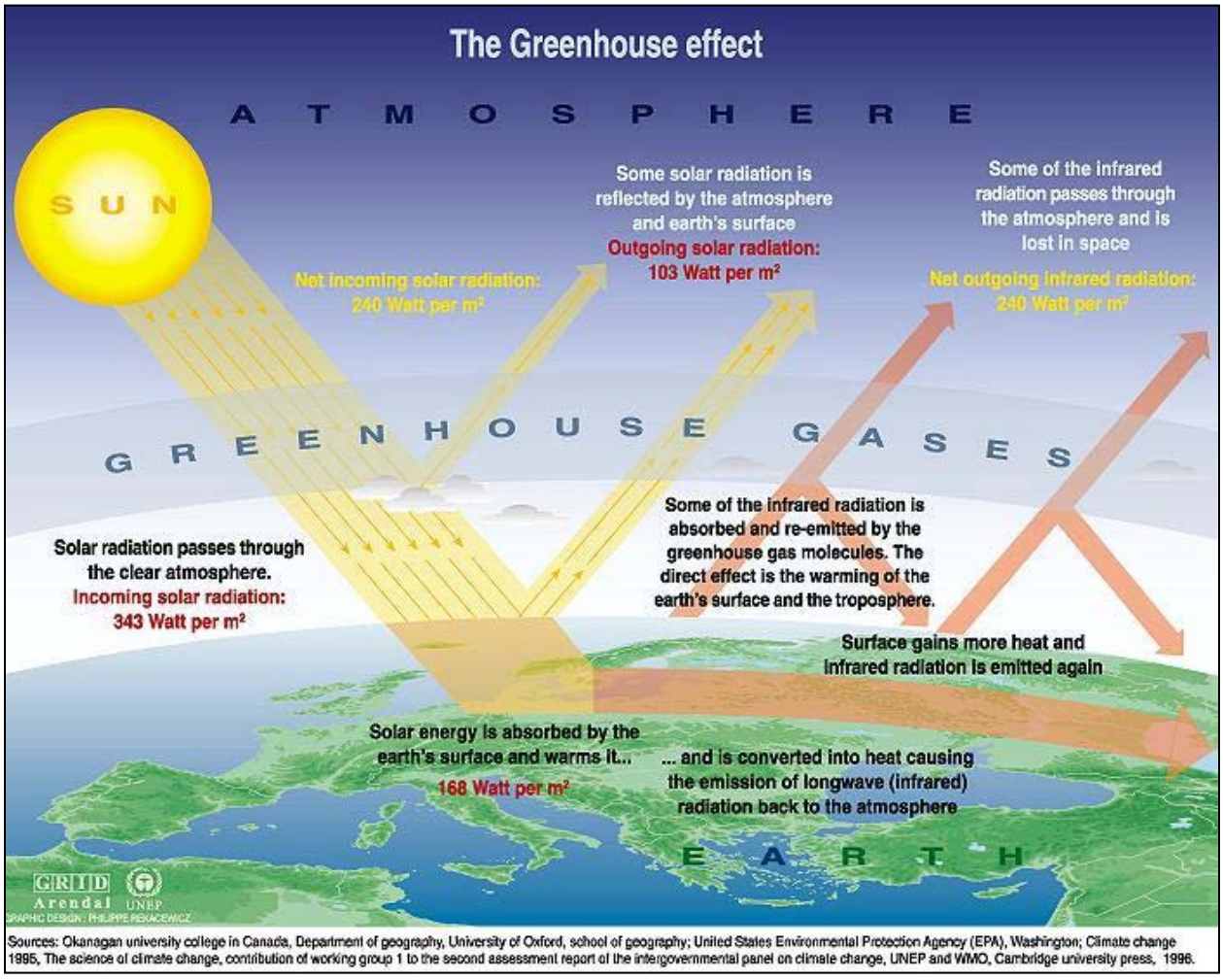
The term greenhouse effect likens the trapping of the heat by certain atmospheric gases to the glass panels of a greenhouse, which lets sunlight in, isolates warm air, and impedes the loss of heat. A greenhouse is a building made of glass that allows sunlight to enter but traps heat inside, so the building stays warm even when it's cold outside. Because gases in the Earth's atmosphere also let in light but trap heat, many people call this phenomenon the "greenhouse effect." The greenhouse effect works somewhat differently from an actual greenhouse, but the name stuck, so that's how we still refer to it today.

Source: University Corporation for Atmospheric Research, *Cycles of the Earth and Atmosphere*, *The Greenhouse Effect*

The "Greenhouse Effect"

The "greenhouse effect," as explained above, is the trapping by certain atmospheric gases of heat that radiates from the Earth's surface after it has been heated by the Sun. Many chemical compounds found in the Earth's atmosphere act as "greenhouse gases." These gases allow

sunlight to enter the atmosphere freely. When sunlight strikes the Earth's surface, some of it is reflected back towards space as infrared radiation (long wave radiation). Greenhouse gases, which allow the shorter wave radiation to pass through, absorb this longer wave infrared radiation. The absorption of the radiation causes the molecules of the greenhouse gases to vibrate more than they were which then heats the atmosphere. The diagram below describes the workings of this phenomenon.



Sources: Okanagan university college in Canada, Department of geography, University of Oxford, school of geography; United States Environmental Protection Agency (EPA), Washington; Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge university press, 1996.

2. What is Global Warming?

The Earth gets energy from the sun in the form of sunlight. The Earth's surface absorbs some of this energy and heats up. That's why the surface of a road can feel hot even after the sun has gone down – because it has absorbed a lot of energy from the sun. The Earth cools down by giving a different form of energy, called infrared radiation. But before all this radiation can escape to outer space, greenhouse gases in the atmosphere absorb some it, which makes the atmosphere warmer. As the atmosphere gets warmer, it makes the Earth surface warmer, too.

Source: United States Environmental Protection Agency, *A Student's Guide to Global Climate Change*, The Greenhouse Effect

Global warming is the unusually rapid increase in Earth's average surface temperature over the past century primarily due to the greenhouse gases released as people burn fossil fuels. The global average surface temperature rose 0.6 to 0.9 degrees Celsius (1.1 to 1.6 degrees F) between 1906 and 2005, and the *rate* of temperature increase has nearly doubled in the last 50 years.

Source: National Aeronautics and Space Administration (NASA), Earth Observatory, Global Warming

3. What Causes Global Warming?

The causes of the increase are complex, but scientists believe that human activities have enhanced the greenhouse effect which has lead to global warming and to climate change.

Scientists have spent decades figuring out what is causing global warming. They've looked at the natural cycles and events that are known to influence climate. But the amount and pattern of warming that's been measured can't be explained by these factors alone. The only way to explain the pattern is to include the effect of greenhouse gases (GHGs) emitted by humans.

To bring all this information together, the United Nations formed a group of scientists called the *Intergovernmental Panel on Climate Change* or IPCC. The IPCC meets every few years to review the latest scientific findings and write a report summarizing all that is known about global warming. Each report represents a consensus, or agreement, among hundreds of leading scientists.

One of the first things scientists learned is that there are several greenhouse gases responsible for warming, and humans emit them in a variety of ways. Human activities that release heat-trapping gases into the atmosphere include burning petroleum (gasoline and diesel fuel) for transportation, industrialized agriculture (a major source of methane), burning household biofuels (wood and dung), and deforestation (to clear land for agricultural). Today and for the next decade or so cars, trucks and buses are the greatest contributors to atmospheric warming.

The gas responsible for the most warming is carbon dioxide. Other contributors include methane released from landfills and agriculture (especially from the digestive systems of grazing animals), nitrous oxide from fertilizers, gases used for refrigeration and industrial processes, and the loss of forests that would otherwise store CO_2.

Source: National Geographic, Environment, Causes of Global Warming

4. GHG Global Warming Potentials

Different greenhouse gases have very different heat-trapping abilities. Some of them can even trap more heat than CO_2. A molecule of methane produces more than 20 times the warming of a molecule of CO_2. Nitrous oxide is 300 times more powerful than CO_2. Other gases, such as chlorofluorocarbons (which have been banned in much of the world because they also degrade the ozone layer), have heat-trapping potential thousands of times greater than CO_2. But because their concentrations are much lower than CO_2, none of these gases adds as much warmth to the atmosphere as CO_2 does.

Source: National Geographic, Environment, Causes of Global Warming

Some gases, as noted above, are more effective than others at making the planet warmer and "thickening the Earth's blanket." Table 1 shows that for each greenhouse gas, a Global Warming Potential (GWP). has been calculated to reflect how long it remains in the atmosphere, on average, and how strongly it absorbs energy. Technically stated, GWP is a measure of the amount of warming a GHG may cause, measured against the amount of warming caused by carbon dioxide (CO_2). The GWP for both Methane and Nitrous Oxide are based on the Intergovernmental Panel on Climate Change (IPCC) 4th Assessment. Gases with a higher GWP absorb more energy, per pound, than gases with a lower GWP, and thus contribute more to warming Earth.

Table 1
Greenhouse Gas Characteristics and Global Warming Potentials

Greenhouse Gases	Chemical Formula	Combustion	Global Warming Potential (CO2e)
Carbon dioxide	CO_2	Combustion	1
Methane	CH_4	Combustion, Anaerobic Decomposition of Organic Waste (Landfills, Wastewater), Fuel Handling	25
Nitrous oxide	N_2O	Combustion, Wastewater Treatment	298
Hydrofluorocarbons	Various	Leaking Refrigerants, Fire Suppressants	12-14,800
Perfluorocarbons	Various	Aluminum Production, Semiconductor Manufacturing , HVAC Equipment Manufacturing	7,390-12,200
Sulfur Hexafluoride	SF_6	Transmission and Distribution of Power	22,800

Source: Intergovernmental Panel on Climate Change (IPCC), *Fourth Assessment Report – Climate Change 2007*

D. CLIMATE CHANGE INDICATORS

Global warming is causing climate patterns to change. According to the United States Environmental Protection Agency:

- **Weather** is a specific event or condition that happens over a period of hours or days. For example, a thunderstorm, a snowstorm, and today's temperature all describe the weather.
- **Climate** refers to the average weather conditions in a place over many years (usually at least 30 years). For example, the climate in Minneapolis is cold and snowy in the winter, while Miami's climate is hot and humid. The average climate around the world is called global climate.

According to the United States Environmental Protection Agency:

- **Global warming** refers to the recent and ongoing rise in global average temperature near Earth's surface. It is caused mostly by increasing concentrations of greenhouse gases in the atmosphere. Global warming is causing climate patterns to change. However, global warming itself represents only one aspect of climate change.

- **Climate change** refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer.

The Earth's climate is getting warmer, and the signs are everywhere. Rain patterns are changing, sea level is rising, and snow and ice are melting sooner in the spring. As global temperatures continue to rise, more changes will be seen in our climate and our environment.

These changes will affect people, animals, and ecosystems in many ways. Less rain can mean less water for some places, while too much rain can cause terrible flooding. More hot days can dry up crops and make people and animals sick. In some places, people will struggle to cope with a changing environment. In other places, people may be able to successfully prepare for these changes. The negative impacts of global climate change will be less severe overall if people reduce the amount of greenhouse gases they are putting into the atmosphere and worse if we continue producing these gases at current or faster rates.

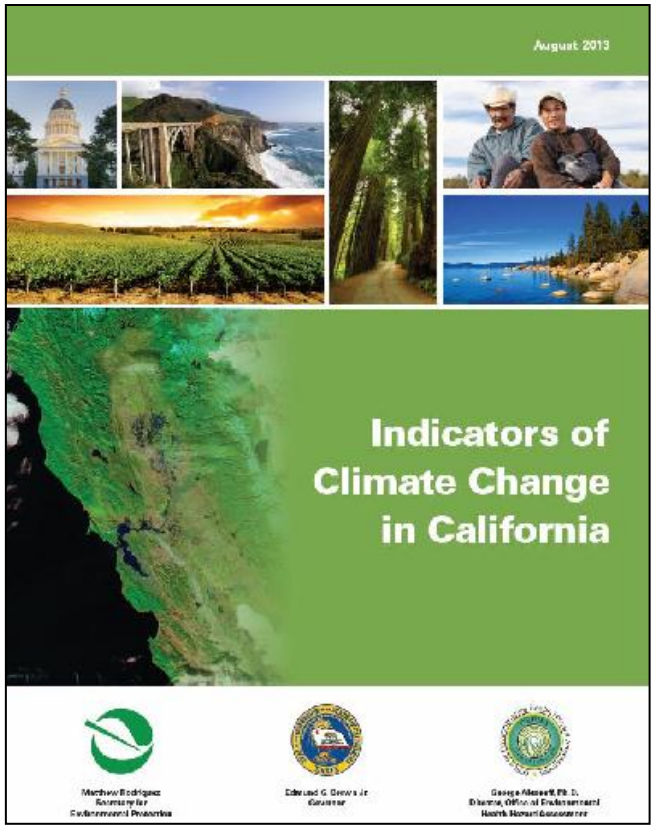
The planet is warming, from North Pole to South Pole, and everywhere in between. Globally, the mercury is already up more than 1 degree Fahrenheit (0.8 degree Celsius), and even more in sensitive Polar Regions. Signs are appearing all over, and some of them are surprising. The heat is not only melting glaciers and sea ice; it's also shifting precipitation patterns and setting animals on the move.

The IPCC reports that some impacts from increasing temperatures that are inducing climate change include:

- Ice is melting worldwide, especially at the Earth's poles. This includes mountain glaciers, ice sheets covering West Antarctica and Greenland, and Arctic sea ice.
- Researcher Bill Fraser has tracked the decline of the Adélie penguins on Antarctica, where their numbers have fallen from 32,000 breeding pairs to 11,000 in 30 years.
- Some butterflies, foxes, and alpine plants have moved farther north or to higher, cooler areas.
- Precipitation (rain and snowfall) has increased across the globe, on average.
- Spruce bark beetles have boomed in Alaska thanks to 20 years of warm summers. The insects have chewed up 4 million acres of spruce trees.
- Sea levels are expected to rise between 7 and 23 inches (18 and 59 centimeters) by the end of the century, and continued melting at the poles could add between 4 and 8 inches (10 to 20 centimeters).
- Hurricanes and other storms are likely to become stronger.
- Species that depend on one another may become out of sync. For example, plants could bloom earlier than their pollinating insects become active.
- Floods and droughts will become more common. Rainfall in Ethiopia, where droughts are already common, could decline by 10 percent over the next 50 years.
- Less fresh water will be available. If the Quelccaya ice cap in Peru continues to melt at its current rate, it will be gone by 2100, leaving thousands of people who rely on it for drinking water and electricity without a source of either.
- Some diseases will spread such as malaria carried by mosquitoes.
- Ecosystems will change—some species will move farther north or become more successful; others won't be able to move and could become extinct. Wildlife research scientist Martyn Obbard has found that since the mid-1980s, with less ice on which to live and fish for food, polar bears have gotten considerably skinnier. Polar bear

biologist Ian Stirling has found a similar pattern in Hudson Bay. He fears that if sea ice disappears, the polar bears will as well.

The California Environmental Protection Agency, Office of Environmental Health Hazard Assessment tracks climate change in California. The recent *Indicators of Climate Change* report found the following:



- **Temperatures:** California's high, low and average temperatures are all rising, and extreme heat events also have increased in duration and frequency. The rate of warming has accelerated since the mid-1970s, and night time (minimum) temperatures have increased almost twice as fast as maximum (daytime) temperatures.
- **Wildfires:** The number of acres burned by wildfires has been increasing since 1950. The size, severity, duration and frequency of wildfires are greatly influenced by climate. The three largest fire years on record in California occurred in the last decade, and annual acreage burned since 2000 is almost twice that for the 1950-2000 period.
- **Water:** Spring snowmelt runoff has decreased, indicating warmer winter temperatures and more precipitation falling as rain rather than snow. Earlier and decreased runoff can reduce water supplies, even when overall rainfall remains the same. This trend could mean less water available for agriculture, the environment and a growing population.
- **Coast and Ocean:** A number of indicators reflect physical and biological changes in the ocean, impacting a range of marine species, including sea lions, seabirds and salmon. And data for Monterey Bay shows increased carbon dioxide levels in coastal waters, which can harm shell-forming organisms and have impacts throughout the marine food chain.
- **Species Migration:** Certain plants and animals have responded to habitat changes influenced by warming. For example, conifer forests in the Sierra Nevada have been moving upslope and certain small mammals in Yosemite National Park have moved to higher elevations compared to the early 1900s.

Source: California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, *Indicators of Climate Change in California*, August 2013

Climate change impacts have been analyzed locally. A study completed for the Imperial Irrigation District found that by 2050 some likely climate changes for the Imperial Regional Water Management Plan (IRWMP) region include milder winters, warmer maximum temperatures for spring and fall, and hotter summers.

Source: Imperial Regional Water Management Plan*, Appendix O – Imperial Region Vulnerability to Climate Change and Evaluation of Greenhouse Gas Emissions*, page O-12

E. 2005 AND 2012 GHG EMISSIONS INVENTORIES

1. Methodology

a. Baseline Year (2005) and Interim Year (2012)

While the AB 32 emissions reduction goals establish a 1990 base year for the State, most local governments lack comprehensive data from that time period and would be unsuccessful in backcasting to that year. Brawley, as the majority of municipalities currently in the emissions inventory process, opted to use 2005 as the base year due to the availability of activity data. The City also chose to prepare an inventory for 2012, an interim year between 2005 and the 2020 and 2030 forecast years.

Table 2 lists the primary data sources used to complete the Brawley GHG Emissions Inventory. The purpose of the baseline inventory is to estimate the quantities of emissions so that the City may establish a reduction target for 2020 and 2030.

b. Greenhouse Gas Emissions Calculations

Greenhouse gas emissions were calculated using activity data and emission factors. The basic equation below is used:

Activity Data x Emission Factor = Emissions

Activity data refer, for example, to electricity and natural gas consumption, vehicle miles traveled, solid waste tonnage, and water consumption. Emission factors are used to convert energy usage or other activity data into associated emissions quantities. They are usually expressed in terms of emissions per unit of activity data (e.g. lbs CO_2/kWh of electricity).

c. Carbon Dioxide Equivalent ($MTCO_2e$)

Standard practice quantifies GHG emissions in terms of metric tons of carbon dioxide equivalent ($MTCO_2e$) units. Carbon dioxide equivalent is a unit of measurement that allows the effect of different greenhouse gases to be compared using carbon dioxide as a standard unit of reference. In the context of emissions of greenhouse gases, carbon dioxide equivalent refers to the amount of carbon dioxide that would have the same warming effect as the effect of the greenhouse gas or greenhouse gases being emitted [e.g., methane (CH_4) and nitrous oxide (N_2O)].

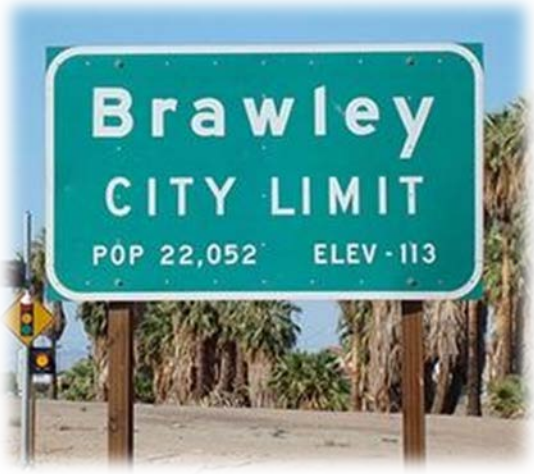
These greenhouse gases are then converted to carbon dioxide equivalents (CO_2e), enabling the City to consider different greenhouse gases in comparable terms. The conversion of greenhouse gases is done by comparing the global warming potential (GWP) of each gas to CO_2. For example, methane (CH_4) is 25 times more powerful than CO_2 on a per weight basis in its capacity to trap heat, and therefore one metric ton of CH_4 would be calculated as 25 MT CO_2e. Nitrous oxide (N_2O) is 298 times more powerful than CO_2; therefore, one metric ton of N_2O would be calculated as 298 metric tons of carbon dioxide.

Table 2
City of Brawley
Greenhouse Gas Emissions Inventory
Community-wide and Municipal Data Sources

Sector	Activity Data	Unit of Measurement	Data Source
Community-wide Inventory			
Residential	Electricity Consumption	MWh	CA Energy Commission
	Natural Gas Consumption	Therms	SoCalGas
Commercial/Industrial	Electricity Consumption	MWh	CA Energy Commission
	Natural Gas Consumption	Therms	SoCalGas
Transportation	Vehicle Miles Traveled (VMT)	VMT	SCAG CARB
Off-Road Vehicles and Equipment	Emissions by Equipment Type	CO_2 Exhaust	US EPA NONROAD Model
Solid Waste	Solid Waste Tonnage	Tons	CalRecycle CARB
Water	Water Consumption	Gallons Per Capita Per Day GPCD	City of Brawley 2010 Urban Water Management Plan
Municipal Inventory			
Buildings and Facilities	Electricity Consumption	MWh	CA Energy Commission
	Natural Gas Consumption	Therms	SoCalGas
Streetlights and Traffic Signals	Electricity Consumption	MWh	CA Energy Commission
Water Delivery Facilities	Electricity Consumption	MWh	CA Energy Commission
Solid Waste	Solid Waste Tonnage	Tons	CalRecycle CARB
Vehicle Fleet	Gasoline and Diesel Consumption	Gallons	City of Brawley Public Works
Employee Commute	Sample of Employee Commuting Patterns	Annual VMT	City of Brawley Planning Department

2. Community Inventory

a. Purpose



A greenhouse gas inventory is an accounting of greenhouse gases (GHGs) emitted to or removed from the atmosphere over a period of time. The inventory establishes a baseline for tracking emission trends, developing mitigation strategies and policies, and assessing progress. Greenhouse gas emissions inventories have been completed by several California cities, the California Air Resources Board, and individual agencies such as Imperial Irrigation District, and individual businesses mandated to perform such inventories such as the now closed National Beef facility.

The Inventory measures three primary GHG emissions

- ❒ Carbon dioxide (CO_2)
- ❒ Methane (CH_4)
- ❒ Nitrous oxide (N_2O)

Attachment A describes these greenhouse gases.

Through the Statewide Energy Efficiency Collaborative (SEEC) program, ICLEI – Local Governments for Sustainability USA – provided some overview trainings for climate action planning in the Imperial Valley area. These trainings were introductory overviews to the process of conducting greenhouse gas inventories and introductory climate action planning. The City staff participated in these trainings. Brawley's accounting of greenhouse gas emissions is based primarily on the ICLEI's detailed and comprehensive protocol. ICLEI's *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions* (October 2012) describes the required activity data, emissions factors, and formulas for estimating greenhouse gas emissions.

b. 2005 and 2012 Emissions

The City of Brawley's baseline year inventory and interim year inventory is organized by sector: residential, commercial and industrial, transportation and solid waste.

The City obtained County-wide electricity consumption for the years 2005 and 2012 from the State Energy Commission. The County-wide residential electricity consumption then was allocated to Brawley on the basis of the City's share of households residing in Imperial County. The County-wide non-residential electricity use was allocated on the basis of Brawley's share of the jobs located within Imperial County.

Natural gas usage by residential and non-residential uses was obtained from the Southern California Gas Company.

Vehicle miles traveled (VMT) for Brawley was obtained from SCAG and the California Air Resources Board (ARB) EMFAC Model. The EMFAC Model produces estimates of Imperial County's CO_2 emissions (tons per day) that are generated by gasoline and diesel powered vehicles. Brawley's CO_2 emissions are estimated based on its DVMT as a percentage of Imperial County's DVMT.

Solid waste emissions are generated from decomposing organic waste in place and methane management activities. Solid waste generated within Brawley, as a result of community and municipal activities, is collected by Allied Waste Management and deposited at various landfills throughout the region. Annual tons of waste disposed at landfills was obtained from Cal Recycle to determine the total emissions. In addition, emissions are generated from the collection, transportation and processing of the solid waste.

Tables 3 and 4 present the community-wide GHG emissions by sector for 2005 and 2012, respectively.

Between 2005 and 2012 there was a decrease in the amount of community-wide greenhouse gas emissions. The likely reasons for the decrease may include:

- ❒ Residential: Energy consumption may have decreased because of the weak economy which leads to lower consumption overall and the energy conservation measures taken by residents.

- ❒ Commercial & Industrial: Energy consumption may have decreased because of the weak economy (less occupied business space in 2012) and the energy conservation measures taken by local businesses.

- ❒ Transportation: There was a decrease in the vehicle miles traveled which may have been due to fewer trips taken by residents and businesses because of the poor economy as well as better fuel economy leading to a reduction in emissions.

- ❒ Solid Waste: According to CalRecycle the decrease in solid waste tonnage is primarily related to both increased recycling efforts and the economic downturn.

Table 3
City of Brawley
Community-Wide GHG Emissions by Sector: 2005

Sector	Emissions Source	GHG Emissions ($MTCO_2e$)	Percentage of Total
Residential	Electricity and natural gas used in homes, apartments and other residences	39,349	24.7%
Commercial & Industrial	Electricity and natural gas used in commercial and industrial buildings	43,233	27.2%
Transportation	Vehicle miles traveled on-road by cars, trucks and other vehicles and off-road emissions from agriculture, construction, commercial and industrial equipment and lawn maintenance	40,890	25.7%
Solid Waste	Solid waste generated by residences and by commercial and industrial uses and transported to landfills	35,516	22.3%
Total		158,987	100.0%

Table 4
City of Brawley
Community-Wide GHG Emissions by Sector: 2012

Sector	Emissions Source	GHG Emissions ($MTCO_2e$)	Percentage of Total
Residential	Electricity and natural gas used in homes, apartments and other residences	35,700	26.4%
Commercial & Industrial	Electricity and natural gas used in commercial and industrial buildings	36,833	27.3%
Transportation	Vehicle miles traveled on-road by cars, trucks and other vehicles and off-road emissions from agriculture, construction, commercial and industrial equipment and lawn maintenance	39,085	28.9%
Solid Waste	Solid waste generated by residences and by commercial and industrial uses and transported to landfills	23,540	17.4%
Total		135,158	100.0%

3. Government Operations Inventory

a. Purpose

The government operations inventory identifies the sources and quantities of greenhouse gas emissions resulting from City operations in 2005 and 2012. The inventory is a necessary first step in addressing greenhouse gas emissions, serving two primary purposes:

- ❒ To create an emissions baseline against which the City can set emissions reduction targets and measure future progress.
- ❒ To provide insight into the scale of emissions from the various sources within their operations, underpinning informed and strategic emission reduction measures.

For the most part, emissions from the City of Brawley local government operations are quantified separately from the community inventory. Solid waste generated by municipal operations could not be reported separately and is included in the Community Inventory. The municipal or governmental operations inventory reports emissions for the following *sectors*:

- ❒ Buildings and Facilities (separate from Community Residential and Non-Residential)
- ❒ Streetlights (separate from Community Residential and Non-Residential)
- ❒ Vehicle Fleet (unique to the City of Brawley)
- ❒ Brawley Municipal Airport
- ❒ Employee Commute (unique to the City of Brawley)
- ❒ Distribution of Potable Water
- ❒ Wastewater Treatment

Water is included in the Governmental Operations Inventory because the City of Brawley owns and operates both the Water Treatment Plant and Wastewater Treatment Plant. The Public Works Department plans, constructs, and maintains the water system. The ICLEI *Local Government Operations Protocol* (May 2010) strongly encourages local governments to include water in the governmental operations inventory when it has operational control over the facilities.

b. 2005 and 2012 Emissions

Table 5 shows that the GHG emissions from the municipal operations were almost the same in 2012 as they were in 2005. There were decreases in building and street light use of electricity. The main reason for these declines probably is due to the fact there was a decline in electricity consumption throughout Imperial County in 2012 compared to 2005. Brawley's municipal operations experienced a significant increase in natural gas usage. This is due to the fact that between 2005 and 2012, the City opened new buildings and constructed a heated pool. The Teen Center also was constructed after 2005. The amount of fuel dispensed at the Brawley Municipal Airport in 2012 was more than two times than the amount in 2005. Reasons for the

increase include higher operations per based aircraft and higher airport use by agricultural aircraft. The per capita water consumption declined between 2005 and 2012.

Table 5
City of Brawley
Government Operations Greenhouse Gas Emissions by Sector: 2005 and 2012

Sector/Category	2005 MTCO2e	Percentage of Total	2012 MTCO2e	Percentage of Total
Buildings: Electricity	593.14	15.7%	491.74	14.4%
Buildings: Natural Gas	60.19	1.6%	191.91	5.6%
Streetlights	479.45	12.7%	249.26	7.3%
Vehicle Fleet	331.53	8.8%	347.30	10.2%
Brawley Municipal Airport	163.39	4.3%	398.99	11.7%
Employee Commute	264.53	7.0%	242.93	7.1%
Distribution of Potable Water	1,004.57	26.5%	701.14	20.5%
Wastewater Treatment	891.37	23.5%	794.05	23.2%
Total	3,788.17	100.0%	3,417.31	100.0%

Total 2005 GHG emissions (162,775 $MTCO_2e$) is the sum of the Community (158,987 $MTCO_2e$) and Governmental Operations (3,788.17 $MTCO_2e$) Inventories.

F. Community GHG Emissions – 2020 and 2030 Forecasts

1. Methodology

The GHG emissions forecasts provide an idea of how emissions will grow based on the following factors:

- ❒ Population, household and employment growth forecasts which are consistent with SCAG's Sustainable Communities Strategy
- ❒ Accounting for the energy savings due to Title 24 updates effective in 2014, 2017 and between 2020 and 2030
- ❒ Accounting for the energy savings due the 33% Renewable Portfolio Standard by 2020 and assumed 50% RSP by 2030
- ❒ Per capita water consumption rates will be the same in the two forecast periods as in 2005
- ❒ Per capital solid waste disposal rates will be the same in the two forecast periods as in 2005
- ❒ Forecasts of vehicle miles traveled are based on SCAG and EMFAC forecasts
- ❒ Off road emissions are based on EPA's Nonroad Model
- ❒ Emissions factors such as lbs CO_2e/MWh will be the same in 2020 and 2030 as they were in 2005
- ❒ No additional federal, state or regional reduction measures are incorporated in the 2020 and 2030 forecasts

Table 6 shows the numerical values of the growth factors which are applied to five sectors.

Table 6
City of Brawley
Growth Projections: 2020 and 2030

Growth Factor	2020	2030	Growth Factor Applied to:
Population	33,600	42,400	Solid Waste, Water & Wastewater
Households	10,700	14,100	Electricity and Natural Gas-Residential
Employment	10,000	13,100	Electricity and Natural Gas-Non-Residential
Daily Vehicle Miles Traveled	208,840	265,840	Transportation

Source: Southern California Association of Governments and California Air Resources Board, EMFAC Model

Based on the 2005 energy and water consumption rates, disposal rates, vehicle miles traveled, the following factors were developed for purposes of forecasting to 2020 and 2030:

- ❒ MWh per occupied housing unit
- ❒ Therms per occupied housing unit
- ❒ MWh per job
- ❒ Therms per job
- ❒ Daily vehicle miles traveled (DVMT) per service area population (population + jobs)
- ❒ Per capita solid waste disposal rate (lbs/resident/day)
- ❒ Gallons per capita per day (water)

2. Emissions Forecasts

The 2020 and 2030 emissions forecasts are shown in Tables 7 and 8.

Even though there is population and job growth between 2005 and 2020, the decrease in residential and non-residential energy GHG emissions reflects the energy savings due to Title 24 updates in 2014 and 2017 and a 33% RPS by 2020. The transportation sector is only one of the four sectors that increased. That is because no fuel efficiency or land use measures were incorporated into the 2020 forecast.

Between 2020 and 2030, the assumed additional Title 24 updates and a 50% RPS lead to energy savings and a reduction in GHG emissions. There is an increase in transportation sector emissions which corresponds to a growth in vehicle miles traveled and no incorporation of reduction measures. Emissions due to solid waste also increase because the per capita disposal rate remains constant and the population growth is substantial during the decade.

Table 7
City of Brawley
Community GHG Emissions Forecast by Sector: 2020

Sector	Emissions Source	GHG Emissions ($MTCO_2e$)	Percentage of Total
Residential	Electricity and natural gas used in homes, apartments and other residences	35,667	23.8%
Commercial & Industrial	Electricity and natural gas used in commercial and industrial buildings	29,265	19.6%
Transportation	Vehicle miles traveled on-road by cars, trucks and other vehicles and off-road emissions from agriculture, construction, commercial and industrial equipment and lawn maintenance	50,063	33.5%
Solid Waste	Solid waste generated by residences and by commercial and industrial uses and transported to landfills	34,583	23.1%
Total		149,579	100.0%

Table 8
City of Brawley
Community GHG Emissions Forecast by Sector: 2030

Sector	Emissions Source	GHG Emissions ($MTCO_2e$)	Percentage of Total
Residential	Electricity and natural gas used in homes, apartments and other residences	34,834	20.9%
Commercial & Industrial	Electricity and natural gas used in commercial and industrial buildings	29,175	17.5%
Transportation	Vehicle miles traveled on-road by cars, trucks and other vehicles and off-road emissions from agriculture, construction, commercial and industrial equipment and lawn maintenance	59,198	35.5%
Solid Waste	Solid waste generated by residences and by commercial and industrial uses and transported to landfills	43,640	26.2%
Total		166,848	100.0%

G. GOVERNMENTAL SECTOR GHG EMISSIONS – 2020 AND 2030 FORECASTS

1. Methodology

Based on the 2012 energy consumption and the number of City employees, the following factors were developed for purposes of forecasting to 2020 and 2030.

- ❒ MWh per employee
- ❒ Therms per employee

Based on the 2012 number of employees and fuel consumed, the following factor was developed:

- ❒ Gallons of fuel consumed per employee

The employee commute growth involved the 2012 gallons of fuel consumed per employee and employee growth.

The Table 9 forecasts on the number of future City jobs was based on information contained in the *2012 Service Area Plan* and service standards such as the number of police officers per 1,000 population.

Table 9
City of Brawley
City Employee Forecasts: 2020 and 2035

Employee Category	2012	2020	2030
Firefighters	26	34	42
Police Officers	53	60	67
Library	9	17	21
Other Employees	47	59	74
Total	135	170	204

Source: City of Brawley, *2012 Service Area Plan* and SCAG 2020 and 2030 population forecasts

The 2012 street light electricity usage and number of households were used to construct an MWh per occupied housing unit factor.

The 2020 and 2030 vehicle fleet fuel consumption forecasts involved the following factors:

- ❒ 2012 gallons of fuel consumed per vehicle
- ❒ 2020 and 2030 vehicle fleet growth based on the employee forecasts
- ❒ Number of vehicles in 2020 and 2030 times 2012 fuel consumed per aircraft

The 2020 and 2030 airport operations fuel consumption involved the following factors:

- ❒ 2012 fuel consumed per aircraft
- ❒ 2020 and 2035 aircraft projection based a 1% growth per year

- ❒ Number of aircraft in 2020 and 2030 times 2012 fuel consumed per aircraft

2. Emissions Forecasts

Table 10 shows the 2020 and 2030 government operations forecasts, respectively. The 2020 emissions forecast is 1.12 times greater than the 2005 baseline. The 2030 emissions forecast is1.37 times greater than the 2012 baseline.

Table 10
City of Brawley
Municipal Operations GHG Emissions Forecast by Sector: 2020 and 2030

Government Operation/Sector	2020	2030
Natural Gas	241.05	290.28
Electricity	620.10	746.73
Streetlights	349.10	460.03
Vehicle Fleet	379.59	453.76
Employee Commute	356.89	429.77
Airport Operations	416.23	459.72
Wastewater	960.76	1,212.38
Water Distribution	914.10	1,153.51
Total Municipal Emissions	4,237.82	5,206.18

H. GHG EMISSIONS REDUCTION TARGET

Table 11 lists the reduction targets for the years 2020 and 2030.

The 2020 target (138,359 $MTCO_2e$) is tied to the recommendation of the California Air Resources Board and the Climate Change Scoping Plan, which suggests that local governments work to reduce emissions by 15% below the 2005 baseline emissions. Brawley's 2020 target aligns with this state recommendation and places the City on a course towards California's long-term emissions reduction target, which is an ambitious goal to reduce greenhouse emissions by 80% below 1990 levels in 2050. The 2050 goal is the State's policy interpretation of the percent reduction necessary to stabilize global carbon dioxide levels, while still providing for economic growth.

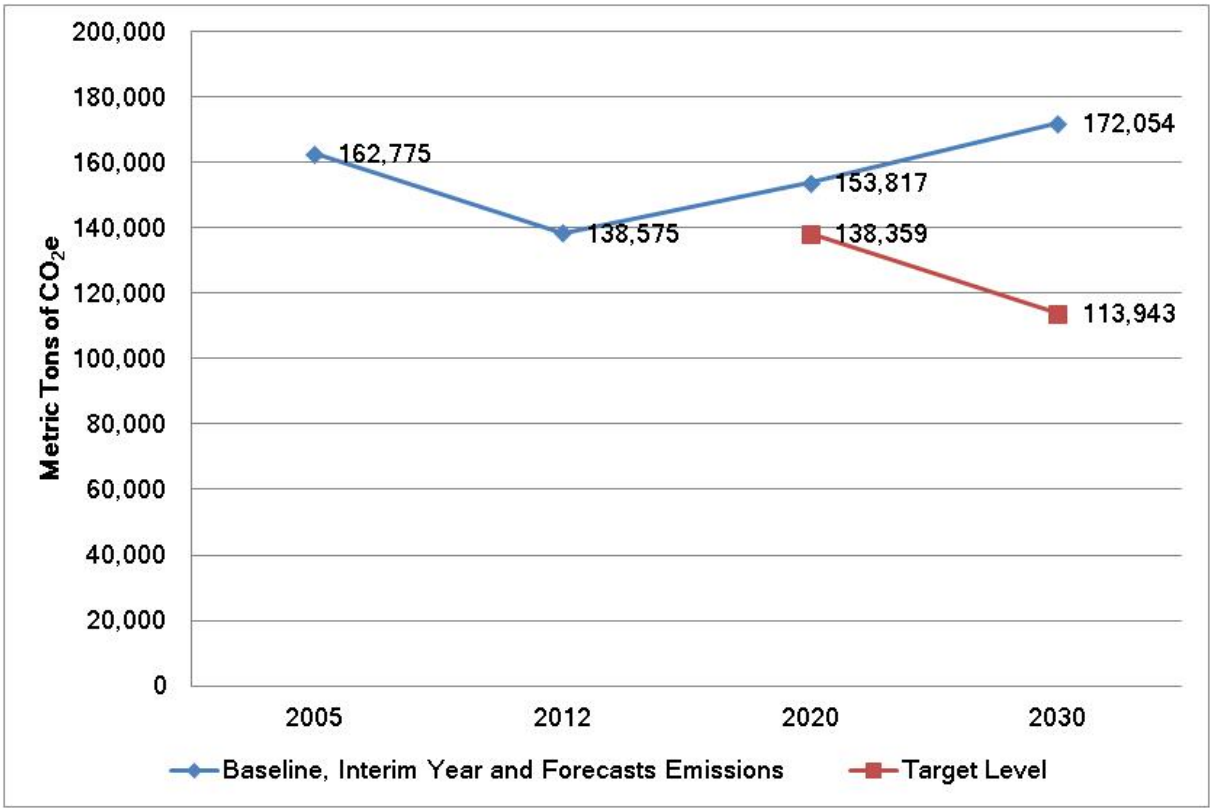
The City recognizes the need to continue reducing emissions beyond 2020 and, therefore, has set a 2030 reduction target of 30% as well.

As previously noted, Governor Brown on April 29, 2015 signed an Executive Order that establishes a new interim emissions reduction target to reduce greenhouse gas emissions to 40% below 1990 levels by 2030. The City recognizes that additional state and federal actions and consumer behavior changes are needed to achieve the target reductions of 40% by 2030, 50% by 2035 and 80% by 2050.

Table 11
City of Brawley
Baseline and Emissions Forecasts and
Emission Reduction Targets: 2020 and 2030

Baseline and Forecast Emissions	GHG Emissions ($MTCO_2e$)
2005 Baseline Emissions	162,775
2020 Forecast Emissions	153,817
Target Level	138,359
Total Reduction Necessary	15,458
2030 Forecast Emissions	172,054
Target Level	113,943
Total Reduction Necessary	58,111

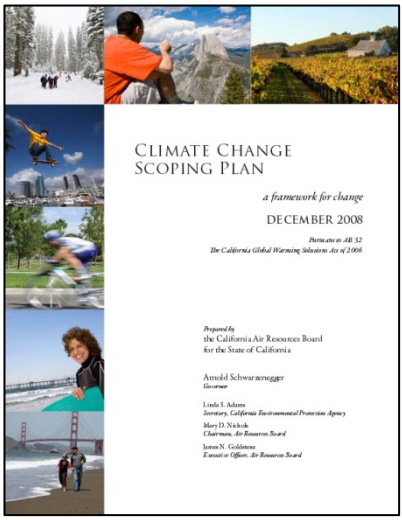
Chart 1
City of Brawley
Baseline, Interim Year, Forecast Emissions and Reduction Targets

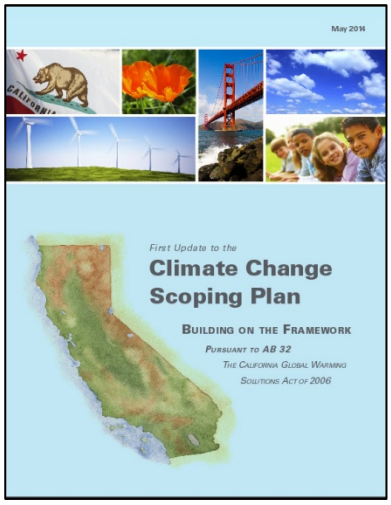


I. STATE GHG REDUCTION MEASURES

The *2008 Scoping Plan* recommended 37 specific GHG emission reduction measures in California's major economic sectors. The list below shows the number of specific measures for each economic sector:

- ❒ Transportation (9)
- ❒ Electricity and Natural Gas (4)
- ❒ Water (6)
- ❒ Green Buildings (1)
- ❒ Industry (5)
- ❒ Recycling and Waste Management (3)
- ❒ Forest (1)
- ❒ High Global Warming Potential Gases (7)
- ❒ Agriculture (1)





In March 2014 the California Air Resources Board (CARB) released a report describing the implementation status of the initial Scoping Plan measures. Some of these measures such as "sustainable forest" and "methane capture at large dairies" will have no effect on Brawley's GHG emissions. But some of these measures, as well as others that may be adopted by the State in the future, will reduce Brawley's GHG emissions below the 2020 and 2030 forecast levels.

Although most State measures will help to reduce emissions from the forecasted levels, it is not possible to quantify the emissions reduction impacts of all measures. Table 12 shows the projected GHG emissions reductions due to the following three State measures:

- ❒ Pavley (AB 1493)
- ❒ Low Carbon Fuel Standard
- ❒ Vehicle Efficiency Measures

Table 12
City of Brawley
GHG Emissions Reductions from State Measures: 2020 and 2030

State Measure	2020 Reduction (MTCO2e)	2030 Reduction (MTCO2e)
Pavley (AB 1493)1	6,783.37	12,879.46
Low Carbon Fuel Standard	2,524.92	9,540.34
Vehicle Efficiency Measures	753.71	954.03
Total	10,062.00	23,373.83

1. Title 24 Updates

The California Energy Commission on May 31, 2012 approved energy efficiency standards for new homes and commercial buildings. The Energy Commission's 2013 Building Energy Efficiency Standards are more efficient than previous standards, as follows:

- ❒ Single family homes 25%
- ❒ Multifamily homes 14%
- ❒ Nonresidential construction 30%

The Standards took effect on January 1, 2014. Some improved measures in the Standards include:

Residential:

- ❒ Solar-ready roofs to allow homeowners to add solar photovoltaic panels at a future date
- ❒ More efficient windows to allow increased sunlight, while decreasing heat gain
- ❒ Insulated hot water pipes, to save water and energy and reduce the time it takes to deliver hot water
- ❒ Whole house fans to cool homes and attics with evening air reducing the need for air conditioning load
- ❒ Air conditioner installation verification to insure efficient operation

Nonresidential:

- ❒ High performance windows, sensors and controls that allow buildings to use "daylighting"
- ❒ Efficient process equipment in supermarkets, computer data centers, commercial kitchens, laboratories, and parking garages
- ❒ Advanced lighting controls to synchronize light levels with daylight and building occupancy, and provide demand response capability
- ❒ Solar-ready roofs to allow businesses to add solar photovoltaic panels at a future date
- ❒ Cool roof technologies

On average, the Standards will increase the cost of constructing a new home by $2,290 but will return more than $6,200 in energy savings over 30 years. Based on a 30-year mortgage, the standards will add approximately $11 per month for the average home, but save consumers $27 on monthly heating, cooling, and lighting bills, according to the California Energy Commission.

The California Energy Commission documented the energy savings due to the 2013 Title 24 updates in a report titled *Impact Analysis: California's 2013 Building Energy Efficiency Standards*, July 2013. The methodology used to calculate the energy savings is based on the *Impact Analysis* and technical assistance provided to the City by Javier Perez, Energy Analyst, California Energy Commission. The energy savings described in the *Impact Analysis* cover single-family, multi-family and non-residential construction as well as alterations and renovations to existing buildings.

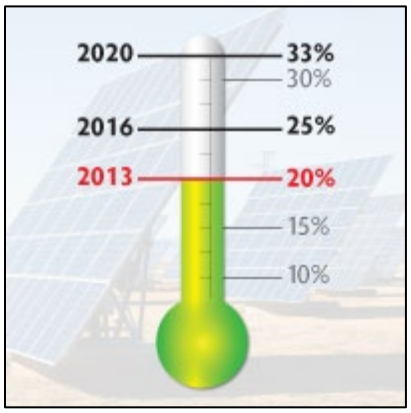
The 2020 and 2030 forecasts (Tables 7, 8 and 10) incorporate savings due to future Title 24 updates. California's Building Energy Standards are updated on an approximately three-year cycle. The 2016 Standards will continue to improve upon the current 2013 Standards for new construction of, and additions and alterations to, residential and nonresidential buildings. The 2016 Standards will go into effect on January 1, 2017.

2. Renewable Energy Portfolio Standards

Established in 2002 under Senate Bill 1078, accelerated in 2006 under Senate Bill 107 and expanded in April 2011 under Senate Bill 2X1-2, California's Renewables Portfolio Standard (RPS) is one of the most ambitious renewable energy standards in the country. The RPS applies to all electricity retailers including publicly owned utilities, investor-owned utilities, electricity service providers, and community choice aggregators. All of these entities must increase procurement from eligible renewable energy resources to 33% of total procurement by 2020.

The California Public Utilities Commission (CPUC) and the California Energy Commission jointly implement the RPS program. The Energy Commission certifies facilities and energy deliveries as eligible for counting towards California's RPS goals.

In 2011, the Imperial Irrigation District (IID) Board of Directors adopted a resolution affirming its commitment to the RPS under Senate Bill 2.



This resolution outlines its adherence to state requirements, including the compliance targets for delivering renewable energy to its retail load within the state-defined compliance periods. California law stipulates utilities must work to meet renewable portfolio standards by year's end in three stages: 20% by 2013, 25% by 2016 and 33% by 2020. "Responsible progress" is required of utilities by the end of the first two compliance periods.

IID's resolution also commits that all RPS eligible resources will be assigned a procurement content category by the utility as set forth in the law that identifies the resource origin and path of transfer.

Since 2011, the Board has approved an RPS policy that includes a detailed enforcement program and procurement plan. It has also entered into power purchase agreements for solar, geothermal, small hydro and biogas energy which will increase its renewable energy resource level.

The IID *2014 Integrated Resource Plan* explains:

> There is an array of varying types of renewable technologies that are currently available for development and/or purchase to IID. However, the bulk of the availability of renewable generation comes from intermittent resources such as solar and wind-based generation. Since IID's service territory has sufficient supply of available land, transmission, and sunshine, solar based generation facilities will increase over the next 10-20 years. IID will utilize this availability to its fullest and meet the RPS targets in an effective manner.

Table 13 is a breakdown of IID's current renewable resources.

Table 13
Imperial Irrigation District
Eligible Renewable Resource Breakdown-2016

Renewable Resource	Capacity (MW)	Full Year Production (MWh)	Approximate Portion of RPS (%)
Small Hydro	32	267,520	7.30%
Ormat Geo	10-13	116,580	3.18%
GreenLeaf Biomass	45	339,100	9.25%
SunPeak Solar 1	20	45,880	1.25%
SolOrchard Solar	20	45,880	1.25%
Ormat Solar	10	25,690	0.70%
SunPeak Solar 2	20	45,880	1.25%
1500 MMBtu/day Biogas	8	74,167	2.02%
Total			26.2%

Source: Imperial Irrigation District, *2014 Energy Department Integrated Resource Plan*, Exhibit 44, page 105

"Increased uses of renewables," according to the *2008 Scoping Plan*, "will decrease California's reliance on fossil fuels, thus reducing emissions of greenhouse gases from the Electricity sector."

For the purposes of calculating the reduction of greenhouse gas emissions in the *2008 Scoping Plan*, ARB counted emissions that would be avoided by increasing the percentage of renewables in California's electricity mix from the current level of 12% to the 33% goal. ARB projected a reduction of 21.3 $MMTCO_2e$ as a result of achieving a 33% renewable mix by 2020. A reduction this large translates to a 15.3% reduction in the electric power sector in 2020 [21.3 $MMTCO_2e$/139.1 $MMTCO_2e$].

Although four cities located within the IID service area have prepared plans to reduce GHG emissions, only one city projected a GHG reduction due to reaching the 33% RPS goal. That city projected a 26% reduction in GHG emissions. Because the latter reduction is specific to IID, it was used to project the GHG emissions reductions in the 2020 forecast.

In his inaugural address in January 2015, Governor Brown announced that within the next 15 years California will increase from one-third to 50% the electricity that is derived from renewable sources. The 2030 emissions forecast (Table 8) assume that a 50% RPS will be in effect within the next 15 years and will result in a 35% reduction in emissions.

3. Pavley (Assembly Bill 1493)

Assembly Bill 1493 (Pavley) requires carmakers to reduce GHG emissions from new passenger cars and light trucks. CARB adopted regulations in September 2004 that create two phases of increasingly stringent standards for car manufacturers between 2009 and 2020. Pavley I took effect for model years starting in 2009 to 2016 and Pavley II, which is now referred to as LEV (Low Emission Vehicle) III will cover 2017 to 2025.

The *2008 Scoping Plan* anticipated that new vehicles sold in California would result 14% fewer GHG emissions in 2020 (31.7 $MMTCO_2e$/225.4 $MMTCO_2e$). More recently, ARB has projected GHG emissions reductions of 18% in 2020 and 27% in 2030. These percentages were used to compute the reduction in GHG emissions due to Pavley I and II in Table 12.

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4. Low Carbon Fuel Standard (LCFS)

The Low Carbon Fuel Standard (LCFS) is a performance-based regulation adopted in California in 2009 that requires regulated parties (e.g., oil producers and importers to California) to reduce the carbon intensity (CI) of their fuel mix by at least 10% by 2020. It sets declining annual targets, starting slowly with a 0.25% reduction in 2011 and increasing to a 10% reduction by 2020. The LCFS is designed to reduce GHG emissions by encouraging the use of low carbon fuels in California and elsewhere. By doing so, this regulation contributes to California's overall GHG emission reduction goals under the Global Warming Solutions Act of 2006 (AB 32).

Carbon intensity (CI) is a measure of the GHG emissions associated with the various production, distribution, and consumption steps in the "life cycle" of a transportation fuel. Carbon intensity is measured in grams of carbon dioxide equivalents (gCO_2e) per unit energy (MJ) of fuel and is quantified on a lifecycle or well-to-wheels basis.

According to UC Davis:

> The LCFS policy aims to reduce emissions of greenhouse gases (GHGs) by creating financial incentives for innovation and deployment of low carbon fuels. Regulated parties have several options to meet the standard. They can produce their own low carbon fuels, buy fuels from producers to sell on the market, purchase credits generated by others, or use some combination of these strategies. Potential low carbon fuel technologies include biofuels from waste and cellulosic materials, natural gas, electricity used in plug-in vehicles, and hydrogen used in fuel cell vehicles.

According to the *2008 Scoping Plan*:

> A 10 percent reduction in the intensity of transportation fuels is expected to equate to a reduction of 16.5 $MMTCO_2e$ in 2020. However, in order to account for possible overlap of benefits between LCFS and the Pavley greenhouse gas standards, ARB has discounted the contribution of LCFS to 15 $MMTCO_2e$.

The reduction of mobile-source (passenger/light truck and heavy/medium duty vehicles) GHG emissions compared to 2020 business-as-usual conditions [15 $MMTCO_2e$/225.4 $MMTCO_2e$] equals 6.7%. As no comparable projections were included in the *2014 Scoping Plan Update*, the 6.7% factor was applied to Brawley's projected transportation GHG emissions in 2020.

ARB is considering extending the LCFS beyond 2020 with more aggressive long-term targets, such as a 15% to 20% reduction in average carbon intensity, below 2010 levels, by 2030. Thus, a 20% factor was used to project the 2030 emissions reductions shown in Table 12.

5. Vehicle Efficiency Measures

These measures were described in the *2008 Scoping Plan* and the Implementation Status of Initial Scoping Plan Measures. The Vehicle Efficiency Measures include:

- ❒ Tire Pressure
- ❒ Low Friction Oil
- ❒ Solar Reflective Automotive Paint and Window Glazing
- ❒ Heavy-Duty Vehicle GHG Emission Reduction Regulation

Tire Pressure: This program reduces GHG emissions by reducing the consumption of fuel from passenger vehicles operating with under inflated tires. Proper tire inflation decreases the tire rolling resistance and reduces fuel consumption.

Low Friction Oil: This measure would require the use of low friction oils in passenger cars to reduce engine load and fuel use. ARB staff expects engine manufacturers to design their engines to accommodate the use of low friction oil to meet the Advanced Clean Cars requirements.

Cooling Vehicle Interiors: A performance-based approach to cooling vehicle interiors was incorporated into the Advanced Clean Cars program.

Heavy-Duty Vehicle GHG Emission Reduction Regulation: The Heavy-Duty Vehicle GHG Emission Reduction Regulation (Tractor-Trailer GHG Regulation) was approved by the Board in December 2008. The purpose of the regulation is to reduce GHG emissions from certain long-haul tractor-trailer combinations that operate in California by requiring them to utilize technologies that result in improved fuel efficiency.

The regulation requires owners of long-haul tractors as well as 53-foot or long box-type trailers to replace or retrofit their affected vehicles with compliant aerodynamic technologies and low rolling resistance tires. These requirements pertain to all applicable tractors and box-type trailers that operate on California highways regardless of where the vehicles are registered, although there are provisions specific to large and small fleets. All aerodynamic and tire technologies must be verified by the United States Environmental Protection Agency's SmartWay Program.

The *2008 Scoping Plan* projected that the vehicle efficiency measures would result in a GHG emissions reduction of 4.5 $MMTCO_2e$ or approximately 2% of the transportation sector total of 225.4 $MMTCO_2e$. Thus, the 2% GHG reduction was applied to the transportation sector projected emissions for 2020 and 2030.

J. CITY GHG EMISSIONS REDUCTION MEASURES, TOTAL REDUCTIONS AND PLAN TO REDUCE GHG EMISSIONS

1. City Reduction Measures and Total GHG Emission Reductions

The City carefully evaluated measures adopted by other cities and measures recommended by several organizations. Among the sources that identified reduction and mitigation measures are:

- ❒ Review of measures described Climate Action Plans prepared by cities in Northern, Central and Southern California
- ❒ California Attorney General's Office, *Sustainability and General Plans: Examples of Policies to Address Climate Change*, January 22, 2010, 9 pgs
- ❒ California Attorney General's Office, *Addressing Climate Change at the Project Level*, January 6, 2010, 18 pgs
- ❒ California Air Pollution Control Officers (CAPCOA*),Model Policies for Greenhouse Gases in General Plans: A Resource for Local Government to Incorporate General Plan Policies to Reduce Greenhouse Gas Emissions,* June 2009, 250 pgs
- ❒ California Air Pollution Control Officers (CAPCOA*), Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Address Emission Reductions from Greenhouse Gas Mitigation Measures*, August, 2010
- ❒ California Department of Housing and Community Development, *Housing, Climate Change and SB 375: Resources and Technical Assistance*
- ❒ Institute for Local Government, *Planning for Climate Change*
- ❒ Institute for Local Government, *Sustainability Best Practices Framework*

Part 2 describes Brawley's *Plan to Reduce GHG Emissions* and each specific measure.

Table 14 estimates the emissions reductions resulting from implementation of 32 specific City measures *and* the State reduction measures. In summary:

- ❒ The total reductions (25,186) exceed the target (15,458) for the year 2020.
- ❒ The total reductions (58,437) exceed the target (58,111) for the year 2030.

However, the row "Other Measures" means that between 2020 and 2030 additional reduction measures must be identified.

These other measures will likely be in the form of mandates and incentives from the State government and technology breakthroughs. In addition, changes in behavior such as reduced energy and water consumption and the use of alternative modes of travel at rates higher than predicted could lead to greater emissions reductions.

It should be noted that it was not possible to quantify the emissions reductions of some measures such as "promote the installation of energy efficient appliances."

Table 14
City of Brawley
Total Emissions Reductions – State and City Measures: 2020 and 2030

State Measure	2020 Reduction (MTCO2e)	2030 Reduction (MTCO2e)
Pavley (AB 1493)1	6,783.37	12,879.46
Low Carbon Fuel Standard	2,524.92	9,540.34
Vehicle Efficiency Measures	753.71	954.03
Total	10,062.00	23,373.83
City Measure	**2020 Reduction (MTCO2e)**	**2030 Reduction (MTCO2e)**
Exceed Title 24 Standards	338.27	1,242.03
Promote Energy Audits	1,627.85	2,465.41
Home Weatherization	320.72	764.27
HERO Program	231.60	617.60
Conversion to LED	19.94	49.85
Energy Efficiency in City Buildings	64.41	193.91
Solid Waste Management	4,802.85	10,910.36
Urban Water Management	89.18	196.94
Active Transportation	324.93	568.11
Clean Vehicle Policy	11.39	17.09
Off Road Vehicle Reductions	1,237.80	1,149.68
Transportation Measures to Reduce VMT	3,299.71	4,322.63
Land Use Measures in Support of SB 375	1,670.12	3,121.30
Electric Vehicle Infrastructure	1,085.44	4,443.91
Total	15,124.22	30,063.09
Total State and City Reductions	25,186.22	53,436.92
Other Measures	**2020 Reduction (MTCO2e)**	**2030 Reduction (MTCO2e)**
Other 2020-2030 State & City Measures	N/A	5,000
Grand Total	25,186.22	58,436.92

2. Brawley's *Plan to Reduce GHG Emissions*

The City's *Plan to Reduce Greenhouse Gas Emissions* is organized according to the following categories:

- ❒ Energy Conservation and Efficiency Measures
- ❒ Solid Waste Management
- ❒ Urban Water Management
- ❒ Transportation
- ❒ Land Use Measures

Table 15 briefly describes each measure and the department(s) responsible for implementation.

Table 15
City of Brawley
Plan to Reduce Greenhouse Gas Emissions
List of GHG Emissions Reduction and Mitigation Measures

Measure	Responsible Department(s)
ENERGY CONSERVATION AND EFFICIENCY MEASURES	
1. Continue to Implement the General Plan Resource Management Element Policies	Planning Department, Public Works Department and Community Development Services Department, Building Division
2. Buildings Exceed Title 24 Energy Efficiency Standards	Planning Department and Community Development Services Department, Building Division
3. New Construction Energy Efficiency Program (NCEEP)	Planning Department and Community Development Services Department, Building Division
4. Buildings Exceed Minimum CALGreen Requirements	Planning Department and Community Development Services Department, Building Division
5. Promote Energy Audits of Existing Buildings	Planning Department, Community Development Services Department, Building Division and Finance Department
6. Promote Participation in Utility Company Residential and Business Rebates	Community Development Services Department, Building Division
7. Weatherization	Community Development Services Department, Housing Division
8. Promote the Brawley HERO Program	Community Development Services Department, Housing Division
9. Promote the Installation of Energy Efficient Appliances	Planning Department and Community Development Services Department, Building Division
10. Explore a Street Light LED Conversion Project	Public Works Department
11. Encourage Project Applicants to Plant Shade Trees	Planning Department and Public Works Department
12. Increase Energy Efficiency in Existing City Buildings	All
SOLID WASTE MANAGEMENT	
1. Continue to Implement the General Plan Resource Management Element Programs	Public Works Department
2. Continue to Implement the Solid Waste Diversion and Per Capita Disposal Rate Programs	Public Works Department
3. Recycle Demolished Construction Material	Public Works Department
4. Increase Commercial Recycling	Public Works Department
5. Increase the Composting of Waste	Public Works Department
6. Implement the Waste Prevention, Recycling & Purchasing Recycled Products Policy	All
7. Community Cleanup Program	Public Works Department

Table 14 continued
City of Brawley
Plan to Reduce Greenhouse Gas Emissions
List of GHG Emissions Reduction and Mitigation Measures

Measure	Responsible Department(s)
URBAN WATER MANAGEMENT	
1. Implement the 2008 General Plan Water Conservation Policies	Public Works Department
2. Implement the 2010 and 2015 Urban Water Management Plan Demand Management Measures	Public Works Department
3. Continue to Enforce the City's Water Efficient Landscape Ordinance	Public Works Department
4. Continue to Enforce the City Ordinance Prohibiting Wasteful Use of Water	Public Works Department
TRANSPORTATION	
1. Continue to Implement the City of Brawley Non-Motorized Transportation Plan	Public Works Department and Planning Department
2. Establish a Clean Vehicle Policy:	All Departments
3. Continue to Implement the Safe Routes to School Program	Public Works Department
4. Off-Road Vehicle Measures	Public Works Department
5. Transportation Measures Reducing VMT	Planning Department and Public Works Dept.
LAND USE MEASURES	
1. Establish a Brawley Greenbelt	Planning Department
2. Establish a Planned Growth Boundary Line	Planning Department
3. Facilitate Infill Development	Planning Department
4. Complete Zoning for Electric Vehicle Infrastructure	Planning Department

a. Energy Conservation and Efficiency Measures

Goal: Reduce energy use in existing and new municipal, residential and non-residential buildings.

1. **Continue to Implement the General Plan Resource Management Element Policies:** The goal of the programs is to improve energy efficiency and sustainable growth.

Responsible Department: Planning Department, Public Works Department and Community Development Services Department, Building Division

GHG Emissions Reduction Potential: GHGs are emitted when electricity and natural gas are used as energy sources in residential and non-residential buildings. Implementation of the *Resource Management Element* (RME) policies will reduce energy consumption.

The following paragraphs describe the policies:

- ❒ Energy Conservation: Using the City's site development review process, energy conservation technological devices shall be encouraged in new development and rehabilitation of existing development. In addition, support innovative site, building, and landscaping designs for all new public and private buildings to maximize cooling efficiency and natural shade.

- ❒ Building Energy Performance: To meet State energy conservation requirements, maintain local legislation to establish, update and implement building code requirements for energy performance according to Title 24 Energy Regulations.

- ❒ Incentive Program: Encourage the Imperial Irrigation District to implement an incentive program to retrofit existing development with energy efficient lighting and air conditioning and heating systems. Provide literature regarding incentive programs at City offices and inform Brawley property owners of incentive programs when reviewing plans for major remodeling and rehabilitation projects.

Although the *Resource Management Element* policies will contribute to GHG emissions reductions, they cannot be quantified in terms of the numbers and types of housing units nor the kinds of energy improvements that may be made in the future by current homeowners and businesses and new developments.

Source: City of Brawley 2008 General Plan, *General Plan Implementation Program*, pages Imp 32-33

2. **Buildings Exceed Title 24 Energy Efficiency Standards:** Encourage projects to exceed Title 24 standards and thereby reduce energy use and reduce GHG emissions.

Responsible Departments: Planning Department and Community Development Services Department, Building Division

GHG Emissions Reduction Potential: GHGs are emitted when electricity and natural gas are used as energy sources in residential and non-residential buildings. Title 24, Part 6 regulates energy uses including space heating and cooling, hot water heating, and ventilation. The

California Energy Commission on May 31, 2012 approved energy efficiency standards for new homes and commercial buildings.

When implementing the *Resource Management Element* policies as new development is proposed, the City will encourage residential and non-residential projects to exceed the Title 24 standards by 20%.

According to the U.S. Energy Information Administration, as square footage increases, the burden on heating and cooling equipment rises, lighting requirements increase, and the likelihood that the household uses more than one refrigerator increases. Square footage typically stays fixed over the life of a home and it is a characteristic that is expensive, even impractical to alter to reduce energy consumption.

When new residential development is proposed the City will explore whether reductions in house sizes and other strategies would reduce energy consumption.

To further assist in attaining the goal of reducing emissions 20% beyond Title 24 updates, the City could explore enacting *a commercial and industrial energy conservation ordinance* that requires certain businesses to reduce energy use by 20% when a property is sold. Reducing energy consumption and associated emissions by 20% could produce significant greenhouse gas savings as more businesses take advantage of the cost savings associated with reducing energy use. This package of actions includes exploration of point of sale energy use disclosures, energy audits, and energy efficiency upgrades.

Along with a commercial energy conservation ordinance, the City could adopt a residential energy conservation ordinance that requires cost-effective energy efficiency upgrades in existing buildings be implemented at point of sale or during major renovation of residential units. A maximum cost ceiling would be established to protect owners from excessive costs. This effort also would significantly reduce greenhouse gas emissions.

Implementation of the 20% above Title 24 policy would result in the following GHG emissions reductions:

- ❒ 2020 338.97 $MTCO_2e$
- ❒ 2030 1,242.03 $MTCO_2e$

Sources:

California Air Pollution Control Officers (CAPCOA*), Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Address Emission Reductions from Greenhouse Gas Mitigation Measures*, August, 2010, pages 85-90.
California Energy Commission, *2013 Building Energy Efficiency Standards*
California Energy Commission, *Impact Analysis: California's 2013 Building Energy Efficiency Standards*, July 2013

3. **New Construction Energy Efficiency Program (NCEEP):** The NCEEP is an Imperial Irrigation District (IID) non-residential new construction and renovation program providing financial incentives for projects that have energy savings design 10% above the current Title 24 requirements.

Responsible Departments: Planning Department and Community Development Services Department, Building Division

GHG Emissions Reduction Potential: GHGs are emitted when electricity and natural gas are used as energy sources in residential and non-residential buildings. Voluntary participation in the NCEEP will result in energy savings beyond the minimum Title 24 requirements.

The NCEEP, as noted above, is a non-residential new construction and renovation energy efficiency program that combines an integrated design process with financial incentives for energy saving design at least 10% above the current Title 24 requirements. The program objectives are to:

- ❒ Achieve at least 10% energy savings over the current Title 24 requirements; and
- ❒ Financially reward energy efficient design and construction.

The program is designed for commercial, agricultural and industrial new construction and renovation/remodel projects. According to IID, funding is limited and is offered on a first-come, first-served basis. It is effective until program funding is exhausted or the program is discontinued. Because of these factors, the potential GHG emissions reductions cannot be quantified.

Source:

Imperial Irrigation District Office of Energy Management and Strategic Marketing, *New Construction Energy Efficiency Program (NCEEP) Guidelines*, July 2014, 17 pgs

4. **Buildings Exceed Minimum CALGreen Requirements:** Encourage new development projects to exceed the 2013 California Green Buildings Code Standards which took effect on January 1, 2014.

Responsible Departments: Planning Department and Community Development Services Department, Building Division

GHG Emissions Reduction Potential: CALGreen creates uniform regulations for new residential and non-residential buildings that are intended to make buildings more efficient in the use of energy and materials and reduce construction waste.

Reduction in electricity and natural gas use from new buildings is based on average energy reductions by building type and climate zone, according to the California Air Pollution Control Officers (CAPCOA*).*

According to the California Department of Housing and Community Development (HCD), there are "voluntary measures" found in the 2013 CALGreen Code which can be adopted by local government. The measures provide enhanced levels of green building construction and sustainability that are not mandatory statewide, but were developed as a consistent set of standards available for adoption by local government. When lawfully adopted, the "voluntary measures" establish prerequisites that are mandatory to achieve compliance. Local enforcing agencies may adopt CALGreen "Residential and Nonresidential Voluntary Measures" in whole, in part, or not at all. Therefore, a local ordinance may require some or all of CALGreen

enhanced measures or they may adopt other green building standards or other green programs altogether. Enhanced green building requirements, according to HCD, may vary from jurisdiction to jurisdiction based upon the goals of the local governing body.

The City of Brawley will consider adoption of residential and nonresidential voluntary measures. At this time no estimate of a reduction in GHG emissions due to implementation of voluntary measures can be quantified.

Sources:

California Air Pollution Control Officers (CAPCOA*), Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Address Emission Reductions from Greenhouse Gas Mitigation Measures*, August, 2010, pages 85-91.
California Building Standards Commission, *California's Green Building Code*
California Department of Housing and Community Development*, Guide to the 2013 California Green Building Standards Code Residential, 134 pages*

5. **Promote Energy Audits of Existing Buildings:** Encourage homeowners and businesses including the owners of multifamily properties to conduct energy audits and implement the energy saving recommendations.

Responsible Departments: Planning Department, Community Development Services Department, Building Division and Finance Department

GHG Emissions Reduction Potential: The measure is intended to help property owners identify energy efficiency opportunities at their existing buildings and, if desired, take advantage of rebates and incentive programs for energy efficiency improvements.

Participation in energy audits and associated energy conservation programs will rely on voluntary participation. Homeowners can be regularly informed through announcements in the utility bills and postings on the City's website. Businesses can be encouraged to complete an energy audit through the business application procedure.

The Imperial Irrigation District (IID) offers free online and onsite energy audits. Upon the completed examination the energy audit representative issues a report that summarizes the existing conditions in a home or business, identifies potential energy saving measures and provides direction towards additional resources and energy saving improvements.

The Southern California Gas Company offers a personalized online energy savings tool for homeowners and energy-efficient assessments for business that consume 250,000 or more therms per year.

Residential Buildings

Home energy upgrades can include the following:

- ❒ Air sealing
- ❒ Attic insulation
- ❒ Duct sealing
- ❒ Hot water pipe insulation
- ❒ Thermostatic shower control
- ❒ Combustion safety testing

- ❒ Smoke detector/CO detector
- ❒ High efficiency furnace
- ❒ Energy efficient cooling
- ❒ Energy efficient hot water heater
- ❒ Energy efficient windows
- ❒ Wall insulation
- ❒ Cool roof
- ❒ Solar panels/renewable energy
- ❒ Water efficient landscaping

IID performs on-site energy audits and provides a link to the Home Energy Saver calculator. The calculator estimates a reduction of 1.93 $MTCO_2e$ per home. Assuming participation rates of 250 homes by 2020 and 500 by 2030, the resulting reductions in GHG emissions would be approximately 483 $MTCO_2e$ and 965 $MTCO_2e$, respectively. That would result in a cumulative reduction of 1,448 $MTCO_2e$.

Commercial Buildings

Owners of existing commercial buildings can be encouraged to undertake a commercial building energy audit. In the past many companies have just considered utilities as "a cost of doing business." However, by running an inefficient building, they are overpaying for energy. A commercial energy audit can include the following:

- ❒ Lighting systems
- ❒ HVAC Systems and Controls
- ❒ Compressed Air Systems
- ❒ Renewable Energy Applications
- ❒ Electric Motors and Drives
- ❒ Process Systems
- ❒ Steam Systems
- ❒ Heat Recovery
- ❒ Building Envelope Upgrades
- ❒ Switching Utility Providers or Utility Rates

When estimating possible energy savings in a facility from performing an energy audit, it's *impossible* to make a reasonable estimate without understanding how the building operates and uses energy. However, according to Abraxas Energy Consulting savings upwards of 40% are possible on some buildings, with the average savings being 10 to 20%. If the building has already had energy audits in the past, and the identified measures were implemented, it's possible that the facility is already efficient, and in that case, there might be much less energy savings potential. If the facility has been in operation for many years without having had an energy audit, it's very possible that an energy audit can identify significant energy savings.

Abaraxas estimates that for a building that has not aggressively pursued energy efficiency in the past 10 years, assume a 20% savings potential. For a building that has been pursuing energy efficiency in the past five years, assume 10% savings potential.

Assuming a 10% business participation rate and 20% in energy savings, this program would *reduce* electricity and natural gas consumption as listed below:

	2020	2030
❒ Electricity (MWh)	11,600	15,196
❒ Natural Gas (Therms)	70,400	92,224

The corresponding reductions in GHG emissions would be:

- ❒ 1,145 $MTCO_2e$ in 2020
- ❒ 1,500 $MTCO_2e$ in 2030

6. **Promote Participation in Utility Company Residential and Business Rebates:** Inform homeowners and businesses of available rebates and incentives to complete energy efficiency improvements.

Responsible Department: Community Development Services Department, Building Division

GHG Emissions Reduction Potential: When used properly ENERGY STAR-certified products use less energy and create less pollution. The ENERGY STAR label provides assurance of energy-efficiency performance that exceeds federal standards.

The Southern California Gas Company provides rebates for improvements meeting the Energy Star standards including water heaters, tankless water heaters, clothes washers, low flow showerheads, attic or wall insulation, furnace, and gravity wall furnaces. Equipment eligible for business rebates include, for instance, boilers, cooking equipment, water heaters and tankless water heaters.

The IID had rebate programs similar to those offered by Southern California Gas Company. Due to the tremendous customer response, the funds for the program had been fully reserved based on applications received as of September 2014. With the depletion of funds, the program is now closed for all measures except attic insulation. Rebates are still available for attic insulation at the $0.30 per sq. ft. incentive level. The City will monitor to see if the program is renewed in 2015.

Sources:

Southern California Gas Company, *Energy-Efficiency Rebates for Business, 2013-2014 Policies and Procedures, Customer Handbook*, Effective January 2013, 14 pages
Southern California Gas Company, *Rebate Guide and Application 2013-2014*, 12 pages

7. **Weatherization:** Promote existing weatherization programs and coordinate with Campesinos Unidos in informing residents of available resources.

Responsible Department: Community Development Services Department, Housing Division

GHG Emissions Reduction Potential: The Weatherization Assistance Program (WAP) is a federal program designed to increase the energy efficiency of homes which are owned or occupied by low-income

persons, to reduce their total residential expenditures such as heating and cooling bills, and to improve the health and safety of families. The process of making homes more energy efficient, thereby reducing energy usage and costs is called *weatherization*. Weatherization services can help a family, struggling to make ends meet, reduce their energy consumption by up to 35%, and save them more than $400 on their heating and cooling bills in the first year alone.

Common types of weatherization include, but are not limited, to:

- ❒ Sealing the holes and cracks around windows, doors and pipes
- ❒ Ensuring proper levels of insulation
- ❒ Fixing or replacing windows
- ❒ Putting an insulated blanket around a water heater
- ❒ Making sure heating and air conditioning systems are working properly

Locally, the WAP is administered Campesinos Unidos, Inc., a nonprofit 501(c)(3) organization located in Brawley, as a subgrantee to the State of California. The 2014 State Plan allocates $191,370 to Campesinos Unidos, Inc. Based on the statewide average cost per dwelling unit of $1,911; the allocated funds could support the weatherization of 100 homes.

Short- and long-term performance assumes that Federal funding will continue to be allocated to the State and that Campesino Unidos, Inc. or another local non-profit will administer the program so that 100 homes can be weatherized per year. Based on a 20% participation rate, Brawley's share of all weatherized homes under WAP is forecasted below on a *cumulative* basis:

- ❒ 2012-2020 160
- ❒ 2012-2030 360

The Imperial Valley Housing Authority (IVHA) also completes weatherization of housing located in Brawley. These efforts have included, for example, foam roofing, A/C replacement, low flow showerheads, water saving toilets, and energy efficient interior lighting, at Austin-Thomas Housing, Eastern Avenue Homes, and Brawley Homes. As additional energy efficient improvements are planned by IVHA for 2015 and beyond, it is estimated that the following number of homes will be weatherized:

- ❒ 2012-2020 75
- ❒ 2012-2030 200

The State Department of Community Services and Development's Weatherization Assistance Program (WAP) webpage states that weatherization services can reduce energy consumption by up to 35%. According to the GHG Inventory homes in Brawley annually consumed 191 therms of natural gas and 11 MWh of electricity. A 35% reduction results in decreases of 67 therms and 4 MWh of consumption. Assuming the above participation rates, the total reductions would be:

- ❒ 2012-2020 235 X 67 = 15,745 Therms
- ❒ 2012-2020 235 X 4 = 940 MWh
- ❒ 2012-2030 560 X 67 = 37,520Therms
- ❒ 2012-2030 560 X 4 = 2,240 MWh

These levels of reduced consumption would result in a decrease by 2020 and 2030 of 320.73 and 764.27 metric tons of CO_2e, respectively. These reductions equate to 1.36 $MTCO_2e$ per occupied home.

Source:

State of California, Department of Community Services and Development, *Weatherization Assistance Program for Low-Income Persons: 2014 State Plan and Application to the U.S. Department*, June 26, 2014

8. **Promote the Brawley HERO Program**: Promote the HERO Program which allows homeowners to borrow money to fund an array of conservation and renewable energy projects including water efficiency projects as well as the installation of electric vehicle charging infrastructure.

Responsible Department: Community Development Services Department, Housing Division

GHG Emissions Reduction Potential: Homeowners have access to funds to improve the energy and water efficiency of their homes. The amount borrowed can be financed over a 5-, 10-, 15-, 20- or 25-year period and is paid through annual installments collected on their property tax bill.

On October 1, 2013 the City Council approved a resolution enabling the California Home Energy Retrofit Program (HERO) Program to be available to owners of property within Brawley to finance renewable energy efficiency and water efficiency improvements and vehicle charging infrastructure. Typical projects include: solar photovoltaic (PV) systems; energy efficient space heating, air cooling and ventilation (HVAC); cool roof systems; energy efficient windows, skylights, and doors; solar thermal water heating; air sealing and weatherization; insulation; water heating; indoor energy efficient light fixtures; and water efficiency measures.

The U.S. Department of Energy online energy savings calculator estimates the cost savings and GHG reductions based on several typical home energy upgrades. The on-line calculator is specific to a zip code, year the home was built and the number of occupants. Based on 2011-2013 American Community Survey data, the median year built for Brawley's owner occupied housing was 1974 while the average household size was 3.17. This data was entered in to the on-line calculator. The results show that whole home upgrades have a potential for $866 in yearly savings in addition to a reduction of 5,249 KWh of electricity and 69 therms. These energy savings result in a reduction of 4,264 pounds of CO_2 or nearly two (1.93) metric tons of CO_2 per dwelling unit.

Over the 16 year period (2014-2030), it is assumed that HERO Program would annually attract the same number (20) of homeowner participants as the weatherization program. Therefore, the GHG reductions are projected as follows:

- ❒ 2014-2020 120 X 1.93 $MTCO_2e$ = 231.6
- ❒ 2014-2030 320 X 1.93 $MTCO_2e$ = 617.6

Source:

United States Department of Energy, Home Energy Saver

9. **Promote the Installation of Energy Efficient Appliances:** Encourage project applicants to install energy efficient appliances in new residential and non-residential developments.

Responsible Departments: Planning Department and Community Development Services Department, Building Division

GHG Emissions Reduction Potential: Using energy-efficient appliances reduces a building's energy consumption and associated GHG emissions from natural gas combustion and electricity production.

The City staff will promote this program to developers of residential and nonresidential projects. The range of effectiveness of installing energy efficient appliances is:

- ❒ Residential: 2-4% GHG emissions from electricity use
- ❒ Grocery Stores: 17-22% of GHG emissions from electricity use

To take credit for this mitigation measure, the project applicant (or contracted builder) would need to ensure that energy efficient appliances are installed. For residential dwellings, typical builder-supplied appliances include refrigerators and dishwashers. Clothes washers and ceiling fans would be applicable if the builder supplied them. For commercial land uses, energy-efficient refrigerators have been evaluated for grocery stores.

As project developers would participate in this program on a voluntary basis, there are no data to quantify potential GHG emissions reductions.

Source:

California Air Pollution Control Officers (CAPCOA*), Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Address Emission Reductions from Greenhouse Gas Mitigation Measures*, August, 2010, pages 103-110

10. **Explore a Street Light LED Conversion Project:** Replace existing streetlight fixtures with new LED fixtures to provide a better quality of light, enhance public safety and reduce energy costs.

Responsible Department: Public Works Department

GHG Emissions Reduction Potential: Light-emitting diode bulbs (LEDs) are thought to be brighter than traditional lights and many cities believe the increased brightness improves public safety. LEDs also are more efficient and reduce GHG emissions and produce energy cost savings. Streetlights make up about 33% of the Brawley's electricity consumption and accounted for 233 metric tons of carbon dioxide equivalent emissions in 2012.

In 2012 street lighting consumed 750 MWh which generated 233.31 metric tons of CO_2e.

Street lighting LED conversion studies have shown that on average a 40% reduction in energy consumption can be expected. A street light inventory indicating the number, location, and type of street lighting has not been completed. Hypothetically, if the entire street lighting

infrastructure were converted to LED, the electricity consumption would be reduced by 40% and, in turn, so would the GHG emissions. An entire conversion would result in a reduction of 93.32 $MTCO_2e$ (233.31 X 40% = 93.32) from usage and additional 6.38 $MTCO_2e$ from reductions in transmissions and distribution (T & D) loss for a total of nearly 100 MT (99.7).

The GHG emissions reductions are estimated below based on a 20% conversion by 2020 and 50% conversion by 2030.

- ❒ 20% conversion 19.94 $MTCO_2e$
- ❒ 50% conversion 69.80 $MTCO_2e$

Sources:

American Public Works Association, Beaumont, California, *Begins Third Year of LED Streetlight Use*
City of Redlands, *Street Lighting Upgrade Program: Energy Efficient Light Emitting Diode (LED) Street Lighting Conversion Study*, July 2010, pages 8-9
Department of Energy Municipal Solid-State Street Lighting Consortium
LEOTEK Lite-On Group, *A Municipal Guide for Converting LED Street Lighting: A Step-by-Step Approach to Improving Outdoor Lighting, Saving Energy and Reducing Maintenance Costs*, 20 pages

11. **Encourage Project Applicants to Plant Shade Trees:** Provide incentives so that project applicants plant shade trees.

Responsible Departments: Planning Department and Public Works Department

GHG Emissions Reduction Potential: Planting shade trees around buildings has been shown to effectively lower the electricity cooling demand of buildings by blocking incident sunlight and reducing heat gain through windows, walls, and roofs. By reducing cooling demand, shade trees help reduce electricity demand and therefore reduce GHG emissions which would otherwise be emitted during the production of that electricity.

Deciduous trees with large canopies are a desirable choice of shade tree because they provide shade in the warm months and shed their leaves in the winter months to allow sunlight to pass through and warm the building.

It takes several years for trees to grow to the height necessary to provide shade to a building. Furthermore, without deed restrictions, the presence of shade trees around a building may not be permanent, as a new owner may decide to remove the trees or not replace them if they die. It may be possible to remedy these issues through adoption of a Tree Ordinance.

The City staff will work with developers of residential and nonresidential projects to promote the planting of shade trees. Because of the drought conditions and an overwhelming need to conserve water, this program will be explored on a case-by-case basis. Therefore, there is at this time no estimate of the impact on reducing GHG emissions.

Source:

California Air Pollution Control Officers (CAPCOA*), Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Address Emission Reductions from Greenhouse Gas Mitigation Measures*, August, 2010, pages 450-455.

12. Increase Energy Efficiency of Existing City Buildings: Establish a goal to reduce City government energy use by 10% by 2020 and 25% by 2030 and implement cost-effective improvements and upgrades to achieve that goal.

Responsible Departments: All

GHG Emissions Reduction Potential: GHGs are emitted when electricity and natural gas are used as energy sources in existing City buildings.

This reduction measure includes the following actions:

- ❒ Formalize a goal to cut City government energy use by 10% by 2020 and 25% by 2030.
- ❒ Complete energy audits and benchmarking of all City-owned or -operated facilities.
- ❒ Maintain a regular maintenance schedule for heating and cooling, ventilation and other building functions.
- ❒ Establish a prioritized list of energy efficiency upgrade projects and implement them as funding becomes available.

This program would *reduce* electricity and natural gas consumption as listed below:

	2020	2030
❒ Electricity (MWh)	186.6	561.8
❒ Natural Gas (Therms)	4,530	13,637

The corresponding reductions in GHG emissions would be:

- ❒ 64.41 $MTCO_2e$ in 2020
- ❒ 193.91 $MTCO_2e$ in 2030

b. Solid Waste Management

Goal: Contribute to achieving the State 75% recycling goal.

1. **Continue to Implement the General Plan *Resource Management Element* Programs:** The goal of the programs is to improve solid waste recycling.

Responsible Department: Public Works Department

GHG Emissions Reduction Potential: Source reduction and recycling lessen the amount of solid waste that is landfilled and thereby reduces the amount of methane that is emitted. The transport and decomposition of landfill waste and the flaring of landfill gas all produce GHG emissions. Decomposition of waste produces methane, a GHG which has a global warming potential over 20 times that of CO_2. The transport of waste from the site of generation to the landfill produces GHG emissions from the combustion of the fuel used to power the vehicle. Choosing waste management practices which reduce the amount of waste sent to landfills will reduce GHG emissions. Strategies to reduce landfill waste include increasing recycling, reuse, and composting, and encouraging lifestyle choices and office practices which reduce waste generation.

The following paragraphs describe the *Resource Management Element* programs:

- ❒ Source Reduction and Recycling: To comply with the State Integrated Waste Management Act and reduce the total volume of solid waste to be disposed, implement the following measures:

  - ✓ Review and update the Brawley Source Reduction and Recycling Plan at least once every five years; submit this Plan to the County for inclusion as an Element of the County Integrated Waste Management Plan;
  - ✓ Assist in the development of local, regional, and statewide markets for materials collected and processed through the City and regional recycling programs;
  - ✓ Coordinate with the County and other local jurisdictions to integrate all source reduction and recycling programs to maximize efficiency and minimize program operating costs; and
  - ✓ Educate Brawley residents and businesses about source reduction and recycling programs, develop educational programs for the local schools, offer incentives where appropriate, and provide opportunities for community feedback.

- ❒ Regional Landfills: Coordinate with the County and other local jurisdictions in the siting and development of regional landfills and identify strategies to participate in the benefits of revenues generated by such uses.

  - ✓ Coordinate with the County to prevent or mitigate environmental impacts from regional landfills.

Although the *Resource Management Element* programs will contribute to GHG emissions reductions, the impacts cannot be quantified at this time. However, the programs will enable the City to reduce the City's per capita disposal rate.

Source:

California Air Pollution Control Officers (CAPCOA*), Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Address Emission Reductions from Greenhouse Gas Mitigation Measures*, August, 2010, page
City of Brawley 2008 General Plan, General Plan Implementation Program, pages Imp 31-32

2. **Continue to Implement the Solid Waste Diversion and Per Capita Disposal Rate Programs:** Continue to divert solid waste and reduce the per capita disposal rate. (Waste diversion and reduction refers to the combined efforts of waste prevention, reuse, recycling, and composting practices.)

Responsible Department: Public Works Department

GHG Emissions Reduction Potential: Diversion and reduction lessens the amount of solid waste that is landfilled and thereby reduces the amount of methane that is emitted. For example, avoided GHG emissions from common waste management pathways include:

- ❒ Emissions from combustion - Waste incineration produces emissions of carbon dioxide (CO_2) and nitrous oxide (NO_X), a GHG that is 298 times as potent as CO_2.
- ❒ Emissions from transportation - Transporting waste to disposal sites produces GHG emissions from the combustion of the fuel used in the equipment.
- ❒ Emissions from landfills - Waste in landfills decomposes anaerobically and produces methane (CH_4), a GHG that is 25 times as potent as CO_2.

Each year the City submits an Electronic Annual Report (EAR) to CalRecycle that describes the progress the City has made in achieving the requirements of the Integrated Waste Management Act particularly on implementing solid waste diversion programs and decreasing the per capita disposal rate. Prior to 2007 progress was measured by diversion rates. Under the old system, according to CalRecycle, calculating diversion rates was a time-consuming and lengthy process, and rates could not be finalized for several years after the fact. Diversion rates also were based on estimates of generation that often were inaccurate. The new system allows reporting jurisdictions to monitor their progress in a timely manner.

Beginning in 2007 diversion rates was no longer measured. Instead, a new goal measurement metric was established; namely, CalRecycle now compares reported disposal tons to population to calculate per capita disposal expressed in pounds/person/day. In 2012, California's statewide disposal rate was 4.3 pounds/resident/day.

The new goal is a 50% equivalent per capita disposal rate which is the amount of disposal a city would have had during the base period if it had been exactly at a 50% diversion rate. It is calculated using the average of 2003-2006 per capita generation for each community. It then divides this generation average in half to determine the 50% equivalent per capita disposal target.

All of the City's solid waste management efforts will contribute to lowering the per capita disposal rate. The reductions in GHG emissions are estimated at the end of this section.

Sources:

California Department of Resources Recycling and Recovery (CalRecycle), Local Government Central, *Annual Reporting Requirements*, 2 pgs
California Department of Resources Recycling and Recovery (CalRecycle), Local Government Central, *Goal Measurement FAQs*, 8 pgs
California Department of Resources Recycling and Recovery (CalRecycle), Local Government Central, Goal Measurement, *California's Statewide Per Resident, Per Employee, and Total Disposal Since 1989*, 2 pgs
California Department of Resources Recycling and Recovery (Cal Recycle), Local Government Central, *California's 2012 Per Capital Disposal Rate*, 1 pg
California Department of Resources Recycling and Recovery (Cal Recycle), Local Government Central, *California's Estimated Statewide Diversion Rates Since 1989*, 2 pgs
City of Brawley Electronic Annual Report

3. **Recycle Demolished Construction Material:** Continue to enforce Municipal Code Chapter 7C Construction and Demolition Debris Recycling Program

Responsible Department: Public Works Department

GHG Emissions Reduction Potential: According to the California Air Pollution Control Officers (CAPCOA*):*

> Recycling demolished construction material can contribute to GHG reductions in multiple ways. First, it displaces new construction materials, thereby reducing the need for new raw material acquisition and manufacturing of those new construction materials. Harvesting of raw materials and manufacturing new materials requires energy in the form of fuel combustion and electricity, both of which are associated with GHG emissions. If the process of recycling construction materials is less carbon-intensive than the processes required to harvest and produce new construction materials, recycling these construction materials results in a net reduction in GHG emissions. Second, using local recycled construction material reduces the emissions associated with the transportation of new construction materials, which are typically manufactured farther away from a project site. Third, recycling construction material avoids sending this material to landfills. Wood-based materials decompose in landfills and contribute to methane emissions.
>
> The California Integrated Waste Management Board (CIWMB) cites decreases in greenhouse gas emissions as a benefit of construction waste management and recycling in its document "Construction Waste Management" which is used as part of California Sustainable Design Training. The document is available online at:
>
> www.calrecycle.ca.gov/greenbuilding/training/statemanual/waste.doc

Municipal Code Chapter 7C Construction and Demolition Debris Recycling Program requires all construction and renovation projects with a value of $50,000 to comply with the Chapter requirements for the preparation of a waste management and recycling plan. Demolition projects of more than 1,000 square feet also must comply with the requirements of Chapter 7C. The plan must satisfy the requirement to divert at least 50% by weight of the total construction and demolition debris generated by a project via reuse or recycling.

Included within the meaning of "construction and demolition debris" are discarded materials (e.g., glass, brick, concrete, asphalt material, pipe, gypsum, wallboard, lumber); clean

cardboard, paper, plastic, wood, and metal scraps; and non-construction and demolition debris wood scraps.

The City evaluates the plan as follows:

- ❒ Is the construction and demolition material that is generated recyclable?
- ❒ Will 50% of waste generated in the project be diverted from landfills?

All of the City's solid waste management efforts will contribute to lowering the per capita disposal rate. The reductions in GHG emissions are estimated at the end of this section.

Sources:

California Air Pollution Control Officers (CAPCOA*), Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Address Emission Reductions from Greenhouse Gas Mitigation Measures*, August, 2010, page 401
City of Brawley Municipal Code, Chapter 7C Construction and Demolition Debris Recycling Program
Integrated Waste Management Board, California Sustainable Design Training, *Construction Waste Management*, 9 pages

4. **Increase Commercial Recycling:** Provide education, outreach and monitoring to increase the amount of commercial recycling.

Responsible Department: Public Works Department

GHG Emissions Reduction Potential: Recycling reduces the amount of solid waste that needs to be landfilled and therefore reduces the amount of methane emitted. Recycling also leads to energy efficiency. When a recycled material, rather than a raw material, is used to make a new product, natural resources and energy are conserved. This is because recycled materials have already been refined and processed once; manufacturing the second time is much cleaner and less energy-intensive than the first. For example, manufacturing with recycled aluminum cans uses 95 percent less energy than creating the same amount of aluminum with bauxite.

AB 341 requires businesses that generate four or more cubic yards of commercial solid waste per week to recycle. The law also applies to multifamily complexes of five or more units regardless of the amount of commercial solid waste generated. Businesses include commercial and industrial uses as well as public uses including schools.

AB 341 requires the City to implement education, outreach, and monitoring programs to inform businesses and multifamily complexes of the state requirement to recycle and how they can recycle in the jurisdiction. CalRecycle states:

> Jurisdictions should choose methods to provide education and outreach that maximize existing resources including using existing websites, brochures, on-site meetings, etc. For example, if the hauler already sends out a sales representative to work with businesses that are not recycling, then the hauler's sales representative could inform the business of the state requirement, and then assist the business in determining the best approach to recycle. Other options include using the jurisdiction's own staff, community groups, or independent recyclers to inform the businesses of the state requirement and how the businesses can recycle in the jurisdiction. If the jurisdiction already sends out

letters to businesses regarding recycling opportunities, the letter could include information about the state requirement.

Recyclable materials in the "blue can" go to Republic Waste Services Materials Recovery Facility.

There are also recycling drop-off centers located in Brawley such as Recycle Station, Amalgamated Recycling, Inc., and I V Recycling.

All of the City's solid waste management efforts will contribute to lowering the per capita disposal rate. The reductions in GHG emissions are estimated at the end of this section.

Sources:

California Department of Resources Recycling and Recovery (CalRecycle), *Mandatory Commercial Recycling: Frequently Asked Questions*, 17 pages
Institute for Local Government, *Sample Commercial Recycling Ordinance*, November 2009, 24 pages

5. **Increase the Composting of Waste:** Provide education, outreach and monitoring to increase the amount of commercial recycling.

Responsible Department: Public Works Department

GHG Emissions Reduction Potential: Compostable organics make up 30% of California's overall waste stream, contributing over 12 million tons annually to the state's landfills. In landfills, this material undergoes anaerobic decomposition and produces significant quantities of methane, up to 80% of which is not captured by a landfill gas system. Composting, on the other hand, is a fundamentally aerobic process, and well managed compost facilities do not produce any methane. Composting offers an environmentally superior alternative to landfilliing organics that eliminates methane production, provides a series of economic and environmental co-benefits, and has a substantial impact on greenhouse gas reduction.

A compost process is either aerobic or anaerobic. Anaerobic composting is when organic materials—or compostables—break down by bacteria without the presence of oxygen. This process, which happens in landfills, produces methane, carbon dioxide, and trace amounts of other gases. Aerobic composting is when organic material breaks down by bacteria in the presence of oxygen. The end byproducts in aerobic composting are mainly carbon dioxide and water, and nutrient-packed soil of finished compost. By composting these materials, the generation of greenhouse gases, particularly methane, is avoided. Backyard composting and well-run industrial compost operations will produce negligible greenhouse gas emissions (mostly from the operation of tractors and other equipment).

Imperial Compost, located in Brawley, is a composting operation that accepts green materials, agricultural and manure.

The Imperial Valley Integrated Waste Management Agency indicates that CR & R is hoping to start a composting program with its green waste.

All of the City's solid waste management efforts will contribute to lowering the per capita disposal rate. The reductions in GHG emissions are estimated at the end of this section.

Sources:

Californians Against Waste, *Composting: A Greenhouse Gas Mitigation Measure*, pg. 1
Eureka Recycling*: Recycling, Composting and Greenhouse Gas Reduction in Minnesota*, page 5

6. **Waste Prevention, Recycling & Purchasing Recycled Products Policy:** implement the City Council adopted Administrative Procedure.

Responsible Departments: All

GHG Emissions Reduction Potential: The largest source of human-generated methane, a potent greenhouse gas, comes from improperly managed landfills. Thus, waste reduction and recycling activities reduce the potential to generate methane at landfills, as well as reducing pollutants generated from transporting waste to disposal sites. Waste reduction and recycling activities also conserve natural resources.

On June 2, 2015, the City Council adopted an Administrative Procedure to implement a Policy for Waste Prevention, Recycling & Purchasing Recycled Products. The Administrative Procedure assigns responsibilities, establishes policies and sets guidelines for:

- ❒ Reducing the amount of solid waste generated and going to the landfill by the City's day to day activities.
- ❒ Purchasing of reusable/non-disposable products and restricting purchases to durable and reusable/non-disposable equipment, materials and products whenever possible.
- ❒ Recycling of mixed paper and cardboard; proper disposal of fluorescent light bulbs, batteries, and other hazardous waste products.
- ❒ Promoting and encouraging the purchase of products made from recycled materials, including but not limited to paper products, desk accessories and other office products.

Sources:

Brawley City Council Resolution Approving an In-House Waste Reduction and Recycled-Content Product Procurement Policy
Institute for Local Government, *Sustainability Best Practices Framework – 2013 Update*, Waste Reduction & Recycling

7. **Community Cleanup Program:** continue the program of Spring and Fall Community Cleanup Days.

Responsible Departments: Public Works Department

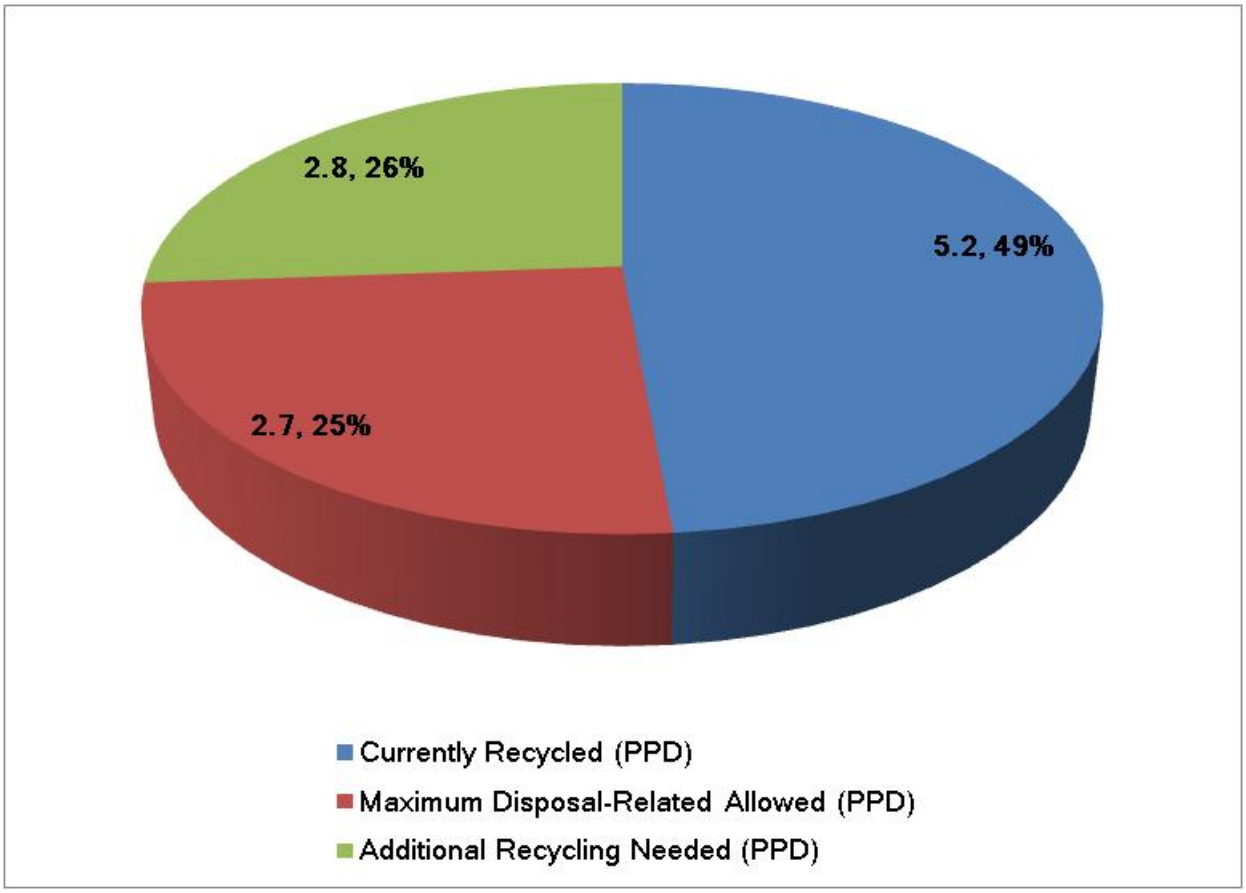
GHG Emissions Reduction Potential: The Community Cleanup days collect MSW trash, recycle greenwaste and metal recycling. The waste collected also results savings on disposal fees.

Solid Waste Management Practices and Greenhouse Gas Emissions Reductions

The cumulative impact of the City's solid waste management practices is to increase "diversion" and "recycling" and to decrease the "disposal" going to landfills. Diversion includes but is not limited to source reduction, recycling, composting, alternative daily cover, alternative intermediate cover, beneficial reuse at landfills, transformation and used-tire derive fuel. Recycling is the practice of recovering used materials from the waste stream and then incorporating those same materials into the manufacturing process. Successful recycling also depends on manufacturers making products from recovered materials and, in turn, consumers purchasing products made of recycled materials.

CalRecycle has selected as the long-term average (1990 through 2010) per-resident generation of 10.7 lbs/person/day as the base rate. AB 939 establishes a State goal of 75% recycling. With a base per resident generation of 10.7 lbs/person/day, the 75% recycling goal will require California to recycle 75%, or 8.0 lbs/resident/day, and allow not more than 25%, or 2.7 lbs/resident/day, to be directed toward disposal-related activities. According to CalRecycle, 49% of the per-resident generation of 10.7 lbs/person/day is achieved by recycling. Chart 2 shows "where we need to go."

Chart 2
Where Do We Need to Go?



Source: CalRecycle

Currently the City's disposal rate (solid waste going to the landfills) is 3.6 lbs/person/day. To calculate the GHG emissions reductions due to solid waste management practices the State target of 2.7 lbs/per person/per day was selected as the target for 2030 with the 2020 target set at 3.1 pounds. These lower disposal rates result in the following decreases from the forecasts:

- ❒ 2020 3,065.80 tons
- ❒ 2030 6,964.40 tons

The associated $MTCO_2e$ reductions are projected at:

- ❒ 2020 4,140.64
- ❒ 2030 9,406.05

Source:

CalRecycle, *California's New Goal: 75% Recycling*, May 9, 2012, page 7

c. Urban Water Management

Goal: Achieve a 20% reduction in water consumption.

1. **Implement the 2008 General Plan Water Conservation Policies:** The *Resource Management Element* contains several policies that guide the City's water conservation measures.

Responsible Department: Public Works Department

GHG Emissions Reduction Potential: Water use contributes to GHG emissions indirectly, via the production of the electricity that is used to pump, treat, and distribute the water. Reducing water demand also reduces electricity demand and associated indirect GHG emissions.

The water sector plays a significant role in California's energy consumption. In 2005, studies showed that 19% of the state's electricity was spent on water-related activities (California Energy Commission, 2005). GHGs emitted into the atmosphere now and in the future will contribute to further impacts on climate and will likely result in more severe impacts in the latter half of the century (California Air Resources Board (CARB) 2008). Because the water sector is such a large user of electricity, it must play an important role in reducing energy demand and GHG emissions.

The General Plan *Resource Management Element* promotes water conservation in existing and new development and agricultural activity. New development and rehabilitation projects will be required to make maximum use of water conservation techniques.

The *Resource Management Element* objective and policies are listed below:

RME Objective 4.1: **Promote city-wide water conservation to reduce the projected demand for water service and associated treatment.**

RME Policy 4.1.1: Protect groundwater resources from depletion and sources of pollution.

RME Policy 4.1.2: Conserve imported water by requiring water conservation techniques and water conserving appliances, in rehabilitated and new projects.

RME Policy 4.1.3: Require all new developments to install low-flow showers and toilets. Consider implementing a low-flow replacement program for showers and toilets in existing facilities.

RME Policy 4.1.4: Encourage the replacement of existing water fixtures, toilets, and landscaping with water-conserving counterparts.

RME Policy 4.1.5: Encourage the Imperial Irrigation District to promote water conservation practices and safety in agricultural activities.

RME Policy 4.1.6: Implement programs to educate adults and children about the importance of water conservation and methods to reduce water use.

RME Policy 4.1.7: Support the development and usage of waste water recycling production and use wherever possible and economically feasible.

RME Policy 4.1.8: Require water meters on all new construction and development and consider implementing a program to install meters on all existing water services.

RME Policy 4.1.9: Encourage the use of drought resistant plant species in ornamental landscaping in new development and rehabilitation projects.

RME Policy 4.1.10: Support the Imperial Irrigation District in its efforts to maintain local water supplies and underground or cover irrigation canals for safety and conservation purposes.

RME Policy 4.1.11: Implement the 2010 and 2015 Urban Water Management Plan Demand Management Measures (DMM). The 2015 UWMP Guidebook lists the following DMMs:

- ❒ Water waste prevention ordinances
- ❒ Metering
- ❒ Public education and outreach
- ❒ Programs to assess and manage distribution system real loss
- ❒ Water conservation program coordination and staffing support
- ❒ Other demand management measures

RME Policy 4.1.12: **Continue to comply with the State Water Resources Control Board mandatory water conservation regulations.**

All of the City's water conservation efforts will contribute to lowering the gallons per capita daily use rate. The reductions in GHG emissions are estimated at the end of this section.

Sources:

City of Brawley, 2008 General Plan, Resource Management Element, page RME-18
California Department of Water Resources (DWR), *Climate Change Handbook for Regional Water Planning*, Section 3: Evaluating the Energy-Water Connection and Greenhouse Gas Emissions, page 3-1

2. **Implement the 2010 and 2015 Urban Water Management Plan Demand Management Measures:** The City Council approved the 2010 UWMP in June 2011. The 2015 UWMP is due to the State Department of Water Resources (DWR) by July 1, 2016.

Responsible Department: Public Works Department

GHG Emissions Reduction Potential: Since GHG is emitted in most thermoelectric electricity generation, each unit of electricity used in a water-related activity contributes to GHG emissions. These emissions result from energy use in treatment and distribution of drinking water, treatment of wastewater, recycling of wastewater, desalination, pumping groundwater, conveyance and pumping of water.

The State Department of Water and Power (DWR) has worked to update the UWMP Guidebook for the 2015 round of UWMPs. The release of the update to the 2015 Guidebook is targeted for September 2015. The 2015 Guidebook Outline requires a discussion of the service area climate and optional discussions of climate change.

Demand management measure (DMM) refer to practices, procedures and methods to reduce water demands, including but not limited to behavior change, installing high-efficiency water fixtures, and financial incentives or penalties to encourage wise water use and discourage water waste.

Examples of demand management measures described in the *2015 UWMP Guidebook* include:

- ❒ Water waste prevention ordinances
- ❒ Metering
- ❒ Public education and outreach
- ❒ Programs to assess and manage distribution system real loss
- ❒ Water conservation program coordination and staffing support
- ❒ Other demand management measures

Attachment B describes the City's 2010 UWMP DMM.

All of the City's water conservation efforts will contribute to lowering the gallons per capita daily use rate. The reductions in GHG emissions are estimated at the end of this section.

Sources:

City of Brawley, *2010 Urban Water Management Plan*, Section 6 – Water Demand Management Measures, pages 114-124

California Department of Water Resources (DWR), *Guidebook to Assist Urban Water Suppliers Prepare a 2015 Urban Water Management Plan*, October 2, 2014, 3 pgs
Imperial Water Forum, *Appendix O – Imperial Region Vulnerability to Climate Change and Evaluation of Greenhouse Gas Emissions*, October 2012, pages O-20 and O-21

3. **Continue to Enforce the City's Water Efficient Landscape Ordinance:** Pursuant to State law the City has adopted the required ordinance.

Responsible Department: Public Works Department

GHG Emissions Reduction Potential: Water efficient practices reduce consumption and therefore energy use.

The City has enacted the Model Water Efficient Landscape Ordinance for the requirements found in state legislation under Assembly Bill 1881 that apply to commercial, industrial and tenant occupied residential property that require landscaping greater than 2,500 square feet and homeowner landscaping greater than 5,000 square feet. While for the most part water conservation guidelines only apply to large landscaping projects, the City encourages its application to smaller scale projects in order to conserve water.

All of the City's water conservation efforts will contribute to lowering the gallons per capita daily use rate. The reductions in GHG emissions are estimated at the end of this section.

Sources:

City of Brawley, *2010 Urban Water Management Plan*, Section 3 – System Demands, page 49

4. **Continue to Enforce the City Ordinance Prohibiting Wasteful of Water:** Ordinance No. 2014-03 was adopted on August 12, 2014

Responsible Department: Public Works Department

GHG Emissions Reduction Potential: Restricting water uses reduce consumption and therefore electricity use.

The Ordinance states "that in order to conserve the City's water supply for the greatest public benefit and to reduce the quantity of water used by the City's customers, that wasteful use of water should be eliminated." The Ordinance also states that "City will pursue such measures as may be necessary to accomplish metering of potable water consumption for all urban uses."

The City's HERO program allows turf replacement as a project eligible for funding.

All of the City's water conservation efforts will contribute to lowering the gallons per capita daily use rate. The reductions in GHG emissions are estimated at the end of this section.

Urban Water Management Practices and Greenhouse Gas Emissions Reductions

With the adoption of the Water Conservation Act of 2009, also known as SBX7-7, the State is required to reduce urban water use by 20% by the year 2020. Each retail urban water supplier must determine the baseline water use during the baseline water use during their baseline period and also target water use for the years 2015 and 2020 in order to help the state achieve the 20% target.

The 2010 Urban Water Management Plan elected to use 222 GPCD to determine the Urban Water Use Target. GPCD per day refers to "Gallons per Capita per Day." GPCD is the total water use within a service area (residential, commercial, etc.) minus allowable exclusions divided by the population. This measure is used in UWMPs for purposes of the Water Conservation Act of 2009. It is different from R-GPCD that is used in drought reporting to the State Water Resources Control Board. R-GPCD is solely the estimated residential water use in a service area divided by the population. As of June 11, 2015, Brawley's R-GPCD is 179.5 for the July-September 2015 period.

The 2010 UWMP determined a baseline water consumption of 205 GPCD. The estimated GHG emissions reductions were calculated on the basis of a GPCD of 185 in 2020 and 170 in 2030, respectively. The corresponding reductions in GHG emissions are 89.18 and 196.94 $MTCO_2e$ respectively, in 2020 and 2030.

d. Transportation

Goal: Reduce vehicle miles traveled (VMT) by encouraging alternative modes of transportation such as walking, biking, carpooling and bus transit and acquisition of fuel efficient or zero emission vehicles.

1. **Continue to Implement the *City of Brawley Non-Motorized Transportation Plan*:** The plan offers alternatives to the automobile for making trips and thereby reduces vehicle miles traveled and GHG emissions

Responsible Department: Public Works Department and Planning Department

GHG Emissions Reduction Potential: According to the *2013 Non-Motorized Transportation Plan*:

> Due to emissions from "cold starts" (i.e., when a car hasn't been driven in a few hours and the engine is cool), a one mile automobile trip emits up to 70 percent as much pollution as a 10-mile excursion. This means that when people decide to bicycle or walk even just for very short trips, they are still significantly reducing their environmental footprint. The *Non-Motorized Transportation Plan* implements the policies of the 2012 Regional Transportation Plan and Sustainable Communities Strategy. From reducing local levels of harmful pollutants that cause asthma and other respiratory illnesses to addressing global climate change, higher rates of bicycling and walking provide tangible, significant air quality benefits.

The California Air Resources Board explains that -

> Active transportation methods refer to a variety of modes of travel that are generally human powered, such as bicycling and walking. In most cases, when a person chooses to replace a car trip with a bike or walk trip to a destination, passenger VMT is reduced, along with GHG emissions. In reviews of the empirical literature related to the impacts of putting bicycling- and pedestrian-related strategies in place, Handy, Sciara, et.al. (2010, 2011) found that a variety of strategies have the potential to reduce vehicle trips and VMT. Increasing the number of miles of bikeways and sidewalks, making changes to existing bike/pedestrian infrastructure to improve the safety, security, or comfort of cyclists and pedestrians, or creating better bike/pedestrian links to transit stations are among the strategies that have been found to increase the likelihood of a shift in trips from cars to bicycles, walking, and/or transit.

The City Council adopted the *Brawley Non-Motorized Transportation Plan* in May 2013. The Plan explains:

> When residents and visitors bicycle or walk for a trip, it alleviates congestion, minimizes greenhouse gas emissions, and helps to improve the quality of people's lives.

The *Plan* projects bicycle trips and pedestrian trips based on assumptions that people will increase their use of these transportation modes in the future. As Brawley children, youth and adults increase their biking and walking trips there will be a reduction in the number of vehicle trips and vehicle miles traveled VMT). The reduction in VMT will then cause a reduction in the amount of carbon dioxide (CO_2) emitted.

The NMTP provides a framework to project future bicycle and pedestrian mode-shares. Factors used in the forecast include:

- ❒ City population
- ❒ Number of workers
- ❒ Numbers of bicycle commuters
- ❒ Number of pedestrian commuters
- ❒ Number of employees working at home
- ❒ Number of transit commuters
- ❒ Number of school children walking and bicycling to school
- ❒ Number of college students walking and bicycling to school

Existing mode-share for both bicycling and walking were based on the NMTP and figures provided by the American Community Survey with conservative projections of increases in the respective mode shares due to improvements in the active transportation system proposed by the plan.

The list below shows that - based on the NMTP methodology and updated projections - active transportation produces significant reductions in vehicle miles traveled:

	2020	2030
❒ Vehicle Miles Reduced Due to Walking	275,406	472,074
❒ Vehicle Miles Reduced Due to Bicycling	605,154	1,067,499

Table 16 shows the GHG emissions reductions resulting from the reductions in VMT.

Table 16
Greenhouse Gas Reductions
from Active Transportation

Alternative Mode	Reduced $MTCO_2$
2020	
Biking	223.30
Walking	101.63
Total	324.93
2030	
Biking	393.91
Walking	174.20
Total	568.11

Sources:

City of Brawley *Non-Motorized Transportation Plan*, May 2013, pages 4-10 to 4-15
California Air Resources Board, *Active Transportation*

2. **Establish a Clean Vehicle Replacement Policy:** Implementation of the policy will increase the number of hybrid and AFV in the City and City-contracted fleets.

Responsible Department: All Departments

GHG Emissions Reduction Potential: The acquisition of hybrid, electric and alternative fuel vehicles will reduce the amount of gasoline consumed and carbon dioxide emitted.

The City could consider annually during the budget process that some of the replacement vehicles purchased for the municipal fleet be high efficiency (hybrid), electric or alternative fuel vehicles (AFVs). Factors that would need to be evaluated during the budget process include the appropriateness for the vehicle task, fueling infrastructure, petroleum displacement, and the overall cost and environmental benefit. An evaluation of these factors would be made prior to purchasing each new or replacement vehicle.

The City Council also could direct staff to work with fleets under City authority to influence their expanded use of alternative fuels and high efficiency/alternative fuel vehicles (AFV) including electric, biodiesel, ethanol, hybrid, hydrogen, and compressed natural gas (CNG) based on appropriateness for vehicle task, fueling infrastructure, petroleum displacement, overall cost, and environmental benefit.

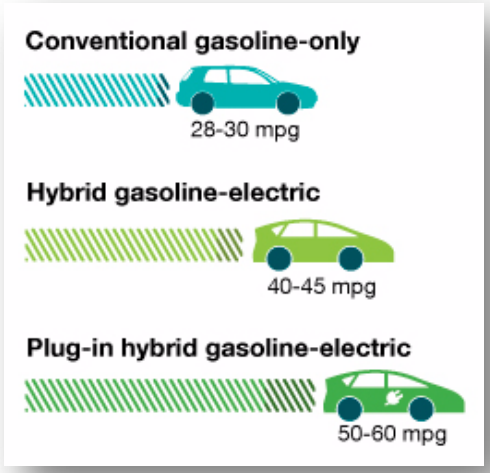
There are 69 vehicles in the City's 2014 vehicle fleet. Of this number, 34 are light trucks and 26 are passenger cars (23 of the 26 are for the Police Department). The ages of the 69 vehicles are between three and 24 years old.

Information is available on the model year, make and miles driven for each vehicle in the fleet. Using average fuel efficiencies available from the Protocol, based on U.S. Department of

Transportation statistics, the amount of fuel consumed by each vehicle in the fleet was calculated.

An estimate was made of the current mileage of each vehicle using the length of service of the vehicle and the miles driven. Using an assumed useful life of 150,000 miles for each vehicle, the remaining life of each vehicle was calculated. Using this method, from 2014 to 2020 15 vehicles would need to be replaced. Seven of the 15 vehicles are assumed to be Police Department cruisers. Given the rigorous needs of those vehicles and the upgrades implemented, those vehicles are not likely to be replaced with hybrid, electric or any alternative fuel vehicles.

The remaining eight vehicles include six light trucks (various departments) and two passenger cars assigned to the Park and Recreation Department. Based on the remaining life of the vehicles, two passenger cars and six light trucks could be replaced by 2020.



The City's current fleet already has nine Chevrolet Silverado hybrid trucks. Should the City elected to continue replacing older non-hybrid trucks with hybrid trucks, the City would benefit from reduced fuel expenditure (consumption) and reduced greenhouse gas emissions. Additional benefits would also be incurred by replacing the two passenger cars with hybrids or alternative fuel vehicles. Table 17 shows the possible fuel cost savings and reductions in GHG emissions by 2020. Additional emissions would occur between 2020 and 2030 as additional hybrid, electric and alternative fuel vehicles replaced older vehicles in the City's fleet.

Table 17
City of Brawley
GHG Emissions Reductions – Vehicle Replacement Policy: 2020

	Light Trucks	Passenger Vehicles	Total
# Replaced with Hybrid Vehicles	6	2	8
Total Reduced Fuel Consumption	672 gallons	517 gallons	1,139 gallons
Total Reduced GHG Emissions	6.85 $MTCO_2e$	4.54 $MTCO_2e$	11.39 $MTCO_2e$

3. **Continue to Implement the Safe Routes to School (SRTS) Program:** Implementation of the program encourages children to walk and bicycle to school.

Responsible Department: Public Works Department

GHG Emissions Reduction Potential: Walking and biking to school eliminates vehicle trips and vehicle miles traveled. By creating a safe environment through infrastructure improvements, children are encouraged to walk or bike to school instead of having their parents drive them to school. The physical activity and improvement of children's health is a co-benefit of the SRTS program.

The aim of Safe Routes to School is to increase the number of children who walk or bicycle to school by funding projects that remove the barriers that currently prevent them from doing so. Those barriers include lack of infrastructure, unsafe infrastructure, lack of education/encouragement programs for children, parents, and the community that promote walking and bicycling.

The *Non-Motorized Transportation Plan* includes suggested routes to school maps which illustrate proposed improvements to Phil Swing Elementary School, Barbara Worth Junior High School, Witter Elementary School, J.W. Oakley School and Miguel Hidalgo Elementary School. Recommended actions include infill of sidewalk gaps, construction of curb ramps, installation of in-pavement markings, and upgrades to existing painted crosswalks.

Source:

City of Brawley *Non-Motorized Transportation Plan*, May 2013, pages 5-13 and 5-26
Brawley Elementary School District, *Safe Routes to School Program*, adopted October 27, 2009, 3 pgs

4. **Off-Road Vehicle Measures**: promote off-road vehicle and equipment upgrades, retrofits, and replacements

Responsible Departments: Planning Department and Public Works Department

GHG Emissions Reduction Potentials: Emissions in the off-road sector result from the combustion of fuel, primarily diesel, gasoline and compressed natural gas, which is used to power off-road equipment and vehicles. Off-road equipment and vehicles include those used in construction, agriculture, commercial, industrial, and landscaping operations as well as recreational vehicles.

GHG emissions reductions can be achieved by reducing off-road equipment and vehicle usage and idling or by using equipment that runs on electricity or alternative fuels. The South Coast Air Quality District (SCAQMD) has a program which allows residents to turn in working gas-powered lawn mower and purchase a new cordless rechargeable electric mower at a discounted price.

The City will conduct additional outreach and promotional activities to promote off-road vehicle and equipment upgrades, retrofits and replacements. The City also will direct interested individuals and organizations to existing websites such as the Imperial County Air Pollution Control District webpage describing the Carl Moyer Grant Program.

For purposes of calculations, these efforts are assumed to generate a GHG reduction potential of 10% and 20% below the 2020 and 2030 forecasted levels, respectively. In the future it is anticipated that the demand for some equipment will be lower due to water conservation measures (i.e., less planted lawn) and new and more efficient equipment replacing older and less efficiency models.

5. **Transportation Measures Reducing VMT:** promote bus transit, carpooling, and other measures to reduce vehicle miles traveled.

Responsible Department: Planning Department and Public Works Department

GHG Emissions Reduction Potentials: The use of alternative modes of transportation such as bus transit, carpooling, walking and biking replace vehicle trips and vehicle miles traveled.

The transportation and land use measures (discussed in the section) will not only help reduce GHG emissions, but also provide multiple other benefits to Brawley. These include:

- ❒ Reduced transportation costs
- ❒ Reduced traffic congestion
- ❒ Improved public health
- ❒ Strengthened local economy
- ❒ Improved infrastructure
- ❒ Increased equity
- ❒ Increased housing and travel options
- ❒ Resource conservation
- ❒ Reduced noise, air, and water pollution

The City plans to continue working with the Imperial Valley Transit to increase ridership particularly by workers whose job is located outside of Brawley.

In addition, the City will promote a decrease in single occupancy vehicle trips by encouraging carpooling among workers and encouraging alternative modes of transportation such as taking transit, walking and biking. These efforts include encouraging City employees to carpool or use bus transit for some home to work commutes.

In 2012, 11.2% of Brawley's workers carpooled and 2.1% used public transit. The GHG emissions reductions were calculated on the basis of a net 8.8% increase in carpooling and 2.9% net increase in workers using public transit. The net increases in carpooling and public transit use resulted in a reduction of 3,299.71 and 4,322.63 $MTCO_2e$ in 2020 and 2030 respectively.

e. Land Use Measures

Goal: Contribute to a reduction of vehicle miles traveled (VMT) through land use and zoning measures.

According to SCAG:

> California's Sustainable Communities and Climate Protection Act, or Senate Bill (SB) 375, calls for this RTP (Regional Transportation Plan) to include an SCS (Sustainable Communities Strategy) that reduces greenhouse gas (GHG) emissions from passenger vehicles by 8 percent per capita by 2020 and 13 percent per capita by 2035 compared to 2005, as set by the California Air Resources Board (ARB).

SCAG's SB 375 *Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS*) exceeds the GHG emission-reduction target set by CARB for the SCAG region by achieving a 9% reduction by 2020 and 16% reduction by 2035.

SCAG also has explained that –

> The SCS focuses the majority of new housing and job growth in high-quality transit areas and other opportunity areas in existing main streets, downtowns, and commercial corridors, resulting in an improved jobs-housing balance and more opportunity for transit-oriented development. This overall land use development pattern supports and complements the proposed transportation network that emphasizes system preservation, active transportation, and transportation demand management measures.

The following demonstrate Brawley's support of the of SCAG's *RTP/SCS*:

- ❒ Brawley Downtown Specific Plan
- ❒ Brawley Transit Transfer Station
- ❒ Imperial Valley Transit (IVT) Gold Line
- ❒ Active Transportation Plan

Through the steps listed above and additional measures describe below, there will be a reduction in the vehicle miles that would otherwise be traveled by Brawley's population.

1. **Brawley Greenbelt:** promote compact and infill growth (and preserve agriculture) by creating a Brawley Greenbelt.

Responsible Department: Planning Department

GHG Emissions Reduction Potential**:** Preventing urban sprawl and leapfrog development can result in a reduction in vehicle miles traveled.

Factors affecting GHG emissions from transportation include the number of VMT, fuel economy, and the type of fuel used. The number of VMT is directly influenced by the geographic distribution of people and places, especially the density of development and zoning. Therefore, land use measures contribute to reducing GHG emissions.

The City plans to collaborate with the County of Imperial and Imperial County LAFCO to establish a Brawley Greenbelt. The purpose of the Greenbelt is to preserve for a definite period of time agricultural land surrounding Brawley and in so doing clearly state that the Greenbelt area is "off limits" for non-agricultural development. The Brawley Greenbelt will help to curb urban sprawl and leapfrog development and facilitate compact development.

Exhibit 1 shows the boundaries of the proposed Brawley Greenbelt.

2. **Planned Growth Boundary Line**: the City will establish a Planned Growth Boundary Line.

Responsible Department: Planning Department

GHG Emissions Reduction Potential**:** The Boundary Line establishes the outer limits of Brawley's growth and development through 2035. In so doing, it will contribute to compact development and vehicle trips of shorter distances.

The City plans to amend the Land Use Element to establish a Planned Growth Boundary Line for lands located with the Sphere of Influence. The line shows lands available for planned development within the City limits and lands to be preserved as a Green Neighborhood (e.g. agricultural, natural habitat, and open space) outside the City limits and inside the Sphere of Influence.

The lands available for governmental services, extension of infrastructure, and development include those located within the City limits such as the Downtown Specific Plan, Luckey Ranch Specific Plan, Rancho-Porter Specific Plan, La Paloma Specific Plan and Brawley Gateway Specific Plan. These planned communities and other approved developments have a combined housing capacity of 7,300 housing units, which is sufficient to accommodate growth to the year 2035.

The Green Neighborhood is comprised of the New River Corridor and R-A Residential Agriculture and A-1 Light Agriculture zoned lands located outside the City limits but within the Sphere of Influence boundary.

Exhibit 2 shows the boundaries of the proposed Planned Growth Boundary Line.

Exhibit 1
Brawley Greenbelt

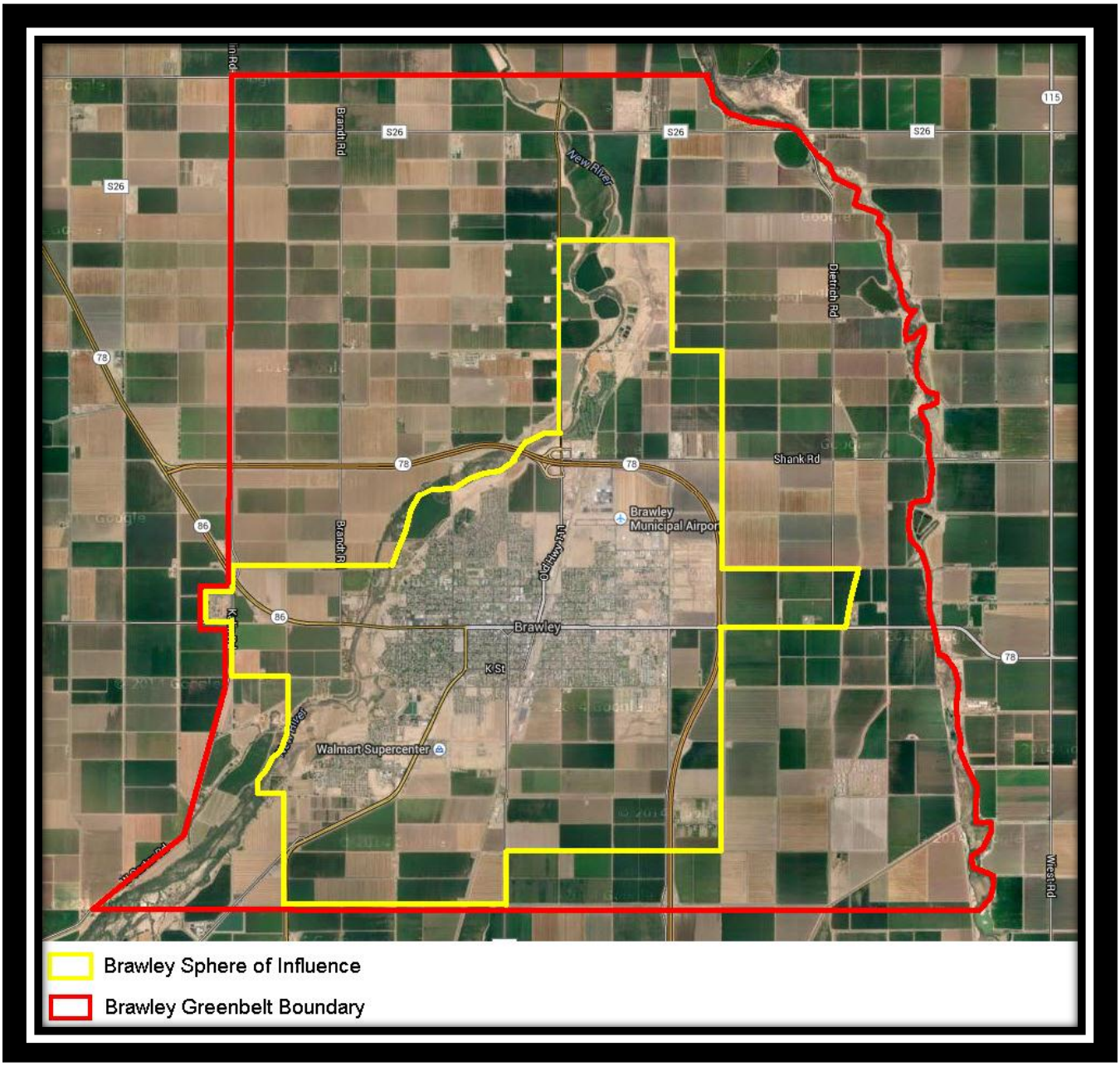
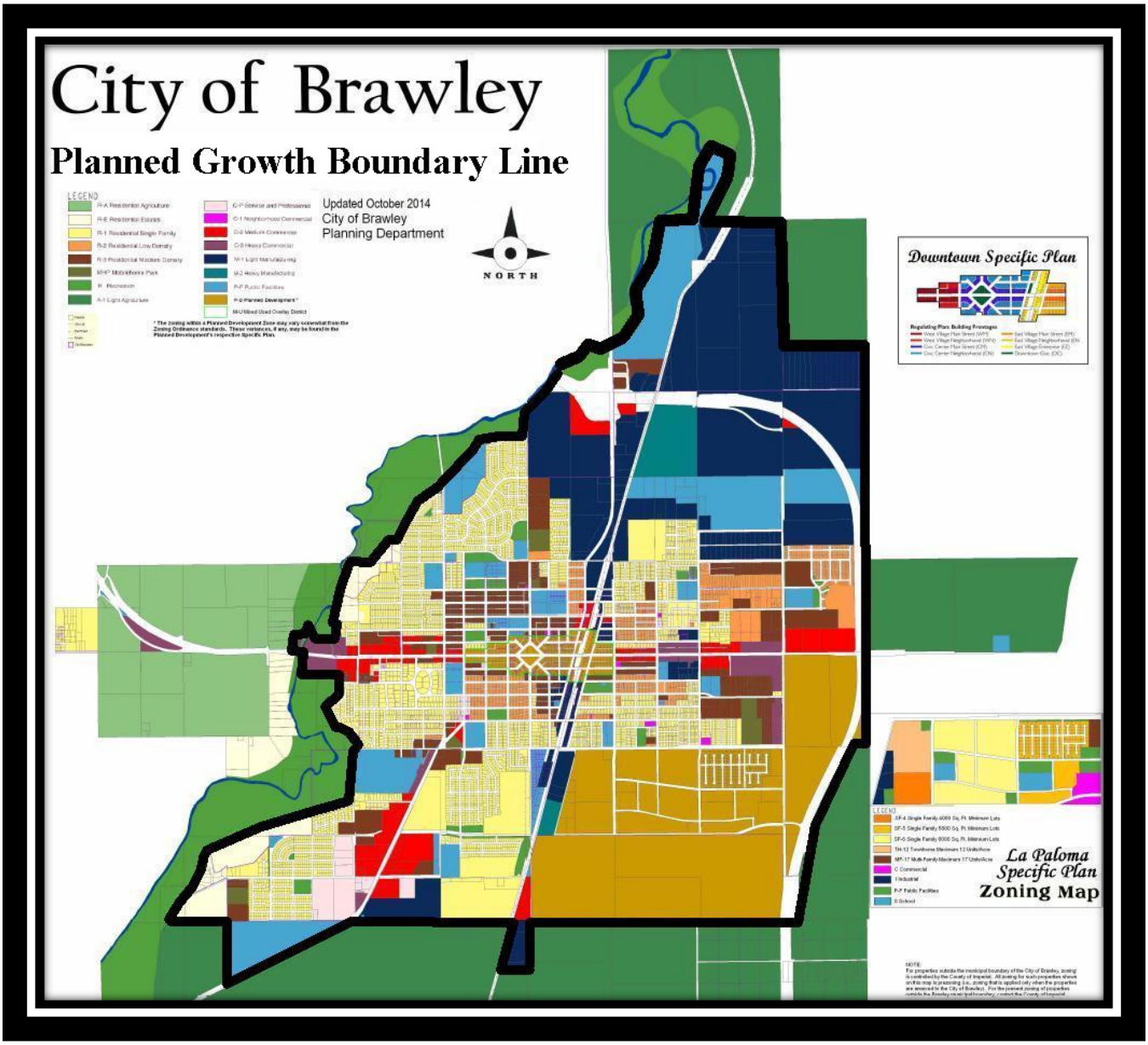


Exhibit 2
Planned Growth Boundary Line



3. **Facilitate Infill Development:** continue to implement the *Brawley Downtown Specific Plan*

Responsible Department: Planning Department

GHG Emissions Reduction Potential: Increased densities allowed by the Specific Plan reduce GHG emissions associated with VMT traveled in many ways. Density is usually measured in terms of persons, jobs or dwellings per unit. Increased densities affect the distance people travel and provide greater options for the mode of travel they choose. Also, transit ridership increases with density, which justifies enhanced transit service.

Additionally, having different types of land uses near one another decreases VMT because trips between land uses types are shorter and can be accommodated by non-auto models of travel. A resident does not need to travel outside the neighborhood to meet his or her trip needs.

In December 2012, the City Council adopted the *Brawley Downtown Specific Plan*. Downtown Brawley consists of approximately 110 acres, 265 parcels, and 1 million square feet of existing civic, commercial, institutional and industrial uses. An estimated 179 dwellings also exist within the Downtown, represented by a mixture of single-family residential and multi-family homes. A purpose of the *Brawley Downtown Specific Plan* is to implement the following Land Use Element Policy:

> *Encourage in-fill of vacant parcels in areas already predominately developed.*

Another purpose of the *Specific Plan* is to:

> *Diversify the City's housing options by providing urban housing opportunities for a range of socio-economic levels.*

Infill development in Downtown Brawley meets one of the major objectives of the Sustainable Communities Planning Program.

Table 18 illustrates that the combined housing capacity in Downtown Brawley is 200 housing units.

Table 18
Brawley Downtown: Housing Capacity by District

District	Permitted Dwelling Units Per Acre (DU)	Maximum # of Dwelling Units[1]	Height Limits
Civic Center (I)	25	150	5 stories
West Village (II)	20	20	3 stories
East Village (III)	18	30	4 stories
Total	N/A	200	

[1]Maximum # of Dwelling Units (DU) was determined by the Downtown Brawley Specific Plan based on total combined acres of parcels designated by one of the "Neighborhood" frontage types.

Exhibit 3 shows the boundaries of the three Districts comprising Brawley Downtown: Civic Center, West Village and East Village.

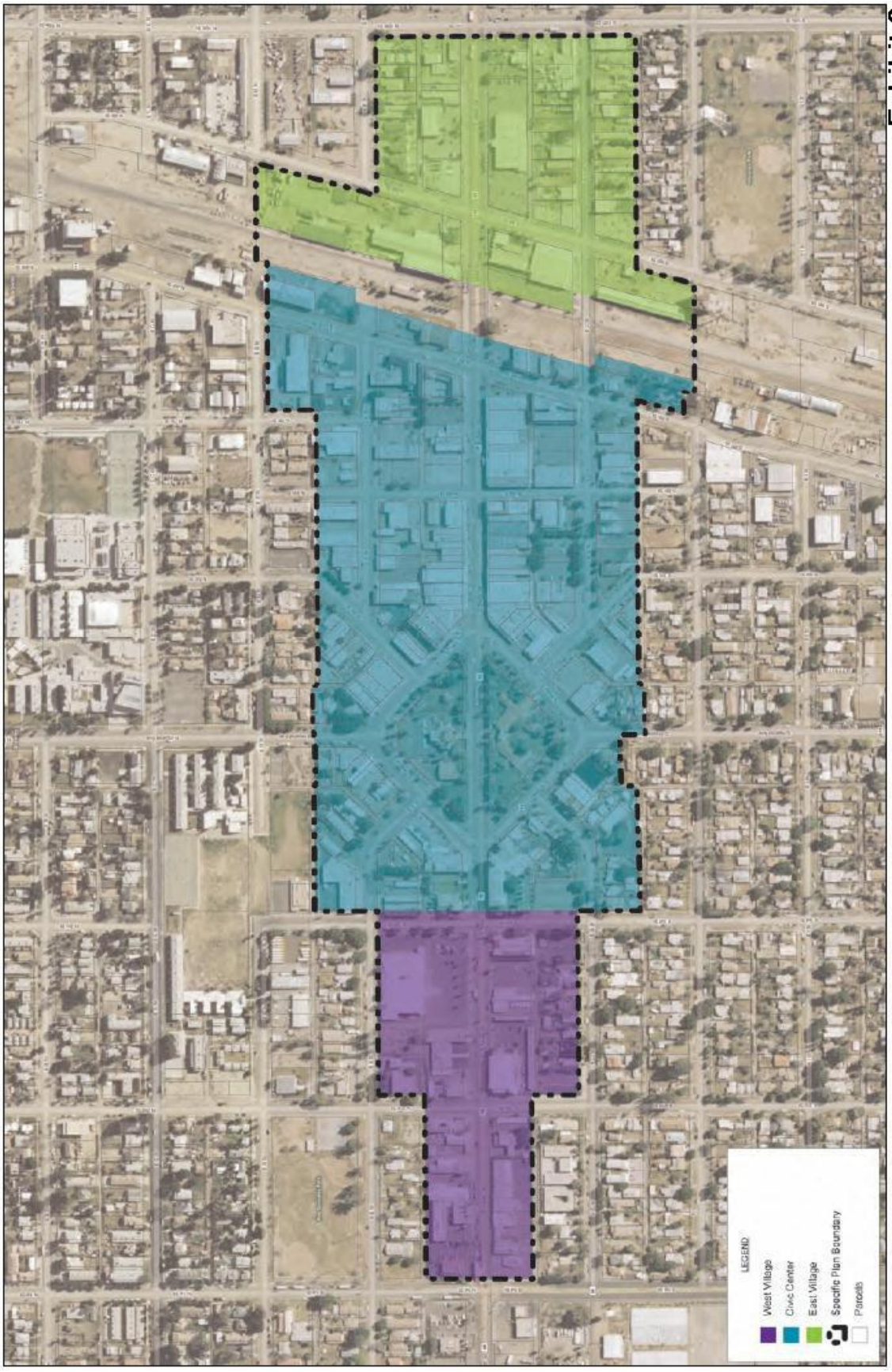


Exhibit 3
City of Brawley
Downtown Districts

The Specific Plan encourages mixed use development on parcels having street frontage, including attached single-family and multi-family residential allowed only on the upper floors. Density bonuses permit housing to be developed at 25, 27 and 34 dwelling units per acre.

Once the housing in Downtown is built and occupied, there will be an opportunity for workers to walk to the Transit Transfer Station and commute by bus to work. Additional reductions in VMT would result as Downtown residents walked or biked to school, shopping, church or parks. Within one half mile of the center of the Downtown Specific Plan area are the following amenities and services:

Schools

- ❒ Brawley Junior College
- ❒ Barbara Worth Jr. High School
- ❒ Reid School
- ❒ Sacred Heart School
- ❒ Desert Valley High School (just outside 1/2/ mile)
- ❒ Witter Elementary School (just outside 1/2/ mile)
- ❒ Miguel Hidalgo Elementary School (just outside 1/2/ mile)

Churches

- ❒ Eighteen Churches of various denominations

Parks

- ❒ Plaza Park (located at the center of the Downtown Specific Plan area)
- ❒ Abe Gonzales Park
- ❒ Hinojosa Park
- ❒ Lions Field
- ❒ Meserve Park
- ❒ Warner Park (just outside 1/2/mile)

Post Office

- ❒ Brawley Post Office located in the Plaza Park

Library

- ❒ Brawley Public Library located in the Plaza Park

Additionally, some Downtown residents also would use the Gold Line for doctor and hospital trips and shopping trips to WalMart.

The land use measures support SCAG's SB 375 Sustainable Communities Strategy. The measures will contribute to a reduction in passenger car and light truck emissions because the land use measures will cause a reduction in vehicle miles traveled. The SCAG emissions reductions of 9% and 13% were applied to the emissions forecasted by the EMFAC model for the years 2020 and 2030.

4. **Complete Zoning for Electric Vehicle Infrastructure:** Zoning regulations should be in place to be in a state of readiness as the number of EVs increase.

Responsible Department: Planning Department

GHG Gas Potential Reductions: Hybrid vehicles (HEVs), plug-in hybrid vehicles (PHEVs) and all electric vehicles typically produce lower emissions than conventional vehicles. EVs and PHEVs running only on electricity have zero tailpipe emissions, but emissions may be generated by the source of electrical power such as a power plant.

In March 2012, Governor Brown issued Executive Order B-16-2012, directing specific government agencies to establish benchmarks resulting in 1.5 million zero-emission vehicles (ZEVs) on California roadways by 2025. There are two major goals and milestones associated with this assessment. The first is supporting the 1.5 million ZEV goal, which is targeted at 2025. A second goal, which supports the first, is that California's ZEV infrastructure will be able to support up to 1 million vehicles by 2020.

To widely accept the use of plug-in hybrid electric vehicles (PHEVs) and all-electric vehicles (EVs), consumers and fleets need a developed infrastructure of charging stations. Drivers need affordable, convenient, and compatible options for charging at home (or at fleet facilities, in the case of fleets). Charging stations at workplaces and public destinations may also bolster the market acceptance of PEVs.

Charging plug-in electric vehicles requires plugging into electric vehicle supply equipment (EVSE). Hybrid electric vehicles (HEVs) are charged using regenerative braking and the internal combustion engine and are not plugged into charging equipment.

Charging equipment for plug-in hybrid electric vehicles (PHEVs) and all-electric vehicles (EVs) is classified by the rate at which the batteries are charged. Charging times vary based on how depleted the battery is, how much energy it holds, the type of battery, and the type of EVSE. The charging time can range from 15 minutes to 20 hours or more, depending on these factors.

A May 2014 report entitled *California Statewide Plug-in Electric Vehicle Infrastructure Assessment* prepared for the California Energy Commission, projects more than 900,000 charging stations (both home dominate and high public access) by 2020 in southern California.

Strategies to accommodate EV infrastructure include:

- ❒ Developing a City electric vehicle charging infrastructure ordinance
- ❒ Streamlining permitting processes
- ❒ Installing public charging infrastructure for electric vehicles
- ❒ Integrating electric vehicles in the City's fleet

Some cities encourage new developments to "rough in" in their garages or parking lots for future charging station installations. Other cities require accommodation of EV infrastructure by requiring EV charging spaces as a percentage of total parking.

Zoning for EV infrastructure includes, but is not limited, to:

- ❒ Providing opportunities for EV infrastructure in certain zoning districts
- ❒ Providing opportunities for the traveling public to have adequate and convenient electric vehicle charging stations

- ❒ Providing opportunities for Brawley residents to have safe and efficient personal electric vehicle charging station located at their place of residence
- ❒ Expediting the permit approval process on behalf of homeowners
- ❒ Working with apartment developments to find feasible ways of installing vehicle charging stations
- ❒ Providing the opportunity for commercial and industrial projects to supply electric vehicle charging services for their customers and employees
- ❒ Establishing definitions for battery exchange station, charging levels, electric vehicle charging station, and rapid charging station

With the addition of charging stations, it will be more convenient for residents to charge such vehicles and incentivize them to purchase electric vehicles. The purchase

If 250 Brawley residents were to replace their current gasoline/diesel vehicles by 2020 with full electric vehicles there is the potential for a reduction of approximately 1,085 $MTCO_2e$.

If an additional 1,000 residents converted their vehicle usage to plug-in electric vehicles by 2030 there would be a reduction of approximately 4,400 $MTCO_2e$.

Sources:
American Public Transit Association's Public Transportation Fact Book Tables 6, 7 and 20
Federal Highway Administration Table VM-1
California Energy Commission, *California Statewide Plug-In Electric Vehicle Infrastructure Assessment*, May 2014
UCLA Luskin Center, *Southern California Plug-in Electric Vehicle Readiness Plan*, December 2012, page 36 (report prepared for the Southern California Association of Governments)
UCLA Luskin Center, *Early Plug-in Electric Vehicle Sales: Trends, Forecasts, and Determinants*, pg. 2 (report prepared for the Southern California Association of Governments)
U.S. Department of Energy – Energy Efficiency and Renewable Energy, Alternative Fuels Data Center – Emissions from Hybrid and Plug-in Electric Vehicles
U.S. Department of Transportation Bureau of Transportation Statistics Table 4-23 Average U.S. Light Duty vehicle Efficiency (MPG) for Light Duty Vehicle Short Wheel Base, 2013

Attachment A
Definitions of Greenhouse Gases

A. Carbon Dioxide (CO_2)

1. What is Carbon Dioxide?

At room temperature, carbon dioxide (CO_2) is a colorless, odorless, faintly acidic-tasting, non-flammable gas. CO_2 is the fourth most abundant gas in the earth's atmosphere. Depending on the temperature and pressure, carbon dioxide can also exist as a liquid or a solid. In its solid form, carbon dioxide is called dry ice because it slowly changes from a cold solid directly into a gas.

CO_2 is a byproduct of normal cell function. It is removed from the body via the lungs in the exhaled air. CO_2 is also produced when fossil fuels are burned. Decaying vegetation can also produce CO_2. Surface soils can sometimes contain high concentrations of this gas, from decaying vegetation or chemical changes in the bedrock. In its solid form, CO_2 is used in fire extinguishers, in laboratories, and in theater and stage productions as dry ice to make fog.

There are three major forms of fossil fuels: coal, oil and natural gas. All three were formed many hundreds of millions of years ago before the time of the dinosaurs – hence the name fossil fuels. The age they were formed is called the Carboniferous Period. It was part of the Paleozoic Era. "Carboniferous" gets its name from carbon, the basic element in coal and other fossil fuels.

Carbon dioxide is a colorless, odorless, non-flammable and slightly acidic liquefied gas. CO_2 is heavier than air and soluble in water.

CO_2 is produced industrially by using sources of CO_2 obtained through processes in the petrochemical industry, or by burning natural gas in cogeneration processes. Air Products supplies CO_2 to customers worldwide as a liquefied gas. It is delivered under pressure in steel cylinders and refrigerated in thermally insulated containers.

Carbon dioxide is the primary greenhouse gas emitted through human activities. In 2012, CO_2 accounted for about 82% of all U.S. greenhouse gas emissions from human activities. Carbon dioxide is naturally present in the atmosphere as part of the Earth's carbon cycle (the natural circulation of carbon among the atmosphere, oceans, soil, plants, and animals). Human activities are altering the carbon cycle—both by adding more CO_2 to the atmosphere and by influencing the ability of natural sinks, like forests, to remove CO_2 from the atmosphere. While CO_2 emissions come from a variety of natural sources, human-related emissions are responsible for the increase that has occurred in the atmosphere since the industrial revolution.

The main human activity that emits CO_2 is the combustion of fossil fuels (coal, natural gas, and oil) for energy and transportation, although certain industrial processes and land-use changes also emit CO_2. The main sources of CO_2 emissions in the United States are described below.

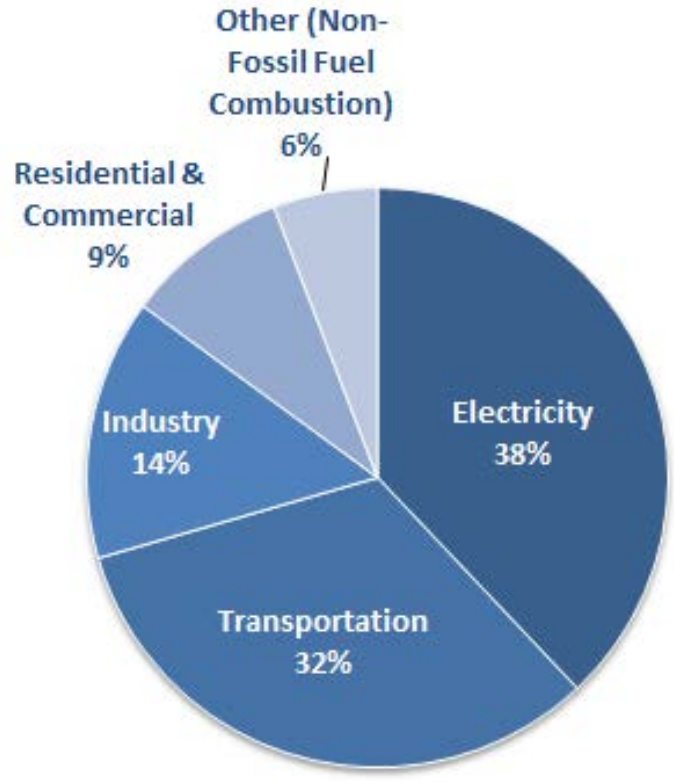
- **Electricity.** Electricity is a significant source of energy in the United States and is used to power homes, business, and industry. The combustion of fossil fuels to generate electricity is the largest single source of CO_2 emissions in the nation, accounting for about 38% of total U.S. CO_2 emissions and 31% of total

U.S. greenhouse gas emissions in 2012. The type of fossil fuel used to generate electricity will emit different amounts of CO_2. To produce a given amount of electricity, burning coal will produce more CO_2 than oil or natural gas.

- **Transportation.** The combustion of fossil fuels such as gasoline and diesel to transport people and goods is the second largest source of CO_2 emissions, accounting for about 32% of total U.S. CO_2 emissions and 27% of total U.S. greenhouse gas emissions in 2012. This category includes transportation sources such as highway vehicles, air travel, marine transportation, and rail.

- **Industry.** Many industrial processes emit CO_2 through fossil fuel combustion. Several processes also produce CO_2 emissions through chemical reactions that do not involve combustion, for example, the production and consumption of mineral products such as cement, the production of metals such as iron and steel, and the production of chemicals. Fossil fuel combustion from various industrial processes accounted for about 14% of total U.S. CO_2 emissions and 12% of total U.S.greenhouse gas emissions in 2012. Note that many industrial processes also use electricity and, therefore, indirectly cause the emissions from the electricity production.

U.S. Carbon Dioxide Emissions, By Source



Note: All emission estimates from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2012*.

B. Methane (CH_4)

1. What is Methane?

Methane is an odorless, colorless flammable gas. It is used primarily as fuel to make heat and light. It is also used to manufacture organic chemicals. Methane can be formed by the decay of natural materials and is common in landfills, marshes, septic systems and sewers.

Methane can form an *explosive* mixture in air at levels as low as 5%. You can smell leaking methane only when commercial gas utility companies add a chemical smell to it or when it mixes naturally with hydrogen sulfide, causing a "rotten egg" smell. If you can smell it, the level may be too high to be safe.

Methane can also be found in coal gas. Pockets of methane exist naturally underground. In homes, methane may be used to fuel a water heater, stove and clothes dryer.

Methane evaporates quickly. Therefore, most of the methane that ends up in lakes, streams, or soil is eventually released into the air. However, methane that is formed underground and moves through soil can remain unchanged for many years.

2. How are People Exposed to Methane?

- **Breathing:** Most exposures occur when people inhale methane. Methane can go into homes through sewer traps or foundation cracks. People can be exposed by inhaling the chemical at work, cooking on a gas stove, or entering confined spaces such as manholes, silos, animal waste pits, septic tanks and sewers.

- **Drinking/Eating:** Because methane evaporates quickly, it is usually not found in food or drinking water. Very low level exposure can occur when contaminated water is used for drinking and/or for food preparation or when children eat contaminated soil.

- **Touching:** Methane gas does not pass readily through intact skin. Methane in its extremely cold liquefied form can, however, cause burns to the skin and eyes.

Methane (CH_4) is the second most prevalent greenhouse gas emitted in the United States from human activities. In 2012, CH_4 accounted for about 9% of all U.S. greenhouse gas emissions from human activities. Methane is emitted by natural sources such as wetlands, as well as human activities such as leakage from natural gas systems and the raising of livestock. Natural processes in soil and chemical reactions in the atmosphere help remove CH_4 from the atmosphere. Methane's lifetime in the atmosphere is much shorter than carbon dioxide (CO_2), but CH_4 is more efficient at trapping radiation than CO_2. Pound for pound, the comparative impact of CH_4 on climate change is over 20 times greater than CO_2 over a 100-year period.

Globally, over 60% of total CH_4 emissions come from human activities. Methane is emitted from industry, agriculture, and waste management activities, described below.

- **Industry.** Natural gas and petroleum systems are the largest source of CH_4 emissions from industry in the United States. Methane is the primary component of natural gas. Some CH_4 is emitted to the atmosphere during the production, processing, storage, transmission, and distribution of natural gas. Because gas is often found alongside petroleum, the production, refinement, transportation, and storage of crude oil is also

a source of CH_4 emissions. For more information, see the *Inventory of U.S. Greenhouse Gas Emissions and Sinks* sections on Natural Gas Systems and Petroleum Systems.

- **Agriculture.** Domestic livestock such as cattle, buffalo, sheep, goats, and camels produce large amounts of CH_4 as part of their normal digestive process. Also, when animals' manure is stored or managed in lagoons or holding tanks, CH_4 is produced. Because humans raise these animals for food, the emissions are considered human-related. Globally, the Agriculture sector is the primary source of CH_4 emissions. For more information, see the *Inventory of U.S. Greenhouse Gas Emissions and Sinks*.

- **Waste from Homes and Businesses.** Methane is generated in landfills as waste decomposes and in the treatment of wastewater. Landfills are the third largest source of CH_4 emissions in the United States

Methane is also emitted from a number of natural sources. Wetlands are the largest source, emitting CH_4 from bacteria that decompose organic materials in the absence of oxygen. Smaller sources include termites, oceans, sediments, volcanoes, and wildfires.

C. Nitrous Oxide (N_2O)

Nitrous oxide is a clear, colorless gas with powerful greenhouse properties. It has a long atmospheric lifetime (approximately 120 years) and is about 310 times more powerful than carbon dioxide at trapping heat.

In 2012, nitrous oxide (N_2O) accounted for about 6% of all U.S. greenhouse gas emissions from human activities. Nitrous oxide is naturally present in the atmosphere as part of the Earth's nitrogen cycle, and has a variety of natural sources. The main natural source of nitrous oxide is the activity of microbes in swamps, soil, rainforests and the ocean surface. Human sources of this greenhouse gas include fertilizers, industrial production of nylon and nitric acid, the burning of fossil fuels, and solid waste.

However, human activities such as agriculture, fossil fuel combustion, wastewater management, and industrial processes are increasing the amount of N_2O in the atmosphere. Nitrous oxide molecules stay in the atmosphere for an average of 120 years before being removed by a sink or destroyed through chemical reactions. The impact of 1 pound of N_2O on warming the atmosphere is over 300 times that of 1 pound of carbon dioxide.

Globally, about 40% of total N_2O emissions come from human activities. [1] Nitrous oxide is emitted from agriculture, transportation, and industry activities, described below.

- **Agriculture.** Nitrous oxide is emitted when people add nitrogen to the soil through the use of synthetic fertilizers. Agricultural soil management is the largest source of N_2O emissions in the United States, accounting for about 75% of total U.S. N_2O emissions in 2012. Nitrous oxide is also emitted during the breakdown of nitrogen in livestock manure and urine, which contributed to 4% of N_2O emissions in 2012.

- **Transportation.** Nitrous oxide is emitted when transportation fuels are burned. Motor vehicles, including passenger cars and trucks, are the primary source of N_2O emissions from transportation. The amount of N_2O emitted from transportation depends on the type of fuel and vehicle technology, maintenance, and operating practices.

- **Industry.** Nitrous oxide is generated as a byproduct during the production of nitric acid, which is used to make synthetic commercial fertilizer, and in the production of adipic acid, which is used to make fibers, like nylon, and other synthetic products.

Nitrous oxide emissions occur naturally through many sources associated with the nitrogen cycle, which is the natural circulation of nitrogen among the atmosphere, plants, animals, and microorganisms that live in soil and water. Nitrogen takes on a variety of chemical forms throughout the nitrogen cycle, including N_2O. Natural emissions of N_2O are mainly from bacteria breaking down nitrogen in soils and the oceans. Nitrous oxide is removed from the atmosphere when it is absorbed by certain types of bacteria or destroyed by ultraviolet radiation or chemical reactions.

Attachment B

City of Brawley
2010 Urban Water Management Plan
Water Demand Management Measures
Updated May 15, 2015

1. Residential Surveys

   - ❒ Develop Residential Assistance Checklist (for customers who report high water bills)
   - ❒ Provide site-specific leak detection assistance
   - ❒ Perform site-specific landscape water surveys
   - ❒ Provide reports on the number of residential assistance/leak detection survey visits

2. Residential Plumbing Retrofit

   - ❒ Replace noncompliant with water-conserving plumbing fixtures when a permit is taken out for building additions, alterations – required as of January 1, 2014
   - ❒ Replace noncompliant with water-conserving fixtures in single-family residential property and verify – required by January 1, 2017

3. System Water Audits, Leak Detection and Repair

   - ❒ Quantify the current volume of apparent and real water loss
   - ❒ Repair all reported leaks and breaks to the extent cost effective
   - ❒ Establish and maintain a record-keeping system for the repair of reported leaks

4. Metering with Commodity Rates for New Connections and Retrofit of Existing Customers

   - ❒ Continue the City's metering programs for all service connections

5. Large Landscape Conservation Programs and Incentives

   - ❒ Require new development and rehabilitation projects to make maximum use of water conservation techniques
   - ❒ Encourage drought resistant plant species in ornamental landscaping
   - ❒ Require a water efficient irrigation system in commercial, industrial and multifamily residential developments

6. High Efficiency Washing Machine Rebate Program through Imperial Irrigation District (IID)

7. Public Information Programs

   - ❒ Implement a public information program to promote water conservation and water-conservation-related benefits

8. School Education Programs

   - ❒ Implement a school education program to promote water conservation and water conservation-related benefits

   - ❒ Maintain an active school education program to educate students in the agency's service area about water conservation and efficient water use

9. Commercial, Industrial and Institutional Programs

   - ❒ Focus on landscaping water savings
   - ❒ Actively seek funding for a regional recycled water treatment plant for industrial use

10. Wholesale Assistance

    - ❒ Continue to work with the Imperial Irrigation District to participate in regional DMM efforts through the Integrated Regional Water Management Plan (IRWMP)

11. Conservation Coordinator

    - ❒ Designate a person as the City's responsible conservation coordinator for program management, tracking, planning, and reporting on DMM implementation. This may be a regional position.

12. Water Waste Prohibition

    - ❒ Continue to implement the City's No Waste Resolution.

13. Residential High Efficiency Toilet (HET) Replacement Programs

    - ❒ Consider implementing a low-flow replacement program for showers and toilets in existing facilities.

Attachment C

Persons Consulted

City of Brawley

- ❒ Gordon Gaste, AICP, Planning Director
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- ❒ Ruby D. Walla, Finance Director
- ❒ Pete Sanchez, Equipment/Maintenance Supervisor
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