4.7 GREENHOUSE GAS EMISSIONS

This chapter contains information about greenhouse gas (GHG) emissions in Vacaville. It provides an overview of the current regulatory framework, describes existing conditions, and analyzes the potential impacts of the proposed General Plan and Energy and Conservation Action Strategy (ECAS). As noted in Chapter 3, Project Description, impacts are determined by comparing the proposed General Plan and ECAS to existing conditions, rather than to the existing General Plan. The following evaluation is based on a quantitative analysis and examines effects on existing emissions levels, compliance with a qualified GHG emissions reduction strategy, and conflicts with GHG emissions reduction plans, policies, and regulations. The GHG emissions data used in this analysis is contained in Appendix E of this Draft EIR.

A. Regulatory Framework

This section discusses the federal, State, and regional policies and regulations that are relevant to the analysis of GHG emissions in Vacaville.

1. Federal Laws and Regulations

Currently, there are no adopted regulations to combat global climate change on a national level. On April 2, 2007, the US Supreme Court ruled that the US Environmental Protection Agency (EPA) has the authority to regulate carbon dioxide (CO_2) emissions under the federal Clean Air Act of 1970.

After a thorough examination of the scientific evidence and careful consideration of public comments, the EPA announced on December 7, 2009, that GHG emissions threaten the public health and welfare of the American people. The EPA also finds that GHG emissions from on-road vehicles contribute to that threat. The EPA's final findings respond to the 2007 US Supreme Court decision that GHG emissions fit within the Clean Air Act definition of air pollutants. The findings do not in and of themselves impose any emission reduction requirements, but allow the EPA to finalize the GHG standards proposed in 2009 for new light-duty vehicles as part of the joint rulemaking with the Department of Transportation.

The EPA's endangerment finding covers emissions of six key GHGs – CO_2, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (SF6) – that have been the subject of scrutiny and in-tense analysis for decades by scientists in the US and around the world. In response to the endangerment finding, the EPA issued the Mandatory Reporting of GHG Rule that requires substantial emitters of GHG emissions (e.g. large stationary

sources) to report GHG emissions data. Facilities that emit 25,000 metric tons (MT) of carbon dioxide equivalents (CO_2e)[1] or more per year are required to submit an annual report.

2. State Laws and Regulations

This section describes State laws and regulations that pertain to GHG emissions.

a. Assembly Bill 32 and Executive Order S-03-05

Current State of California guidance and goals for reductions in GHG emissions are generally embodied in Assembly Bill (AB) 32, the Global Warming Solutions Act, and Executive Order S-03-05.

AB 32 was passed by the California State legislature on August 31, 2006, to place the State on a course toward reducing its contribution of GHG emissions. AB 32 follows the 2020 tier of emissions reduction targets established in Executive Order S-03-05, signed June 1, 2005. Executive Order S-03-05 sets the following GHG reduction targets for the State:

- 2000 levels by 2010
- 1990 levels by 2020
- 80 percent below 1990 levels by 2050.

AB 32 directed the California Air Resources Board (CARB), which administers the air quality standards in California, to adopt discrete early action measures to reduce GHG emissions and outline additional reduction measures to meet the 2020 target, which it did through the Scoping Plan that it published in December 2008. Key elements of CARB's Scoping Plan are:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards.
- Achieving 33 percent of energy generation from renewable sources.
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system for large stationary sources.
- Establishing targets for transportation-related GHG emissions for regions throughout California, and pursuing policies and incentives to achieve those targets.
- Adopting and implementing measures pursuant to State laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard (LCFS).

[1] Carbon dioxide equivalents are discussed further in Section B.1, Greenhouse Gases.

- Creating target fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the State's long-term commitment to AB 32 implementation.

Based on the 2002 to 2004 GHG emissions inventory conducted for the Scoping Plan by CARB, GHG emissions in California in 2020 are anticipated to be approximately 596 million metric tons (MMT) of carbon dioxide equivalent (CO2e). In December 2007, CARB approved a 2020 emissions limit of 427 MMTCO2e for the State, which is equivalent to 1990 emissions levels. Therefore, the 2020 target requires emissions reductions of 169 MMTCO2e compared to business-as-usual (BAU) conditions (i.e. projected levels of GHG emissions in 2020 if no actions were taken to reduce GHG emissions), a reduction of 28.5 percent from BAU in 2020 (i.e. 28.5 percent of 596 MMTCO2e), in order to achieve the target to achieve 1990 emissions levels by 2020.[2]

Many factors affect GHG emissions, including the economy, demographics, improved efficiency standards, and changes in environmental conditions such as drought, so it is important to periodically update the statewide inventory to measure actual emissions and account for these factors.[3] In 2013, as part of the ongoing process of meeting the 1990 statewide GHG emissions target required by AB 32, CARB released an updated statewide GHG emissions inventory for the years 2000 to 2010.[4] This update provides actual GHG emissions data for this time period, whereas the previous statewide inventory relied on projections for years after 2004. This updated and comprehensive annual statewide emissions inventory offers a better understanding of historical GHG emission trends, which, in turn, helps track progress towards meeting the State's target.

The 2000-2010 statewide GHG emissions inventory shows that GHG emissions in California are increasing at a slower rate than anticipated in the 2008 Scoping Plan, likely due to the downturn in the economy. Based on the revised data available in the 2000-2010 inventory, CARB projects that statewide BAU emissions in 2020 would be approximately 545 $MMTCO_2e$, about 10 percent lower than the 596 $MMTCO_2e$ projected in 2008. Therefore, as shown in Figure 4.7-1, to achieve the AB 32 target of 427 $MMTCO_2e$ by 2020 (i.e. 1990 emissions levels by 2020), the

[2] California Air Resources Board (CARB) defines BAU as emissions levels that would occur if California continued to grow and increase GHG emissions, but did not adopt any measures to reduce emissions.

[3] The California Environmental Protection Agency, California Air Resources Board website, http://www.arb.ca.gov/cc/inventory/inventory.htm, accessed on October 15, 2012.

[4] The 1990 through 1999 GHG emission estimates are included in the 1990-2004 GHG inventory that was published in November 2007.

State would only need to reduce emissions by 118 $MMTCO_2e$ compared to BAU conditions, a reduction of 21.7 percent from BAU in 2020.[5]

FIGURE 4.7-1 STATE GHG EMISSION REDUCTION TARGET

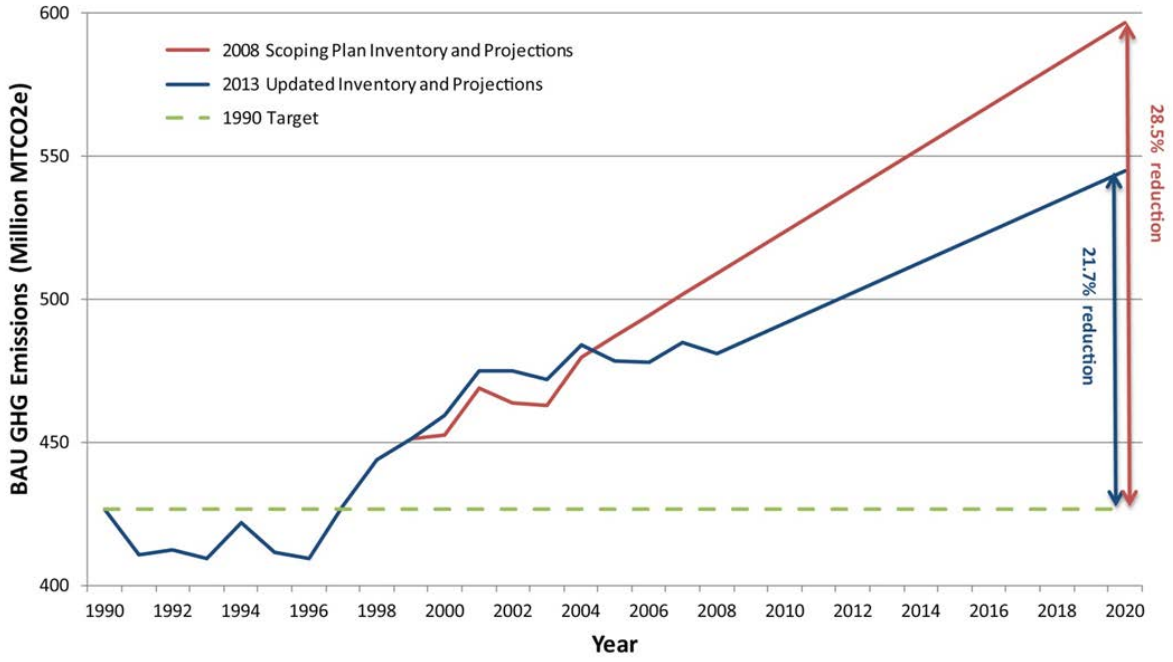

Table 4.7-1 shows the proposed reductions from State-level regulations and programs outlined in the Scoping Plan to meet the State's emission reduction goal. Local government operations were not accounted for determining whether the actions of State agencies could achieve the 2020 emissions reduction. However, the appendices to the Scoping Plan indicated that if local governments took similar actions as State agencies were required to do, then the State would achieve additional GHG reduction benefits in the range of 5 MMTCO2e, which is approximately 3 percent of the 2020 GHG emissions reduction goal.

In recognition of the critical role local governments plays in successful implementation of AB 32, CARB recommends GHG reduction goals of 15 percent of 2005 to 2008 levels by 2020 to ensure that municipal and communitywide emissions match the State's reduction target. (See Section D.1, Project Impacts, for a description of whether the General Plan Update and ECAS would enable Vacaville to meet a reduction goal consistent with AB 32.) Measures that local governments take to support shifts in land use patterns are anticipated to emphasize compact, low-impact growth over development in greenfields, resulting in fewer vehicle miles traveled (VMT).

[5] Association of Environmental Professionals, 2012, *Forecasting Community-Wide Greenhouse Gas Emissions and Setting Reduction Targets (Draft)*, available at: http://www.califaep.org/docs/AEP_Next_Steps_White_Paper.pdf.

TABLE 4.7-1 SCOPING PLAN GHG REDUCTION MEASURES AND REDUCTIONS TOWARD 2020 TARGET

Recommended Reduction Measures	Reductions Counted Toward 2020 Target of 169 MMTCO2e	Percentage of Statewide 2020 Target
Cap and Trade Program and Associated Measures[a]		
California Light-Duty Vehicle GHG Standards	31.7	19%
Energy Efficiency	26.3	16%
Renewable Portfolio Standard (33 percent by 2020)	21.3	13%
Low Carbon Fuel Standard	15	9%
Regional Transportation-Related GHG Targets[b]	5	3%
Vehicle Efficiency Measures	4.5	3%
Goods Movement	3.7	2%
Million Solar Roofs	2.1	1%
Medium/Heavy Duty Vehicles	1.4	1%
High Speed Rail	1.0	1%
Industrial Measures	0.3	0%
Additional Reduction Necessary to Achieve Cap	34.4	20%
Total Cap and Trade Program Reductions	*146.7*	*87%*
Uncapped Sources/Sectors Measures		
High Global Warming Potential Gas Measures	20.2	12%
Sustainable Forests	5	3%
Industrial Measures (for sources not covered under cap and trade program)	1.1	1%
Recycling and Waste (landfill methane capture)	1	1%
Total Uncapped Sources/Sectors Reductions	*27.3*	*16%*
Total Reductions Counted toward 2020 Target	**174**	**100%**
Other Recommended Measures – Not Counted toward 2020 Target		
State Government Operations	1.0 to 2.0	1%

TABLE 4.7-1 **SCOPING PLAN GHG REDUCTION MEASURES AND REDUCTIONS TOWARD 2020 TARGET**

Recommended Reduction Measures	Reductions Counted Toward 2020 Target of 169 MMTCO2e	Percentage of Statewide 2020 Target
Local Government Operations	To Be Determined	NA
Green Buildings	26	15%
Recycling and Waste	9	5%
Water Sector Measures	4.8	3%
Methane Capture at Large Dairies	1	1%
Total Other Recommended Measures – Not Counted Toward 2020 Target	*42.8*	*NA*

Notes: MMTCO2e: million metric tons of carbon dioxide equivalent.
The percentages in the right-hand column add up to more than 100 percent because the emissions reduction goal is 169 MMTCO2e and the Scoping Plan identifies a reduction of 174 MMTCO2e from emissions reductions strategies.
[a] "Cap and trade" refers to a program under which an overall limit on GHG emissions from "capped" sectors is established and facilities subject to the cap may trade permits to emit GHGs. The overall cap is designed to decline over time. Capped facilities include refineries, power plants, industrial facilities, and transportation fuels. Eight percent of a company's emissions can be covered using offset credits from emission reduction projects in uncapped sectors, such as agriculture and forestry projects. For more information, please see: http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm.
[b] Reductions represent an estimate of what may be achieved from local land use changes. It is not the Senate Bill (SB) 375, the Sustainable Communities and Climate Protection Act of 2008, regional target.
Source: California Air Resources Board (CARB), 2008, Climate Change Proposed Scoping Plan, a Framework for Change.

CARB is in the process of completing a five-year update to the 2008 Scoping Plan, as required by AB 32. A discussion draft of the 2013 Scoping Plan was released on October 1, 2013. The 2013 Scoping Plan update defines CARB's climate change priorities for the next five years and lays the groundwork to reach post-2020 goal set forth in Executive Order S-3-05. The update also includes the latest scientific findings related to climate change and its impacts, including short-lived climate pollutants, and highlights California's progress toward meeting the near-term 2020 GHG emission reduction goals defined in the original 2008 Scoping Plan.

As identified in the 2013 Scoping Plan update, California is on track to meeting the goals of AB 32. The State's long-term GHG goals are addressed within a post-2020 element that provides a high-level view of a long-term strategy for meeting the 2050 GHG goals, including a recommendation for the State to adopt a mid-term target. According to the 2013 Scoping Plan update, reducing emissions to 80 percent below 1990 levels will require a fundamental shift to efficient, clean energy in every sector of the economy.

b. Energy Conservation Standards

The California Energy Resources Conservation and Development Commission, frequently referred to as the California Energy Commission (CEC), is charged with "forecasting energy supply and demand, developing and implementing energy conservation measures, conducting energy-related research and development programs, and siting major power plants."[6] Energy conservation standards for new residential and nonresidential buildings were adopted by the CEC in June 1977 and most recently revised in 2013 (Title 24, Part 6 of the California Code of Regulations [CCR]). Title 24 requires the design of building shells and building components to conserve energy. The standards are updated periodically to allow for consideration and possible incorporation of new energy efficiency technologies and methods; the 2013 standards will become effective on January 1, 2014. The 2013 standards are approximately 24 percent more energy efficient for residential buildings and 30 percent more energy efficient for non-residential buildings compared to the previous Building and Energy Efficiency Standards that were revised in 2008.The 2006 Appliance Efficiency Regulations (Title 20, CCR Sections 1601 through 1608) were adopted by the CEC on October 11, 2006, and approved by the California Office of Administrative Law on December 14, 2006. The regulations include standards for both federally regulated appliances and non-federally regulated appliances. While these regulations are now often viewed as "business-as-usual," they exceed the standards imposed by all other states and they reduce GHG emissions by reducing energy demand.

On July 17, 2008, the California Building Standards Commission, an eleven-member, Governor-appointed commission which administers and implements California's building codes, adopted the nation's first green building standards. The California Green Building Standards Code (proposed Part 11, Title 24) was adopted as part of the California Building Standards Code (Title 24, California Code of Regulations). The green building standards that became mandatory in the 2010 edition of the code established voluntary standards on planning and design for sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and internal air contaminants. The mandatory provisions of the California Green Building Code Standards became effective January 1, 2011.

c. Renewable Power Requirements

A major component of California's Renewable Energy Program is the renewable portfolio standard (RPS) established under Senate Bills 1078 (Sher) and 107 (Simitian). Under the RPS, certain retail sellers of electricity were required to increase the amount of renewable energy each year by at least 1 percent in order to reach at least 20 percent by December 30, 2010. In Sep-

[6] Legislative Analyst's Office, California Energy Resources Conservation and Development Commission, http://www.lao.ca.gov/analysis_2008/resources/res_anl08006.aspx, accessed on August 23, 2012.

tember 2010, CARB approved an even higher goal of 33 percent by 2020.[7] Renewable sources of electricity include wind, small hydropower, solar, geothermal, biomass, and biogas. The increase in renewable sources for electricity production will decrease indirect GHG emissions from development projects because electricity production from renewable sources is generally considered carbon neutral.

d. Vehicle Emission Standards/Improved Fuel Economy

Vehicle GHG emission standards were enacted under AB 1493 (Pavley I) and the Low Carbon Fuel Standard (LCFS). Pavley I is a clean-car standard that reduces GHG emissions from new passenger vehicles (light duty auto to medium duty vehicles) from 2009 through 2016 and is anticipated to reduce GHG emissions from new passenger vehicles by 30 percent in 2016. The LCFS requires a reduction of 2.5 percent in the carbon intensity of California's transportation fuels by 2015 and a reduction of at least 10 percent by 2020.

e. Senate Bill 375

In 2008, Senate Bill (SB) 375, the Sustainable Communities and Climate Protection Act, was adopted to connect the GHG emissions reductions targets established in the CARB Scoping Plan for the transportation sector to local land use decisions that affect travel behavior. Its intent is to reduce GHG emissions from light-duty trucks and automobiles (excluding emissions associated with goods movement) by aligning regional long-range transportation plans, investments, and housing allocations to local land use planning to reduce VMT and vehicle trips. Specifically, SB 375 required CARB to establish GHG emissions reduction targets for each of the 17 regions in California managed by a metropolitan planning organization (MPO). The Metropolitan Transportation Commission (MTC) is the MPO for the nine-county San Francisco Bay Area region that includes Vacaville. MTC's targets are a 7 percent reduction in emissions from light-duty trucks and automobiles from 2005 levels by 2020, and a 15 percent reduction from 2005 levels by 2035.

MTC's strategies to reduce vehicle emissions are based on land use, road-pricing options (e.g. tolls and high-occupancy vehicle toll lanes), and maintenance policy options, as well as the potential reductions from combining these policies. MTC's 2035 targets might be achieved through a focused growth strategy and reliance on road pricing. MTC's current plan builds on the regional plan, FOCUS, which identified approximately 120 Priority Development Areas (PDAs) to focus the region's future growth. FOCUS, a regional development and conservation strategy, promotes a more compact land use pattern for the Bay Area and unifies the four regional agencies (the Association of Bay Area Governments [ABAG], Bay Area Air Quality Man-

[7] California Air Resources Board press release, 2010, *California Commits to More Clean, Green Energy*, http://www.arb.ca.gov/newsrel/newsrelease.php?id=155, accessed on September 5, 2012.

agement District [BAAQMD], Bay Conservation and Development Commission [BCDC], and MTC) into a single program that links land use and transportation by encouraging the development of complete, livable communities in areas served by transit, and promotes conservation of the region's most significant resource lands. FOCUS is partially funded by a Blueprint Planning Program Grant from the State of California Business, Transportation, and Housing Agency. The plan also includes investments of more than 80 percent of MTC's revenues into maintaining and operating the region's existing transportation network, building out high occupancy vehicle lanes, converting express high occupancy toll lanes, completing several transit projects, expanding the ferry system, conducting region-wide ramp metering, and completing a regional bicycle network.

SB 375 requires the MPOs to prepare a Sustainable Communities Strategy (SCS) in their regional transportation plan. For the MTC region, the first SCS was adopted on July 18, 2013. The SCS sets forth a development pattern for the region, which, when integrated with the transportation network and other transportation measures and policies, would reduce GHG emissions from transportation (excluding goods movement). The SCS is meant to provide individual jurisdictions with growth strategies that, when taken together, achieve the regional GHG emissions reduction targets. However, the SCS does not require that local general plans, specific plans, or zoning be consistent with the SCS, instead it provides incentives for consistency to governments and developers. If the SCS is unable to achieve the regional GHG emissions reduction targets, the MPO is required to prepare an Alternative Planning Strategy that shows how the GHG emissions reduction target could be achieved through other development patterns, infrastructure, and/or transportation measures.

3. Regional Plans and Policies

Vacaville primarily falls within the jurisdiction of the Yolo-Solano Air Quality Management District (YSAQMD), although a portion of Vacaville lies with the Bay Area Air Quality Management District (BAAQMD). YSAQMD is responsible for achieving and maintaining healthful air quality for its residents by establishing programs, plans, and regulations enforcing air pollution control rules in order to attain all State and federal ambient air quality standards and to minimize public exposure to airborne toxins and nuisance odors. YSAQMD is in the process of identifying GHG significance thresholds and best management practices in conformance with AB 32 and SB 375. In the interim, YSAQMD directs projects to use the standards adopted by BAAQMD.[8]

BAAQMD has published guidance on the criteria for a "qualified" GHG emissions reduction strategy, which allows future developments to potentially "tier" off the plan by avoiding the

[8] Jones, Matt. Supervising Air Quality Planner, Yolo Solano Air Quality Management District. Personal communication with Aaron Engstrom, The Planning Center | DC&E, January 18, 2012.

need for project-specific GHG emissions analyses under CEQA. BAAQMD permits this tiering consistent with the State CEQA Guidelines, Section 15183.5, which reads, in part:

> *(a) Lead agencies may analyze and mitigate the significant effects of greenhouse gas emissions at a programmatic level, such as in a general plan, a long range development plan, or a separate plan to reduce greenhouse gas emissions. Later project-specific environmental documents may tier from and/or incorporate by reference that existing programmatic review.*
>
> *(b) Plans for the Reduction of Greenhouse Gas Emissions. Public agencies may choose to analyze and mitigate significant greenhouse gas emissions in a plan for the reduction of greenhouse gas emissions or similar document… a lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project complies with the requirements in a previously adopted plan or mitigation program under specified circumstances.*

Put simply, tiering means that, for the purpose of analyzing GHG emissions impacts, projects that conform to the qualified GHG emissions reduction plan have already received CEQA and may simply conclude that the project impacts are less than significant.

The determination that a plan or project conforms with a qualified GHG emissions reduction strategy is made if the actions and policies of the plan or project do not conflict with those in the qualified GHG emissions reduction plan. BAAQMD sets forth the required elements for a GHG emissions reduction strategy, which is often called a climate action plan, to be considered qualified. BAAQMD also stipulates the characteristics that qualified GHG emissions strategies must have.

Beyond these criteria, BAAQMD requires that qualified GHG emissions reduction strategies address certain key emissions sectors, including: residential, commercial, industrial, transportation and land use, waste, agriculture (if pertinent), and water and wastewater treatment. In general and for each of these sectors, BAAQMD provides standards, sources, and guidelines for performing suitable GHG inventories. Qualified GHG emissions reduction strategies must evaluate the specific current emissions for each of these sectors, as well as projected emissions under both a BAU scenario and under the proposed strategy. Qualified GHG emissions reduction strategies must reasonably demonstrate that the proposed strategy would lead to decreases in GHG emissions consistent with the goals and targets of State laws, such as AB 32.

The proposed ECAS has been prepared in accordance with these guidelines from BAAQMD, and is evaluated as part of this EIR.

B. Existing Conditions

The earth's atmosphere contains a group of naturally occurring gases that are responsible for maintaining a habitable climate. These gases allow sunlight to enter the earth's atmosphere freely and then prevent a portion of the resulting heat from exiting the atmosphere. Because of their ability to contain heat, these gases are known as greenhouse gases, or GHGs. Natural levels of GHGs exist in balanced proportion, resulting in steady maintenance of the temperature within earth's atmosphere. Emissions from human activities, such as electricity production and motor vehicle use, elevate the concentrations of GHGs, upsetting their natural balance. When GHG concentrations exceed natural concentrations in the atmosphere, the "greenhouse effect" of trapped heat is enhanced, and the phenomenon known as global warming occurs.

Please see Chapter 4.15, Utilities and Service Systems, for a description of existing climate conditions as they pertain to Vacaville's drainage characteristics.

1. Greenhouse Gases

The natural process through which heat is retained in the troposphere is called the "greenhouse effect." The greenhouse effect traps heat in the troposphere, the lowest portion of earth's atmosphere, through a three-fold process, as follows: 1) short wave radiation emitted by the sun is absorbed by the earth; 2) the earth emits a portion of this energy in the form of long wave radiation; and 3) GHGs in the upper atmosphere absorb this long wave radiation and emit some of it back toward the earth. This "trapping" of the long wave (thermal) radiation emitted back toward the earth is the underlying process of the greenhouse effect.

To gauge the potency of GHGs, scientists have established an international unit of measure, called Global Warming Potential (GWP). All GHGs have a GWP and this value is used to estimate the relative impact GHGs will have on global climate change. Assigning a GWP value allows policy makers to compare the impacts of emissions and reductions of different gases. For instance, methane is a significant contributor to the greenhouse effect and has a GWP of 21. This means methane is approximately 21 times more heat-absorptive than carbon dioxide per unit of mass.

Based on the GWP, all GHGs can be converted into CO2e. For a given mixture and amount of GHGs, the CO2e is a quantity that describes the amount of carbon dioxide that would have the same global warming potential when measured over a specified period, generally 100 years. The carbon dioxide equivalency for a gas is obtained by multiplying the mass and the GWP of the gas.

California State law defines GHGs to include the following: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride.[9] However, some of these GHGs are only emitted through very specific processes, such as semiconductor manufacturing, and those GHGs are not likely to be emitted in Vacaville. Table 4.7-2 shows the various GWPs and atmospheric lifetimes of the GHGs likely to be emitted in significant quantities as a consequence of this project. These GHGs that are relevant to the proposed project are described below:

- **Carbon dioxide (CO_2)** enters the atmosphere through the burning of fossil fuels (e.g. oil, natural gas, and coal), solid waste, trees, and wood products; through respiration; and as a result of other chemical reactions. Carbon dioxide is also removed from the atmosphere (i.e. sequestered) when it is absorbed by plants as part of the biological carbon cycle.
- **Methane (CH_4)** is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices, as well as from the decay of organic matter, including waste in municipal landfills and wastewater treatment facilities.
- **Nitrous oxide (N_2O)** is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.

2. Human Influence on Climate Change

For approximately 1,000 years before the Industrial Revolution, the amount of GHGs in the atmosphere remained relatively constant. However, during the 20th century, scientists observed rapid changes in the climate and in the atmospheric levels of climate change pollutants that are attributable to human activities. The amount of atmospheric CO_2 has increased by more than 35 percent since preindustrial times and has increased at an average rate of 1.4 parts per million (ppm) per year since 1960, mainly due to combustion of fossil fuels and to deforestation.[10] These recent changes in climate change pollutants far exceed the extremes of the ice ages, and the global mean temperature is warming at a rate that cannot be explained by natural causes alone.

Human activities are directly altering the chemical composition of the atmosphere through the buildup of climate change pollutants.[11]

[9] Health and Safety Code, Section 38505(g).

[10] Intergovernmental Panel on Climate Change (IPCC), 2007. *Fourth Assessment Report: Climate Change 2007*, New York: Cambridge University Press.

[11] California Climate Action Team, 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature.*

TABLE 4.7-2 **GLOBAL WARMING POTENTIAL OF GREENHOUSE GASES**

GHGs	Atmospheric Lifetime (Years)	Global Warming Potential
Carbon Dioxide (CO_2)	50 to 200	1
Methane (CH_4)[a]	12 (±3)	21
Nitrous Oxide (N_2O)	120	310

[a] The methane GWP includes the direct effects and those indirect effects due to the production of tropospheric ozone and stratospheric water vapor. The indirect effect due to the production of CO_2 is not included.
Source: United States Environmental Protection Agency (USEPA), 2009, *Global Warming Potentials and Atmospheric Lifetimes, Non-CO_2 Gases Economic Analysis and Inventory*, available at: http://www.epa.gov/climatechange/glossary.html#GWP.

3. California's GHG Sources and Relative Contribution

California is the second largest emitter of GHGs in the United States, only surpassed by Texas, and the tenth largest GHG emitter in the world.[12] However, because of more stringent air emission regulations, in 2001 California ranked fourth lowest in carbon emissions per capita and fifth lowest among states in CO_2 emissions from fossil fuel consumption per unit of Gross State Product (i.e. total economic output of goods and services). In 2009, California produced 457 MMTCO2e GHG emissions, of which 86 percent were from CO_2, 7 percent were from CH_4, and 3 percent were from N_2O. The remaining 4 percent of GHG emissions were from high GWP gases, which include hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.[13]

CO_2 emissions from human activities make up 84 percent of California's total GHG emissions. California's transportation sector is the single largest generator of GHG emissions, producing 38 percent of the State's total emissions. Electricity generation is the second largest source, comprising 23 percent. Industrial activities are California's third largest source of GHG emissions, generating 20 percent of state's total emissions. Commercial and residential electricity consumption, recycling and waste, agriculture, forestry, and high GWPs make up the balance of California's GHG emissions.[14]

[12] California Energy Commission, 2005. Climate Change Emissions Estimates from Bemis, Gerry and Jennifer Allen, *Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2002 Update,* California Energy Commission Staff Paper CEC-600-2005-025, Sacramento, California.

[13] California Air Resources Board (CARB), 2011. *California Greenhouse Gas Emissions Inventory: 2000 to 2009*, available at http://www.arb.ca.gov/cc/inventory/data/data.htm.

[14] California Air Resources Board (CARB), 2011. *California Greenhouse Gas Emissions Inventory: 2000 to 2009*, available at http://www.arb.ca.gov/cc/inventory/data/data.htm.

4. Potential Climate Change Impacts for California

Climate change is not a local environmental impact; it is a global impact with local implications. Unlike criteria pollutants (i.e. principal air pollutants subject to health-based air quality standards established by the State and federal governments), CO_2 emissions cannot be attributed to a direct health effect. However, human-caused increases in GHG have been shown to be highly correlated with increases in the surface and ocean temperatures on earth.[15] The extent of the impact on environmental systems, however, is less clear.

In California and western North America, climate observations have indicated: 1) a trend toward warmer winter and spring temperatures; 2) a decreasing fraction of precipitation is falling as snow; 3) diminished spring snow accumulation in the lower and middle elevation mountain zones; 4) snowmelt occurring 5 to 30 days earlier in the springs; and 5) a similar shift (5 to 30 days earlier) in the timing of spring flower blooms.[16]

The Intergovernmental Panel on Climate Change (IPCC) is an international scientific organization that was established in 1988 by the United Nations Environmental Programme and World Meteorological Organization. The IPCC's 2007 Fourth Assessment Report projects that the global mean temperature increase from 1990 to 2100, under different climate change scenarios, will range from 1.4 to 5.8°C (2.5 to 10.4°F). In the past, gradual changes in the earth's temperature changed the distribution of species, availability of water, and other environmental characteristics. However, human activities are accelerating this process so that environmental impacts associated with climate change no longer occur in a geologic timeframe but within a human lifetime.[17]

Like the variability in the projections of the expected increase in global surface temperatures, the environmental consequences of gradual changes in the earth's temperature are also hard to predict. According to the California Energy Commission's (CEC) 2008 report, *The Future Is Now, An Update on Climate Change Science, Impacts, and Response Options for California*, global climate change risks include public health impacts, water resources impacts, agricultural impacts, disruption of native ecosystems, altered landscapes, increased wildfire risk, accelerated rises in sea level, forestry impacts, and growing energy demand. These risks are shown in Table 4.7-3.

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[15] Intergovernmental Panel on Climate Change, 2007. *Fourth Assessment Report: Climate Change 2007*, New York: Cambridge University Press.

[16] California Climate Action Team, 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature.*

[17] Intergovernmental Panel on Climate Change, 2007. *Fourth Assessment Report: Climate Change 2007*, New York: Cambridge University Press.

TABLE 4.7-3 **SUMMARY OF CLIMATE CHANGE RISKS TO CALIFORNIA**

Impact Category	Potential Risk
Public Health Impacts	Poor air quality made worse More severe heat
Water Resources Impacts	Decreasing Sierra Nevada snow pack Challenges in securing adequate water supply Potential reduction in hydropower Loss of winter recreation
Agricultural Impacts	Increasing threats from pests and pathogens Declining productivity Irregular blooms and harvests
Ecosystem Impacts	Northward and upward shifts of biomes, species Altered timing of migration and mating habits Loss of sensitive or slow-moving species
Landscape Alteration	Movement of forest areas Conversion of forest to grassland Changes to water bodies
Wildfire Risk	Increased risk and severity of wildfire Lengthening of wildfire season
Coast Sea Level Impacts	Accelerated sea level rise Increasing coastal floods Worsened impacts on infrastructure
Forestry Impacts	Increasing wildfires Increasing threats from pest and pathogens Declining forest productivity Shifting vegetation and species distribution
Energy Demand Impacts	Potential reduction in hydropower Increased energy demand

Sources: California Energy Commission (CEC), *The Future Is Now, An Update on Climate Change Science, Impacts, and Response Options for California*, 2008 Report, PIER Publications, CEC-500-2008-077, 2008; California Climate Action Team (CAT), March 2006, *Climate Action Team Report to Governor Schwarzenegger and the Legislature.*

The California Climate Action Team (CAT) is comprised of State agency secretaries and heads of agencies, boards, and departments that works to coordinate various Statewide efforts to reduce GHG emissions. According to the CAT, even if actions could be taken to immediately curtail climate change emissions, the potency of emissions that have already built up, their long atmospheric lifetimes, and the inertia of the earth's climate system could produce as much as 0.6°C (1.1°F) of additional warming. Consequently, some impacts from climate change are now considered unavoidable.

5. Vacaville Emissions

This section summarizes existing GHG emissions in Vacaville resulting from the following sectors: transportation, residential and non-residential energy use, water and wastewater, solid waste disposal, and other sources.

This baseline GHG inventory was compiled for the year 2008.[18] Vacaville's average annual communitywide GHG emissions in 2008 were 949,340 MTCO2e. The results of the inventory are shown in Table 4.7-4.

a. Transportation Emissions

Transportation sources of GHG emissions are a result of fuel combustion from the burning of fossil fuels, including gasoline and diesel, and from on-road mobile sources (e.g. passenger vehicles and trucks). Transportation emissions are based on trips generated by land uses within Vacaville. Transportation emissions include:

- 100 percent of trips that both begin and end within Vacaville.
- 50 percent of the trip length for trips from Vacaville to somewhere else (internal-external trips) and trips from somewhere else to Vacaville (external-internal trips).
- 0 percent of pass-through trips that neither begin nor end in Vacaville, such as cars driving from San Francisco to Sacramento on Interstate 80.

Vehicular Miles Traveled (VMT) generated by land uses within the city were compiled by Kittelson & Associates for Vacaville in 2008. GHG emissions from those VMT were compiled by LSA Associates using CARB's Emissions Factors 2011 (EMFAC2011) program and are shown in Table 4.7-5.

b. Residential Emissions

Residential land uses generate GHG emissions primarily from purchased electricity and natural gas used for heating and cooking.[19] Pacific Gas and Electric Company (PG&E) provided residential purchased energy use and natural gas use for years 2006 to 2008. This data is shown in Table 4.7-6.

[18] Energy use (purchased electricity and natural gas), water use, and waste disposal fluctuate according to meteorological conditions (e.g. precipitation and temperatures), so it is recommended that a three-year average be used. A three-year average between 2006 and 2008 was obtained for energy use and waste disposal; however, three years of data were unavailable for water use.

[19] Burning wood is considered a biogenic source of carbon dioxide (a GHG) because the carbon is associated with recently living organic material. Biogenic sources of GHG emissions are not included as part of a communitywide GHG inventory.

TABLE 4.7-4 BASELINE COMMUNITYWIDE GREENHOUSE GAS EMISSIONS SUMMARY

	GHG Emissions (MTCO2e/Year)	Percent of Total
Transportation[a]	598,040	63%
Residential[b]	153,210	16%
Non-Residential[b]	156,390	16%
Water/Wastewater[c]	10,680	1%
Solid Waste Disposal[d]	19,030	2%
Other Off-Road Emissions[e]	11,990	1%
Total	**949,340**	

Note: Emissions are rounded to the nearest tens place.
[a] EMFAC2011 based on VMT provided by Kittelson & Associates, as modeled by LSA Associates.
[b] Natural gas and purchased energy provided by PG&E.
[c] Local Government Operations Protocol (LGOP) Version 1.1 based on water/wastewater use in the city. Includes wastewater treated at the City's wastewater treatment plant but generated by land uses outside the city.
[d] US EPA Warm Model based on waste disposal obtained from CalRecycle.
[e] Estimate of stationary equipment use for landscaping, light commercial and industrial, and construction equipment obtained from the Solano Transportation Authority (STA) as part of the 2005 inventory for the City of Vacaville prepared by AECOM in May 2011.
Source: The Planning Center | DC&E, 2012; LSA Associates, 2012; and STA, 2011.

TABLE 4.7-5 BASELINE COMMUNITYWIDE GREENHOUSE GAS EMISSIONS FROM TRANSPORTATION SOURCES

Vehicle Miles Traveled		GHG Emissions
Daily	Annual	MTCO2e /Year
3,075,130	1.067 Billion	598,040

Notes: Daily VMT is multiplied by 347 days/year to account for reduced traffic on weekends and holidays, consistent with the CARB methodology within the Climate Change Scoping Plan Measure Documentation Supplement. Emissions are rounded to the nearest tens place.
Source: EMFAC2011.

TABLE 4.7-6 **BASELINE COMMUNITYWIDE GREENHOUSE GAS EMISSIONS FROM RESIDENTIAL LAND USES**

Source	Energy Usage	GHG Emissions MTCO2e/Year
Residential Building Purchased Energy	253,500,590 kWh	66,760
Residential Building Natural Gas	12,966,918 therms	86,450
Total		**153,210**

Notes: Based on the three-year average energy use from 2006 to 2008. Excludes properties owned by another governmental entity that are outside the land use authority of the City of Vacaville (i.e. County or State jurisdiction). Based on PG&E's third-party verified GHG emission factors. Emissions are rounded to the nearest tens place. "kWh" = kilowatt hours.
Source: May 11, 2012, *Community Wide Inventory Report for Cities in Solano County 2003 to 2010*.

c. Non-Residential Emissions

The non-residential category includes GHG emissions associated with commercial, office, and industrial land uses. Non-residential land uses generate GHG emissions primarily from purchased electricity and natural gas used for heating and cooking (e.g. restaurants). PG&E provided data on non-residential purchased energy use and natural gas use for years 2006 to 2008, as shown in Table 4.7-7.

d. Water/Wastewater Emissions

Water demand and wastewater generation in Vacaville result in indirect GHG emissions from the energy required to convey, treat, and distribute potable water and from emissions of methane and nitrous oxide from wastewater treatment that are not captured within the wastewater treatment system. Table 4.7-8 shows GHG emissions from the city's water use and wastewater generation.

Wastewater treatment processes produce "fugitive" GHG emissions. Under anaerobic conditions, microorganisms biodegrade soluble organic material in wastewater during both nitrification and denitrification and generate emissions of nitrous oxide, a GHG. These are shown in Table 4.7-8 as Fugitive Emissions. For the purposes of comparison to other emissions sources, these emissions are converted to CO2e.

TABLE 4.7-7 **BASELINE COMMUNITYWIDE GREENHOUSE GAS EMISSIONS FROM NON-RESIDENTIAL LAND USES**

Source	Energy Usage	GHG Emissions MTCO2e /Year
Non-Residential Building Purchased Energy	303,085,739 kWh	79,820
Non-Residential Building Natural Gas	11,485,325 therms	76,570
Total		**156,390**

Notes: Based on the three-year average energy use from 2006 to 2008. Excludes properties owned by another government entity that are outside the land use authority of the City of Vacaville (i.e. County or State jurisdiction). Based on PG&E's third-party verified GHG emission factors. Emissions are rounded to the nearest tens place. "kWh" = kilowatt hours.
Source: PG&E, May 11, 2012, Community Wide Inventory Report for cities in Solano County 2003 to 2010.

TABLE 4.7-8 **BASELINE COMMUNITYWIDE GREENHOUSE GAS EMISSIONS FROM WATER USE AND WASTEWATER TREATMENT**

	Energy (Megawatt Hours/Year)[a]	Energy Emissions (MTCO2e/ Year)[b]	Fugitive Emissions (MTCO2e/ Year)	Total GHG Emissions (MTCO2e/ Year)
Water Use	22,689	5,990	--	5,990
Wastewater Treatment	5,580	4,000 [c]	690	4,690
Total	**28,269**	**9,990**	**690**	**10,680**

Notes: Emissions are rounded to the nearest tens place.
[a] Energy associated with water conveyance, treatment, and distribution, and wastewater treatment.
[b] Based on GHG emission factors provided by PG&E, GHG Inventory for Project EIR, Easterly Wastewater Treatment Plant, Ryan Hougham, E.I.T, December 29, 2009, and Vacaville General Plan Update and EIR water demand and wastewater treatment information.
[c] GHG Inventory for Project EIR, Easterly Wastewater Treatment Plant, Ryan Hougham, E.I.T, December 29, 2009. Treatment Plant is under City ownership, but also treats waste from outside the city. Specifically, there are 2,531 MTCO2e generated from waste from outside of the city, which was added to 1,472 MTCO2e from waste originating inside the city.

The vast majority of households and businesses in Vacaville are connected to the City's sanitary sewer system.[20] Wastewater connected to the sanitary sewer system in Vacaville is treated at the Easterly Wastewater Treatment Plant (WWTP). Treated water is discharged as fresh water into Old Alamo Creek, east of the Plant.

[20] A small portion of households in the hillsides are on separate septic tank systems. For the purpose of this GHG emissions inventory, all wastewater was modeled as treated wastewater.

e. Solid Waste Disposal Emissions

Treatment and disposal of solid waste produces a significant amount of methane, a GHG. Most operating landfills in California also implement a landfill gas recovery system as a common way to reduce methane emissions from solid waste disposal. Although solid waste disposal sites produce biogenic carbon dioxide, biogenic sources of GHG emissions are not included as part of a communitywide GHG inventory.

The California Department of Resources Recycling and Recovery (CalRecycle) maintains a disposal reporting system to document waste disposal by jurisdiction and facility; this system was used to access the data needed to identify GHG emissions from solid waste generated in Vacaville. The system tracks solid waste disposal and alternative daily cover that is used as a temporary overlay on an exposed landfill face to reduce insects and vermin. Typical cover materials include green materials, sludge, ash and kiln residue, compost, construction, and demolition debris, and special foams and fabric; these materials contribute to the total solid waste disposal documented for Vacaville.

The US Environmental Protection Agency's Waste Reduction Model (WARM), Version 12, was used to calculate average annual GHG emissions from communitywide waste disposed in a given year. Pursuant to BAAQMD's methodology, a three-year average (2006 to 2008) was compiled. According to the CalRecycle disposal reporting system, between 2006 and 2008, Vacaville disposed of an average of 105,168 tons of solid waste and 5,864 tons of alternative daily cover, for a total disposal of 111,032 tons of solid waste. The vast majority (approximately 99 percent) of solid waste generated by the city is disposed at the Recology Hay Road Landfill, which has an active landfill methane gas collection system.[21] A landfill gas control efficiency of 75 percent was assumed based on the default value recommended by the Local Governments Operations Protocol (LGOP). However, most large landfills, such as the Recology Hay Road Landfill, have clay or geomembrane covers, which have a gas collection efficiency of 85 to 90 percent, respectively.[22] Therefore, GHG emissions estimates for Vacaville from waste disposal are conservative. Table 4.7-9 shows total GHG emissions from waste disposal for the city.

f. Other Off-Road Emissions

Other sources of GHG emissions include the combustion of fossil fuels for off-road stationary equipment, such as landscaping and construction equipment; these sources are summarized in Table 4.7-10. This category represents GHG emissions from off-road equipment exhaust from the following types of equipment used within Vacaville:

[21] Pacific Gas & Electric (PG&E), 2012, *Hay Road and Yuba Sutter Landfill Projects, Recology*, http://www.pge.com/myhome/environment/whatyoucando/climatesmart/climatesmartabout/projects/hayroadyubasutterlandfill.shtml, accessed June 8, 2012.

[22] Bay Area Air Quality Management District (BAAQMD), 2008, *Greenhouse Gas Mitigation Landfill Gas and Industrial, Institutional, and Commercial Boilers, Steam Generators and Process Heaters*, Prepared by URS Corporation.

TABLE 4.7-9 **BASELINE COMMUNITYWIDE GREENHOUSE GAS EMISSIONS FROM WASTE DISPOSAL**

CO2e Generated (Metric Tons/Year)	Fugitive CO2e Not Captured (Metric Tons/Year)[a]
76,130	19,030

Notes: Biogenic carbon dioxide is not included. Highest emissions occur approximately three years after disposal. An aggregated three years of emissions was used to account for cumulative disposal (waste-in-place). Emissions are rounded to the nearest tens place.
[a] Assumes a landfill gas control efficiency of 75 percent based on the LGOP.
Source: US EPA, February 2012, Waste Reduction Model (WARM), Version 12.

TABLE 4.7-10 **BASELINE COMMUNITYWIDE GREENHOUSE GAS EMISSIONS FROM OTHER OFF-ROAD EMISSIONS**

Source	GHG Emissions (MTCO2e/Year)
Landscaping Equipment	850
Light Commercial and Industrial Equipment	3,050
Construction Equipment	8,100
Total	**11,990**

Notes: Emissions are rounded to the nearest tens place.
Source: Solano Transportation Agency, 2011, *Greenhouse Gas Inventory*.

- ♦ Landscaping equipment, including blowers, mowers, and other landscaping tools.
- ♦ Light commercial and industrial equipment, including generators, pressure washers, welders, and pumps.
- ♦ Off-road construction equipment such as bulldozers, cranes, backhoes, and water trucks.

The emissions presented summarize the results of a GHG inventory for Solano County for the year 2005 completed for the Solano Transportation Authority (STA) by AECOM in May 2011.[23] AECOM used CARB's OFFROAD2007 model to calculate these stationary sources of emissions on a countywide level. Pursuant to BAAQMD guidance, stationary emissions for the City of Vacaville are estimated based on the percentage of the Solano County inventory that represents the city's GHG emissions.

[23] Solano Transportation Agency, 2011, *Greenhouse Gas Inventory*.

C. Standards of Significance

CEQA requires that lead agencies consider the reasonably foreseeable adverse environmental effects of projects considered for approval, including cumulative impacts. Cumulative impacts are the collective impacts of one or more past, present, or future projects that, when combined, result in adverse changes to the environment. Global climate change is considered an "effect on the environment" and an individual project's incremental contribution to global climate change, although small, can have a cumulatively significant impact when considered collectively with past present and future projects. Therefore, climate change is addressed primarily as a cumulative impact for purposes of CEQA.

Vacaville falls within the jurisdiction of YSAQMD, which is in the process of developing significance thresholds for GHGs. In the interim, the YSAQMD will consult with project applicants and lead agencies to identify thresholds of significance for GHG that have been adopted by other agencies and may be appropriate for use by the project. The EIR consultant consulted with YSAQMD regarding the proposed General Plan and ECAS, and the YSAQMD has determined that BAAQMD thresholds are appropriate for this project.[24] The BAAQMD thresholds of May 2011 are currently suspended due to legal action pending CEQA review. It is a matter for each jurisdiction to decide if it would like to adopt them voluntarily. The City of Vacaville has decided to use the standards believing them to be based on sound and substantial scientific evidence.

On December 30, 2009, the California Natural Resources Agency adopted CEQA Guidelines Amendments related to climate change. These amendments became effective on March 18, 2010. Consistent with the amended guidelines, climate change impacts associated with the project would be considered significant if the project would:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

For the first impact above, BAAQMD sets the plan-level standards of significance by which the proposed project is to be evaluated. As such, the impact of the proposed project is deemed less than significant if it:

- Complies with a qualified GHG emissions reduction strategy, or

[24] Jones, Matt, Yolo-Solano Air Quality Management District. Personal communication with Aaron Engstrom, The Planning Center | DC&E, February 3, 2012.

- Results in emissions less than 6.6 MTCO2e per service population, per year, where service population is the total number of employees and residents within the city.

However, the second metric, 6.6 MTCO2e per service population per year, is not applicable to cities outside of the Bay Area because it is based on the Bay Area's GHG emissions inventory that achieves the 2020 targets. To use this metric for Vacaville, an inventory for the Yolo-Solano portion of the Sacramento Valley Air Basin would be needed, and an efficiency metric developed based on that data.

Therefore, to evaluate the first threshold identified in the CEQA Guidelines, this EIR considers the whether the project complies with a qualified GHG emissions reduction strategy.

D. Impact Discussion

This section discusses potential impacts of the proposed General Plan and ECAS related to GHG emissions.

1. Project Impacts

The discussion of potential project impacts is organized by and responds to each of the potential impacts identified in the Standards of Significance.

a. Complies with a qualified GHG emissions reduction strategy.

The proposed ECAS is the City's GHG emissions reduction strategy. BAAQMD guidelines state that in order for a GHG emissions reduction strategy to be considered qualified, it must include the following elements:

- A GHG emissions inventory and a BAU projection.
- A GHG emissions reduction target consistent with AB 32.
- A review of relevant local and State policies.
- Quantitative emissions projections demonstrating target achievement.
- Strategies for implementation and monitoring.
- Environmental review.

BAAQMD also stipulates that qualified GHG emissions reduction strategies must be characterized by:

- A complete and comprehensive inventory of GHG emissions.
- Transparent calculations and assumptions.
- GHG reductions measures which are mostly mandatory.

- A "margin of safety" to ensure emission reduction goals are met.
- Measures that address both new and existing development.
- Clearly-defined implementation and monitoring strategies.

Finally, a qualified GHG emissions reduction strategy must address the residential, commercial, industrial, transportation and land use, waste, agriculture (if pertinent), and water and wastewater treatment sectors. Qualified GHG emissions reduction strategies must evaluate the specific current emissions for each of these sectors, as well as projected emissions under both a BAU scenario and under the proposed strategy. Qualified GHG emissions reduction strategies must reasonably demonstrate that the proposed strategy would lead to decreases in GHG emissions consistent with the goals and targets of State laws, such as AB 32.

The proposed ECAS meets these criteria for a qualified GHG emissions reduction strategy. It includes the required elements, as outlined below:

- The proposed ECAS includes a GHG emissions inventory for 2008 in Chapter 2, Existing GHG Emissions Inventory, and a BAU projection in Chapter 3, 2020 Business As Usual and Adjusted GHG Emissions Inventory.
- The proposed ECAS includes a GHG emissions target of a 21.7 percent reduction from 2020 BAU levels. This target is discussed in Chapter 4, GHG Emissions Reduction Target, of the proposed ECAS. As explained in that chapter, the target reflects the most recent Statewide GHG emissions inventory, which indicates that in order to achieve the AB 32 target of 1990 emissions levels by 2020, the State would need to reduce 2020 BAU emissions by 21.7 percent.
- The proposed ECAS includes a review of relevant State and local policies in Chapter 1, Introduction.
- In Chapter 5, Communitywide Measures, Implementation, and Monitoring, and Chapter 6, Municipal Measures, Implementation, and Monitoring, the proposed ECAS quantifies the projected GHG emissions reductions from the ECAS measures. These measures, in combination with GHG emissions reductions from State and federal regulations, which are quantified in Chapter 3, 2020 Business as Usual and Adjusted GHG Emissions Inventory, achieve the GHG emissions reduction target.
- The proposed ECAS includes implementation and monitoring direction in Chapter 7, Funding, Adaptation, and Monitoring.
- This EIR serves as the environmental review for the proposed ECAS.

In addition, the proposed ECAS contains the characteristics of a qualified GHG emissions reduction strategy:

- The inventory of GHG emissions provided in Chapter 2, Existing GHG Emissions Inventory, is consistent with BAAQMD guidance regarding the methodology for GHG inventories.
- All calculations and assumptions are transparently demonstrated in the appendices to the ECAS.
- The proposed ECAS includes a variety of types of measures, some of which are mandatory and some that are voluntary. The majority of the measures that contribute to the quantified GHG emissions reductions are mandatory.
- The proposed ECAS includes a substantial "margin of safety" to ensure that emissions reduction goals are met. Specifically, the proposed ECAS must reduce GHG emissions by 260,988 MTCO2e in order to reach its target. The measures in the proposed ECAS, in combination with State and federal requirements, would reduce GHG emissions by 325,404 MTCO2e, leaving a "margin of safety" of 64,416 MTCO2e, or 25 percent of the required reduction.
- The proposed ECAS includes measures that apply to both new and existing development. While the majority of the measures apply to new development, some measures also apply to existing development, such as Measure EC-7, which directs the City to offer innovative, low-interest financing for energy efficiency and renewable energy projects in existing development through the PACE program.
- The implementation and monitoring strategies in Chapter 5, Communitywide Measures, Implementation, and Monitoring; Chapter 6, Municipal Measures, Implementation, and Monitoring; and Chapter 7, Funding, Adaptation, and Monitoring of the proposed ECAS are clearly defined. Implementation strategies address action items, responsible parties, cost effectiveness, and implementation schedule for each measure. The monitoring plan directs the City to review and modify the ECAS every five years to evaluate implementation and achievement of measure reductions and to identify potential plan update needs. As part of this review, the plan directs the City to re-inventory its GHG emissions, allowing the City to monitor progress and report results toward local emissions reduction targets and identify opportunities to integrate new or improved measures into the emissions reduction plan.

The proposed ECAS also addresses the emissions sectors identified in BAAQMD guidance, with the following exceptions:

- Although there are industrial uses in Vacaville, the proposed ECAS does not include industrial stationary source GHG emissions in the inventory or forecasts because those

emissions are regulated by the YSAQMD, and are not under the jurisdiction of the City of Vacaville; therefore, Vacaville cannot adopt measures to reduce emissions from these sources.

- Although there are currently agricultural uses in Vacaville, and the conversion of agricultural lands to urban land uses can release GHGs, the amount of biomass stored in agricultural areas in the city does not constitute a substantial portion of the city's GHG emissions. Therefore, carbon stock from agricultural biomass would not make a measurable difference in determining the amount of Vacaville's future emissions and is not included in the GHG emissions inventory or forecasts.

The sectors described above are addressed in Chapter 2, Existing GHG Emissions Inventory, of the proposed ECAS, but are not included in the inventory or emissions projections for the reasons stated above.

For all other sectors, the proposed ECAS evaluates the current emissions and projected emissions under both a BAU scenario and with implementation of the proposed ECAS in Chapter 3, 2020 Business as Usual and Adjusted GHG Emissions Inventory, and Chapter 5, Communitywide Measures, Implementation, and Monitoring.

The proposed General Plan is consistent with the proposed ECAS because the proposed General Plan policies and actions do not conflict with those in the proposed ECAS. In addition, the policies and actions under proposed General Plan Goal COS-9 aim to reduce GHG emissions in Vacaville, which promotes the concepts of the proposed ECAS. In particular, Policy COS-P9.1 directs the City to maintain the ECAS, and Action COS-A9.1 directs the City to implement the ECAS and monitor its effectiveness every five years by conducting a GHG emissions inventory. This action also directs the City to adjust the ECAS as needed based on these calculations to ensure that the City is on track to meet its GHG emissions reduction target.

Because the proposed ECAS is a qualified GHG emissions reduction strategy, and because the proposed General Plan is consistent with the proposed ECAS, the impact would be *less than significant*.

b. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

As described in Section A.2.a, Assembly Bill 32 and Executive Order S-03-05, in accordance with AB 32, CARB developed the Scoping Plan to outline the State's strategy to achieve 1990 level emissions by 2020. To estimate the reductions necessary, CARB projected statewide 2020 BAU GHG emissions, and then determined that the State as a whole would need to reduce GHG emissions by 28.5 percent from 2020 BAU in order to achieve 1990 levels, as directed by

AB 32.[25] However, as also explained in Section A.2.a, Assembly Bill 32 and Executive Order S-03-05, based on updated Statewide GHG emission inventory data, the State would only need to reduce emissions 21.7 percent from 2020 BAU in order to reach 1990 levels.[26] As explained in Section D.1.a, Project Impacts, the proposed General Plan and ECAS would exceed this target for Vacaville.

The Scoping Plan also identifies strategies to reduce GHG emissions, including the Low Carbon Fuel Standard, California Appliance Energy Efficiency regulations, California Building Standards (e.g. California Green Building Code [CALGreen] and the 2008 Building and Energy Efficiency Standards), California Renewable Energy Portfolio standard (33 percent RPS), changes in the corporate average fuel economy standards (e.g. Pavley I and Pavley II), and other measures that would ensure the state is on target to achieve the GHG emissions reduction goals of AB 32. The proposed General Plan and ECAS would be consistent with these statewide GHG emissions reduction measures.

In addition to the 2020 target and statewide GHG emissions reduction measures covered in the Scoping Plan, Executive Order S-03-05 establishes a target to reduce GHG emissions by 80 percent below 1990 levels by 2050. While the proposed General Plan and ECAS are not intended to be effective through the year 2050, the proposed General Plan includes a horizon year of 2035, so emissions through 2035 should be considered for consistency with this Executive Order S-03-05 goal.

Without consideration of any federal, State, or local measures to reduce GHG emissions, GHG emissions in Vacaville in 2035 under the proposed General Plan are projected to be 1,519,040 MTCO2e. Known State and federal measures are projected to reduce 2035 emissions to 1,131,010 MTCO2e. While the proposed ECAS measures would further reduce the 2035 emissions, it is likely that additional measures would be needed to place the City on track to meeting Executive Order S-03-05's 2050 goal. In addition, State action beyond 2020 is uncertain, as there are no adopted State plans to achieve reductions beyond 2020. Therefore, the proposed General Plan and ECAS would conflict with the goal of Executive Order S-03-05 to reduce GHG emissions by 80 percent below 1990 levels by 2050, and the impact would be *significant*.

Impact GHG-1: The proposed General Plan and ECAS would conflict with Executive Order S-03-05's goal to reduce GHG emissions by 80 percent below 1990 levels by 2050.

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[25] California Air Resources Board (CARB), 2008. *Climate Change Proposed Scoping Plan, a Framework for Change.*

[26] Association of Environmental Professionals, 2012. *Forecasting Community-Wide Greenhouse Gas Emissions and Setting Reduction Targets (Draft)*, available at: http://www.califaep.org/docs/AEP_Next_Steps_White_Paper.pdf.

The majority of the reductions needed to reach the 2050 target will likely come from State measures (e.g. additional vehicle emissions standards), but the City does not have authority over such measures. The State has not identified plans to reduce emissions beyond 2020. In addition, as part of the ECAS process, the City considered a wide range of GHG emission reduction measures, and all feasible measures are included in the proposed ECAS. No additional mitigation is available, and the impact is considered *significant and unavoidable*.

2. Cumulative Impacts

Climate change is the result of cumulative global emissions. There is no single project when taken in isolation that can "cause" global warming as a single project's emissions are insufficient to change the radiative balance of the atmosphere. Because global warming is the result of GHG emissions, and GHGs are emitted by innumerable sources worldwide, global climate change is a significant cumulative impact of human development and activity. The global increase in GHG emissions that has occurred and will occur in the future is the result of the actions and choices of individuals, businesses, local governments, states, and nations. Therefore, the analysis in Section D.1, Project Impacts, addresses cumulative impacts.

E. Full Buildout

The full buildout anticipated under the proposed General Plan would include significantly more development than the 2035 horizon-year development projection analyzed in Section D, Impact Discussion, in terms of both the amount and the extent of development. Therefore, the potential for impacts related to GHG emissions would increase. However, as discussed in Chapter 3, Project Description, it is extremely unlikely that full buildout would ever occur under the proposed General Plan. Therefore, an analysis of full buildout is not required by CEQA.