
7. CLIMATE CHANGE

This EIR chapter addresses the climate change implications of the proposed Specific Plan, both beneficial and adverse. The chapter describes the climate change issue, assesses the potential climate change impacts of the Specific Plan, determines the significance of the impacts, and identifies mitigation measures warranted to reduce climate change impacts. In the current absence of any State-adopted regulations pursuant to CEQA or County-adopted regulatory standards for greenhouse gas (GHG) emissions to clearly define what constitutes a "significant" project contribution to global climate change, the County has undertaken this programmatic EIR climate change impact analysis based on best available information and consistent with current available guidance from the State Governor's Office of Planning and Research (OPR).

On June 19, 2008, OPR released an interim technical advisory that offered "informal guidance" regarding the steps that lead agencies should take to address climate change impacts in their CEQA documents,¹ in the absence of adopted statewide thresholds. Subsection 7.2.1(d) of this chapter provides more information on this interim guidance. Subsequently, on April 13, 2009, OPR released proposed draft amendments to the CEQA Guidelines,² which the California Resources Agency is required to adopt on or before January 1, 2010, pursuant to Senate Bill 97. Subsection 7.2.1(c) of this chapter provides more information on SB 97. Subsection 7.2.1(e) of this chapter provides more information on the draft guidelines. The draft guidelines, although not yet adopted, provide additional direction "for the mitigation of greenhouse gas or the effects of greenhouse gas emissions."

7.1 SETTING

7.1.1 Background

The term *climate change* is often used interchangeably with the term *global warming*. *Climate change* refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from a variety of causes, both natural and human-induced. *Global warming* refers to an average increase in the temperature of the atmosphere near the Earth's surface and in the troposphere, which can contribute to changes in global climate patterns. Global warming can occur from a variety of causes, both natural and human-induced. In common usage, "global

¹Governor's Office of Planning and Research (OPR). *Technical Advisory, CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review*. June 19, 2008 (CEQA Climate Change Technical Advisory). This document is available online at the Office of Planning and Research's website at www.opr.gov. Viewed July 24, 2008.

²Governor's Office of Planning and Research (OPR), *Proposed Amendments to CEQA Guidelines*, April 13, 2009.

warming" often refers to the warming that can occur as a result of increased emissions of greenhouse gases from human activities.¹

Gases that trap heat in the atmosphere are referred to as "greenhouse gases" (GHGs) because they capture heat radiated from the sun as it is reflected back into the atmosphere, much like a greenhouse does. Over the past 200 years, GHG emissions and deforestation have caused the concentrations of heat-trapping GHGs to increase significantly in the atmosphere. These gases prevent heat from escaping to space. Since the early 1990s, scientific consensus has held that the world's population is releasing GHGs faster than the earth's natural systems can absorb them. These GHGs are released as by-products of fossil fuel combustion, waste disposal, energy use, land use changes, and other human activities.

This release of GHGs creates a blanket around the earth that allows light to pass through but traps heat at the surface, preventing its escape into space. Models show that this greenhouse effect phenomenon will lead to a 2 to 10 degrees Fahrenheit (F) temperature increase over the next 100 years. The Intergovernmental Panel on Climate Change (IPCC), an international group of scientists and representatives, warns that most of the warming observed over the last 50 years is attributable to human activities. The accumulation of GHGs has been implicated as a driving force for global climate change.

There is international scientific consensus that human-caused increases in GHGs have and will continue to contribute to global warming, although there is uncertainty concerning the magnitude and rate of the warming.

Carbon dioxide (CO₂) accounts for approximately 85 percent of total human activity-generated GHG emissions. Emissions of other GHGs, such as methane (CH₄) and nitrous oxide (N₂O), have also increased due to human activities. Methane and nitrous oxide emissions account for almost 14 percent of total greenhouse gas emissions. Each of these gases, however, contributes to global warming at a different relative rate. Methane has a global warming potential 23 times that of carbon dioxide, while the global warming potential of nitrous oxide is 296 times that of the same amount of carbon dioxide. To account for these differences, estimates of greenhouse gas emissions are often described in terms of *carbon dioxide equivalents* (CO₂e).

7.1.2 CEQA Guidance

Based on CEQA, lead agencies should determine whether GHGs may be generated by a proposed project, and if so, quantify or estimate the GHG emissions by type and source. Second, the lead agency must assess whether those emissions are individually or cumulatively significant. When assessing whether a project's effects on climate change are "cumulatively considerable" even though the project's GHG contribution may be individually limited, the lead agency must consider the impact of the project when viewed in connection with the effects of past, current, and probable future projects. Finally, if the lead agency determines that the GHG

¹U.S. Environmental Protection Agency (EPA) website, Climate Change, Basic Information, September 30, 2008.

emissions from the project as proposed are potentially significant, it must identify and implement measures to avoid, reduce, or otherwise mitigate the impacts of those emissions.¹

7.1.3 Existing Conditions

The existing environmental conditions or setting, without the project, constitute the baseline physical condition for determining whether a project's impacts are significant.

(a) Global GHG Emissions. A report of the Intergovernmental Panel on Climate Change (IPCC) predicts a global temperature increase of between 2.0 and 11.5 degrees Fahrenheit (F) (1.1 and 6.4 degrees Celsius) by the end of the 21st century under six different scenarios of emissions and carbon dioxide equivalent concentrations.² Sea levels are predicted to rise by 0.18 to 0.59 meters (7 to 23 inches) during this time, with an additional 3.9 to 7.8 inches possible depending upon the rate of polar ice sheets melting from increased warming. The IPCC reports that the increase in hurricane and tropical cyclone strength since 1970 can also likely be attributed to human-generated greenhouse gases.

Global GHG inventory data published in 2007 by the United Nations³ indicated that worldwide emissions of GHGs in 2004 totaled 27 billion metric tons.⁴

(b) U.S. GHG Emissions. In the U.S., energy-related activities account for three-quarters of human-generated GHG, mostly in the form of carbon dioxide emissions from burning fossil fuels. More than half of the energy-related emissions comes from large stationary sources such as power plants, while about a third comes from transportation. Industrial processes (such as the production of cement, steel, and aluminum), agriculture, forestry, other land use, and waste management are also important U.S. sources of GHG emissions.⁵

The latest EPA-published national inventory of U.S. GHG emissions shows that in 2005 the U.S. emitted over 7.2 billion metric tons of GHG. (A million metric tons of CO₂e is roughly equal to the annual GHG emissions of an average U.S. power plant.)

¹CEQA Climate Change Technical Advisory, page 1. Under SB 97 (2007), the State Office of Planning and Research is to certify and adopt guidelines for evaluation of the effects of greenhouse gas emissions and mitigation of those effects by January 1, 2010.

²IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.

³Combined total of Annex I and Non-Annex I Country CO₂eq emissions. United Nations Framework Convention on Climate Change (UNFCCC), 2007, *Greenhouse Gas Inventory Data*. Information available at http://unfccc.int/ghg_data/ghg_data_unfccc/time_series_annex_i/items/3814.php and http://maindb.unfccc.int/library/view_pdf.pl?url=http://unfccc.int/resource/docs/2005/sbi/eng/18a02.pdf.

⁴A metric ton is equivalent to approximately 1.1 tons.

⁵EPA website.

(c) State GHG Emissions. According to the California Air Resources Board (CARB) emissions inventory estimates, California emitted approximately 480 million metric tons of GHGs in 2004.¹ This large number is due primarily to the sheer size of California compared to other states. By contrast, California has the fourth lowest per-capita GHG emission rate from fossil fuel combustion in the country, due to the success of its energy efficiency and renewable energy programs and commitments that have lowered the state's GHG emissions rate of growth by more than half of what it would have been otherwise.²

The California EPA Climate Action Team stated in its March 2006 report that the composition of gross climate change pollutant emissions in California in 2002 (expressed in terms of CO₂e) was as follows:

- Carbon dioxide (CO₂) accounted for 83.3 percent;
- Methane (CH₄) accounted to 6.4 percent;
- Nitrous oxide (N₂O) accounted to 6.8 percent; and
- Fluorinated gases (HFCs, PFC, and SF₆) accounted for 3.5 percent.³

CARB is responsible for developing the California Greenhouse Gas Emission Inventory. This inventory estimates the amount of GHGs emitted to and removed from the atmosphere by human activities within the State of California and supports the AB 32 Climate Change Program. CARB's current GHG emission inventory covers the years 1990-2004 and is based on fuel use, equipment activity, industrial processes, and other relevant data (e.g., housing, landfill activity, agricultural lands, etc.). The emission inventory estimates are based on the actual amount of all fuels combusted in the state, which accounts for over 85 percent of the GHG emissions within California.

CARB estimates that transportation was the source of approximately 38 percent of the state's GHG emissions in 2004, followed by electricity generation (both in-state and out-of-state) at 23 percent, and industrial sources at 20 percent. The remaining sources of GHG emissions in 2004 were residential and commercial activities at 9 percent, agriculture at 6 percent, high global warming potential gases at 3 percent, and recycling and waste at 1 percent.⁴

Potential Future Emissions. CARB staff has also projected anticipated 2020 unregulated GHG emissions--i.e., the emissions that would be expected to occur statewide in the absence of any

¹California Air Resources Board, Greenhouse Gas Inventory Data - 1990 to 2004. <http://www.arb.ca.gov/cc/inventory/data/data.htm>. Viewed November 2008.

²California Energy Commission (CEC), Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004 - Final Staff Report, publication # CEC-600-2006-013-SF, Sacramento, CA, December 22, 2006; and January 23, 2007 update to that report.

³California Environmental Protection Agency, *Climate Action Team Report to Governor Schwarzenegger and the Legislature*. March 2006.

⁴California Air Resources Board (CARB), <http://www.climatechange.ca.gov/inventory/index.html>. September 2008.

GHG reduction actions. CARB staff estimates the statewide 2020 unregulated GHG emissions would be 596 million metric tons (of CO₂e).

GHG emissions in 2020 from the transportation and electricity sectors as a whole are expected by CARB staff to increase, but remain at approximately 38 percent and 23 percent of total GHG (CO₂e) emissions, respectively. The industrial sector consists of large stationary sources of GHG emissions and the percentage of the total 2020 emissions from that sector is projected by CARB staff to be 17 percent of total GHG emissions. The remaining sources of GHG emissions anticipated in 2020 are high global warming potential gases at 8 percent, residential and commercial activities at 8 percent, agriculture at 5 percent, and recycling and waste at 1 percent.¹

Potential Statewide Impacts. Potential impacts of global warming in California may include, but are not limited to, loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years.² Secondary effects are likely to include impacts on agriculture, changes in disease vectors, changes in habitat and biodiversity, and contribution to global rise in sea level.

The Sierra snow pack, an important source of water supply for the state, has shrunk 10 percent in the last 100 years. It is expected to continue to decrease by up to 25 percent by 2050.

(d) Bay Area Emissions. The Bay Area Air Quality Management District (BAAQMD) established a climate protection program in 2005 to acknowledge the link between climate change and air quality. The BAAQMD regularly prepares inventories of criteria and toxic air pollutants to support planning, regulatory, and other programs. The most recent GHG emissions inventory estimates posted by the BAAQMD for the San Francisco Bay Area are for base year 2007.³

In 2007, an estimated 102.6 million metric tons of GHGs were emitted by the San Francisco Bay Area. Fossil fuel consumption in the transportation sector was the single largest source of these estimated GHG emissions. The transportation sector, including on-road motor vehicles, locomotives, ships and boats, and aircraft, contributed over 40 percent of the estimated GHG emissions. The industrial and commercial sector (excluding electricity and agriculture) was the second largest contributor with 34 percent of total GHG emissions. Energy production activities such as electricity generation and co-generation were the third largest contributor accounting for approximately 15 percent of the total GHG emissions. Off-road equipment--such as construction, industrial, commercial, and lawn and garden equipment--contributed 3 percent of GHG emissions.

¹California Air Resources Board (CARB), <http://www.arb.ca.gov/cc/inventory/data/forecast.htm>. September 2008.

²California Air Resources Board (CARB), 2006. Climate Change website (<http://www.arb.ca.gov/cc/120106workshop/intropres12106.pdf>), viewed December 4, 2007; and <http://www.arb.ca.gov/cc/factsheets/ccbackground.pdf>, viewed February 17, 2009.

³Bay Area Air Quality Management District, *Source Inventory of Bay Area Greenhouse Gas Emissions*. December 2008.

(e) Solano County Emissions. Fuel consumption in the transportation sector is the single biggest source of GHG emissions in most urban communities, such as the developed parts of Solano County. The transportation sector includes emissions from private, commercial, fleet, and transit vehicles. The residential, commercial, and industrial sector sources include emissions from electricity and natural gas used in both private and public sector buildings and facilities.

(f) Sea Level Rise. Worldwide climate changes are causing sea levels in California coastal areas to rise. About 8 inches of increase have been recorded at the Golden Gate Bridge over the past 100 years, threatening low coastal areas in the Bay region with inundation and serious damage from storms.¹ Predicted long-term climate change (increased temperatures) is expected to continue to cause rising sea levels along the California coastline, particularly in the San Francisco and the San Joaquin Delta areas, due to ocean expansion. According to a 2008 California Department of Water Resources report, recent peer-reviewed studies estimate a rise of between 7 to 55 inches by 2100 along California's coast.² A recent report by the Pacific Institute predicts that a 1.4-meter (55-inch) sea level rise along California's coast will put 480,000 people at risk of a 100-year flood event, given today's population. This amount of sea level rise is also expected to accelerate erosion, resulting in a loss of 41 square miles (over 26,000 acres) of California's coast by 2100.³

According to sea level rise maps produced by the San Francisco Bay Conservation and Development Commission (BCDC),⁴ the area closest to the Specific Plan area that might be vulnerable to sea level rise is Suisun Marsh, located more than a mile southeast of the southern plan area boundary.

7.2 PERTINENT PLANS AND POLICIES

Adopted and anticipated state and local plans, policies, and programs pertinent to climate change and consideration of the climate change impacts of the proposed Specific Plan are described below.

¹CARB Draft Scoping Plan, page 6.

²California Department of Water Resources, Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water, October 2008, page 6. (<http://www.water.ca.gov/climatechange/docs/ClimateChangeWhitePaper.pdf>)

³California Climate Change Center, The Impacts of Sea-Level Rise on the California Coast, prepared by Matthew Heberger, Heather Cooley, Pablo Herrera, Peter H. Gleick, and Eli Moore of the Pacific Institute, March 2009, page xi. (http://www.pacinst.org/reports/sea_level_rise/report.pdf)

⁴BCDC has produced a three-map series to illustrate two sea level rise scenarios. The series depicts (1) a mid-century sea level rise of 16 inches, (2) an end-of-century sea level rise of 55 inches, and (3) a composite of both 16 and 55 inches. The three Suisun Marsh maps are posted online (http://www.bcdc.ca.gov/planning/climate_change/maps/16/suisun_marsh.pdf, http://www.bcdc.ca.gov/planning/climate_change/maps/55/suisun_marsh.pdf, and http://www.bcdc.ca.gov/planning/climate_change/maps/16_55/suisun_marsh.pdf, viewed November 16, 2009).

7.2.1 State of California

(a) Governor's Executive Order S-3-05 (2005). According to climate scientists, California and the rest of the developed world will have to cut emissions by 80 percent from today's levels to stabilize the amount of carbon dioxide in the atmosphere and prevent the most severe effects of climate change.¹ In 2005, in recognition of this long-range goal and California's vulnerability to the effects of climate change, Governor Schwarzenegger established Executive Order S-3-05, which sets forth a series of target dates by which statewide emission of greenhouse gases (GHG) would be progressively reduced, as follows: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; and by 2050, reduce GHG emissions to 80 percent below 1990 levels.²

(b) AB 32 (2006). In 2006, California passed the California Global Warming Solutions Act of 2006 (Assembly Bill No. 32; California Health and Safety Code Division 25.5, Sections 38500, et seq., or AB 32), which requires the California Air Resources Board (CARB) to design and implement emission limits, regulations, and other measures, such that statewide GHG emissions are reduced to 1990 levels by 2020 (representing a 25-percent reduction in emissions).

In the Findings and Declarations for AB 32, the Legislature found that:

The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to the marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other health-related problems.

AB 32 establishes a timetable for the CARB to adopt emission limits, rules, and regulations designed to achieve the intent of the Act. The CARB met the first AB 32-established milestones in 2007 by developing a list of early actions to begin sharply reducing greenhouse gas emissions, assembling an inventory of historic emissions, and establishing the 2020 emissions limit. A total of 44 early action measures have been identified by the CARB.³ Pertinent measures from the list that could become effective during implementation of the proposed Specific Plan are generally limited to construction-related equipment operations.

AB 32 stipulated that the CARB must also develop a "Climate Change Scoping Plan" to lower the state's greenhouse gas emissions to meet the 2020 limit. In December 2008, the CARB approved a "Climate Change Scoping Plan" that proposes a comprehensive set of actions

¹California Air Resources Board (CARB) Draft Scoping Plan, page ES-2.

²There are 12 exceptions to this requirement (e.g., emergency situations, military, adverse weather conditions, etc.), including: when a vehicle's power takeoff is being used to run pumps, blowers, or other equipment; when a vehicle is stuck in traffic, stopped at a light, or under direction of a police officer; when a vehicle is queuing beyond 100 feet from any restricted area; or when an engine is being tested, serviced, or repaired.

³California Air Resources Board (CARB), *Draft Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California Recommended for Board Consideration*, September 2007.

designed to reduce overall carbon emissions in California, reduce dependence on oil, diversify state energy sources, and save energy. The Scoping Plan measures adopted by the CARB will be further developed over the next three years and put in place by 2012.

The Scoping Plan indicates that reducing statewide greenhouse gas emissions to 1990 levels means cutting approximately 30 percent from business-as-usual emission levels projected for 2020, or about 10 percent from today's levels. On a per-capita basis, the Scoping Plan indicates that this means reducing statewide annual emissions of carbon dioxide for every man, woman, and child in California from approximately 14 tons now down to about 10 tons by 2020.

AB 32 does not require local agencies, such as Solano County, to develop strategies to achieve a reduction of GHG emissions to their 1990 levels by 2020. Rather, the California Legislature has specifically assigned that responsibility to the CARB (see Sections 38510 and 38560 of the Health and Safety Code). Nevertheless, in recognition of the serious threat of global climate change, the County has committed itself to achieving an even greater reduction in GHGs than required by AB 32 (see Implementation Program HS.I-73 in the 2008 Solano County General Plan) through implementation of measures and policies that are feasible to the County.

(c) SB 97 (2007). State Senate Bill 97 (Dutton), enacted in 2007, amended the CEQA statute to clearly establish that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis. SB 97 directed OPR to develop draft amendments to the CEQA Guidelines "for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions" by July 1, 2009 and directed the State Resources Agency to certify and adopt the CEQA Guidelines by January 1, 2010. OPR submitted these draft CEQA Guideline amendments to the Resources Agency on April 13, 2009. The draft Guidelines are described in subsection (e) which follows.

(d) Interim CEQA Technical Advisory, CEQA and Climate Change (June 2008). On June 18, 2008, OPR released a CEQA and Climate Change Technical Advisory¹ for interim use until January 1, 2010 when the new CEQA Guidelines on the analysis and mitigation of GHG emissions in CEQA documents are scheduled to be adopted. The June 2008 Technical Advisory provides "informal guidance" regarding the steps lead agencies should take to address climate change in their CEQA documents. The Technical Advisory was developed in cooperation with the Resources Agency, the California Environmental Protection Agency (Cal/EPA), and the California Air Resources Board (CARB).

The interim Advisory indicates that lead agencies should (1) determine whether greenhouse gases may be generated by a proposed project, and if so, quantify or estimate the GHG emissions by type and source; and (2) assess whether those emissions are individually or cumulatively significant. The Advisory suggests that when assessing whether a project's effects on climate change are "cumulatively considerable" even though its GHG contribution may be individually limited, the lead agency must consider the impact of the project when viewed in connection with the effects of past, current, and probable future projects. If the lead agency determines on that basis that the GHG emissions from the project as proposed are potentially

¹Governor's Office of Planning and Research. *Technical Advisory, CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review*. June 19, 2008. (CEQA Climate Change Technical Advisory, June 2008)

significant, it must identify and implement measures to avoid, reduce, or otherwise mitigate the impacts of those emissions.¹

(e) Draft CEQA Guidelines Amendments (April 2009). Pursuant to SB 97, Draft CEQA Guidelines for the analysis and mitigation of GHG emissions were submitted by OPR to the Resources Agency on April 13, 2009.² Although not yet adopted, these draft amendments provide additional preliminary direction for determining the significance of and mitigating greenhouse gas emissions impacts on the environment. The draft amendments suggest that local agencies should evaluate the following when determining the significance of GHG emissions: (1) the extent to which the project may increase or reduce GHG emissions compared with the existing environment, (2) whether the emissions exceed a threshold of significance that applies to the project, and (3) the extent to which the project complies with requirements adopted to implement a statewide, regional, or local plan for reduction of GHG emissions. The draft amendments also suggest that mitigation measures include (1) measures contained in an existing plan to reduce GHG emissions; (2) reductions in GHG emissions through project design, such as those contained in Appendix F to the CEQA Guidelines (Energy Conservation); (3) off-site measures, including offsets; and (4) measures that sequester GHG emissions (i.e., capture at the source).

7.2.2 Solano County

(a) ICLEI Membership. Solano County is a member of ICLEI--Local Governments for Sustainability, an international association of local governments and national and regional governmental organizations that have made a commitment to sustainable development. Over 1,000 cities, towns, counties, and their associations in 68 countries currently comprise ICLEI's membership. ICLEI works with these local governments through international performance-based, results-oriented campaigns and programs. ICLEI's basic premise is that locally designed initiatives can provide an effective and cost-efficient way to achieve local, national, and global sustainability objectives. ICLEI's Cities for Climate Protection (CCP) Campaign was launched in 1993 when municipal leaders, invited by ICLEI, met at the United Nations in New York and adopted a declaration that called for the establishment of a worldwide movement of local governments to reduce GHGs, improve air quality, and enhance urban sustainability.

(b) Solano County General Plan. The Solano County General Plan includes numerous goals, policies, and programs formulated to reduce Solano County's impacts on global climate change and reduce the threats associated with global climate change on the county. The following are particularly relevant to the Specific Plan:

- *Require all new and remodeled residential, industrial, institutional and civic construction to exceed current (2008) Title 24 state energy-efficiency requirements by at least 20 percent, and require that all new residential homes and major renovations comply with the guidelines for the California Energy Star Homes Program. If the State increases the requirements of Title 24, the County will examine the feasibility of increasing its own energy efficiency requirements...* (Implementation Program RS.I-38)

¹CEQA Climate Change Technical Advisory, page 1.

²See footnote 2 on page 7-1.

- *Require residential development of more than six units to participate in the California Energy Commission's New Solar Homes Partnership and to construct LEED-certified units or meet equivalent performance standards. For new affordable housing projects, performance standards shall be established pursuant to the requirements of the funding source(s). Require new construction or major renovation of commercial and industrial buildings over 10,000 square feet in size to incorporate renewable energy generation to provide the maximum feasible amount of the project's energy needs. Commercial buildings shall incorporate renewable energy generation to provide at least 20 percent of the project's needs. (Implementation Program RS.I-46)*
- *Require the use of Energy Star rated appliances and the most energy-efficient Energy Star rated water heater and air conditioning systems that are feasible in the construction of new homes, in all substantial remodels when appliances are being replaced, and in any case where a permit is needed to install or replace appliances (e.g., water heater, air conditioning). (Implementation Program RS.I-47)*
- *Require that development projects use landscaping and site design techniques that minimize energy use. These may include designing landscaping to shield or expose structures to maximize energy conservation or acquisition; and taking advantage of orientation, sun-shade patterns, prevailing winds, landscaping, and sunscreens. Amend development standards to require such techniques. (Implementation Program RS.I-52)*
- *Adopt ordinances that require the use of water-efficient landscaping, water-conserving appliances and plumbing fixtures. (Implementation Program PF.I-9)*
- *Require the design and orientation of all buildings to maximize passive solar heating during cool seasons, avoid solar heat gain during hot periods, enhance natural ventilation, and promote effective use of daylight. Orientation should optimize opportunities for on-site solar generation. (Implementation Program RS.I-55)*
- *Work with the owners and operators of methane-producing facilities (e.g., landfills, dairies, wastewater treatment plants) to establish methane recovery and electricity generation systems. (Implementation Program PF.I-5)*
- *Comply with all federal and/or state GHG emission reduction targets to reduce the County's contribution to global climate change. The plan should include strategies to reduce vehicle miles traveled, energy consumption, and other sources of GHGs within the county. This should be done in conjunction with the County's Climate Action Plan found in HS.I-73. (Implementation Program HS.I-57)*
- *Develop and adopt a climate action plan for Solano County. It is the intent of Solano County to coordinate and seek participation from all cities in preparation of a countywide baseline study and in preparation and implementation of the Climate Action Plan (CAP).*

The Climate Action Plan will have two primary objectives, which include: (a) reduce total greenhouse gas emissions in the county to 20 percent below 1990 levels by 2020, (b) create adaptation strategies to address the impacts of climate change on the county such as sea level rise, increased risk of flooding, diminished water supplies, public health, and local agricultural-based economy... (Implementation Program HS.I-73)

- *Encourage land use patterns that maximize access and mobility options for commuting and other types of trips, and minimize traffic congestion, vehicle miles traveled (VMT), and greenhouse gas emissions. (Goal TC.G-3)*
- *Encourage the use of alternative forms of transportation such as transit, walking and bicycling to alleviate congestion and promote recreation. (Goal TC.G-4)*
- *Establish land use patterns that facilitate shorter travel distances and non-auto modes of travel and limit the extent of additional transportation improvements and maintenance that may be needed with a more dispersed land use pattern. (Policy TC.P-3)*

See also EIR chapter 5, Air Quality, for Solano County General Plan policies regarding reduction of air emissions; chapter 9, Energy, for policies regarding energy conservation; and chapter 11, Hydrology and Water Resources, for policies regarding flood control.

(b) GHG Emissions Inventory and Forecast for Solano County. A GHG inventory specific for Solano County and a forecast of emissions in 2020 under a business-as-usual scenario would be prepared as part of the CAP process under General Plan Implementation Program HS.I-73. This inventory and forecast would provide a benchmark for planning and monitoring progress in government operations and the community.

Preparation of a GHG inventory is a lengthy process, and will be undertaken as part of the CAP that would be prepared as a result of the 2008 Solano County General Plan. This inventory will be used to determine what GHG reductions are necessary to achieve the County's objective of reducing total GHG emissions to 20 percent below 1990 levels by 2020.

7.3 IMPACTS AND MITIGATION MEASURES

7.3.1 Significance Criteria

Neither the CEQA statute nor the CEQA Guidelines prescribe thresholds of significance for determining climate change impacts for individual projects. This is left to lead agency judgment and discretion, based upon factual data and guidance from regulatory agencies and other sources where available and applicable.

As indicated in subsections 7.2.1(d) and (e) above, OPR has advised that lead agencies should determine whether GHGs may be generated by a proposed project, and if so, quantify or estimate the GHG emissions by type and source. In the case of this Specific Plan EIR, this should involve determination of the Specific Plan-related change in direct GHG emissions from activities occurring or generated within the Specific Plan area. Second, the CEQA Guidelines indicate that lead agencies must assess whether those emissions are individually or cumulatively significant. When assessing whether a project's effects on climate change are "cumulatively considerable" even though its GHG contribution may be individually limited, the lead agency must consider the impact of the project when viewed in connection with the effects of past, current, and probable future projects. Finally, if the lead agency determines that the GHG emissions from the project as proposed are individually or cumulatively significant, it must identify and implement measures to avoid, reduce, or otherwise mitigate the impacts of those emissions.

Although the BAAQMD is currently developing significance criteria for evaluating a project's contribution to climate change, no criteria have yet been adopted by a state or regional agency. The most recent guidance is provided by the June 2008 OPR Technical Report and April 2009 OPR draft Proposed Amendments to CEQA Guidelines discussed in section 7.2.1(e) above. Based on this OPR guidance, for the purposes of this EIR, the proposed Specific Plan, including Specific Plan-facilitated development activities, would be considered to have a significant global climate change impact if it would:

- (a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment;
- (b) Have a cumulatively considerable significant GHG emissions contribution that would conflict with the adopted GHG emissions goal of the State as set forth in Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006--i.e., conflict with the adopted goal of reducing state GHG emissions to 1990 levels by the year 2020, or conflict with the CARB's Climate Change Scoping Plan;
- (c) Conflict with any other applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases; or
- (d) Be adversely affected by sea level rise. (NOTE: As indicated above, the most recent study of the California coastline predicts that sea levels will rise by up to 55 inches by the end of the 21st century. BCDC maps indicate that the closest area to the Specific Plan area that will be affected by sea level rise is Suisun Marsh, located more than one mile southeast of the plan area. Due to the distance between the plan area and Suisun Marsh, the potential for sea level rise is not considered further in this EIR chapter. See chapter 11, Hydrology and Water Quality, of this EIR for discussion of potential flooding impacts.)

The BAAQMD recently published Draft Air Quality Guidelines, which include plan-level GHG thresholds. Under the proposed threshold, GHG emissions associated with a plan that is not consistent with an adopted Qualified Climate Action Plan, Sustainable Communities Strategy, or Alternative Planning Strategy developed pursuant to SB 375 would need to meet a GHG "efficiency metric." Currently, there are no adopted Climate Action Plans or plans to meet the requirements of SB 375 that would apply to the project. Therefore, the GHG efficiency metric would apply under the proposed guidelines. BAAQMD staff have proposed a GHG efficiency metric of 6.6 metric tons of equivalent CO₂ per service population (annual metric tons CO₂e/SP). The efficiency metric is computed by dividing the annual CO₂-equivalent emissions associated with the plan by the total population and number of employees served by the plan. Other than recommending use of best management practices, BAAQMD is not proposing a GHG threshold for construction-period impacts.

The OPR Technical Advisory released in June 2008¹ lists *Examples of GHG Reduction Measures*. Measures from the list that are applicable to the project are listed in Table 7.3. A key consideration in determining Specific Plan consistency with AB 32 is whether the Specific Plan would potentially conflict with or obstruct implementation of these OPR-identified interim GHG emissions reduction measures.

¹OPR, *Technical Advisory, CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act Review*, June 19, 2008; page 1.

7.3.2 Relevant Project Characteristics

As described in chapter 2, Project Description, of this EIR, the Specific Plan proposes development of housing, community/public services uses, "agricultural tourism" uses, and neighborhood commercial uses clustered in four neighborhoods. The remaining approximately 79 percent of land in the plan area would be preserved as open space or agricultural land.

As discussed in chapter 14, Population and Housing, of this EIR, Specific Plan-facilitated development is expected to produce approximately 1,485 new residents and 136 new jobs within the Specific Plan area.

As described in chapter 9, Energy, of this EIR, the Specific Plan proposes that development within the plan area be subject to various guidelines for energy efficiency. For mechanical systems, the Specific Plan refers to the applicable LEED rating system and proposes principles that would either be required or strongly encouraged in development within the plan area.

7.3.3 Impacts and Mitigation Measures

Impact 7-1: Specific Plan-Related and Cumulative Increase in Greenhouse Gas Emissions. Construction and ongoing operation of Specific Plan-facilitated development would result in a net increase in carbon dioxide and other greenhouse gas emissions.

The Specific Plan contains guidelines and principles for encouraging energy efficiency in new development within the plan area. In addition, Specific Plan-facilitated new building construction and other improvements would be required to meet California Energy Efficiency Standards for Residential and Nonresidential Buildings, helping to reduce associated future energy demand and associated Specific Plan contributions to cumulative regional greenhouse gas emissions.

Nevertheless, conservatively assuming construction emissions of 66 to 1,443 tons per year and an estimated ongoing "worst case" net increase in greenhouse gas emissions of approximately 10,779 metric tons per year (or 6.65 metric tons per year per capita), the proposed Specific Plan could be expected to result in a **significant project and cumulative global climate change impact** (see criteria [a] through [c] in subsection 7.3.1, Significance Criteria, above).

Land use planning is considered to be a critical component of lowering GHG emissions. Examples of GHG emissions reduction planning techniques include locating the most intensive residential development near alternative transportation modes (regional and local transit), employment centers, and support commercial centers, and similarly, locating the most intensive employment development near alternative transportation modes (regional and local transit), residential concentrations, and support commercial centers.

The proposed Specific Plan would include measures to encourage energy efficiency in new development. Nevertheless, Specific Plan-facilitated development would increase GHG

emissions, relative to existing conditions, by facilitating residential, commercial, agricultural, and public services in the Specific Plan area and associated increases in the number of residents, employees, and visitors in the area, thereby increasing the daily vehicle miles traveled (VMT) associated with the movement of people and goods to and from the plan area. The proposed Specific Plan would thereby contribute to annual long-term increases in GHGs as a result of VMT increases (mobile sources) and residential and commercial operations associated with heating, energy use, water usage and wastewater treatment, and solid waste disposal (indirect and area sources).

Table 7.1 shows projected GHG emissions in the form of CO₂ associated with the anticipated Specific Plan-related growth in the plan area, as described in chapter 2, Project Description, of this EIR. CO₂ is the primary GHG emitted from land use type projects and represents over 95 percent of the GHG potential from these types of projects. The California Air Pollution Control Officers Association (CAPCOA) guidance was used in calculating Specific Plan-related emissions.¹

Table 7.1 shows the annual GHG emissions in tons per year, along with the CO₂ emissions rate per capita. The CO₂ emissions rate per capita is derived by dividing the total emissions associated with full operation of Specific Plan-facilitated development by the anticipated new population (1,485) plus employees (136). The emissions rate per capita for the Specific Plan--6.65 metric tons per year, as shown in Table 7.1--would exceed the BAAQMD-proposed emissions rate of 6.6 metric tons.

Emissions from Area and Mobile Sources. Area and mobile source emissions listed in Table 7.1 were calculated using the URBEMIS2007 model with the same inputs used to calculate emissions of air pollutants (see chapter 5, Air Quality, of this EIR). Area source emissions are mostly comprised of the emissions associated with the combustion of natural gas consumed for space and water heating as well as cooking. The modeled emissions are based on typical residential and commercial natural gas combustion rates combined with emission factors for CO₂. Mobile source emissions are based on the combination of projected vehicle travel and emission factors from the California Air Resources Board's EMFAC2007 model.

Emissions from Indirect Sources. Indirect source emissions from electricity usage were based on rates recommended by the California Climate Action Registry General Reporting Protocol² and documents prepared for the California Energy Commission (CEC).³ These electricity usage rates were combined with electricity emission rates reported by PG&E. The California Commercial End Use Survey (prepared for CEC) provides annual electricity intensities for various non-residential uses. Residential electricity consumption rates for new and existing homes in California were based on the California Statewide Residential Appliance Saturation

¹California Air Pollution Control Officers Association (CAPCOA), CEQA & Climate Change, January 2008.

²California Climate Action Registry, *California Climate Action Registry General Reporting Protocol – Reporting Entity-Wide Greenhouse Gas Emissions*, Version 3.0, April 2008.

³Itron, California End Use Commercial Survey, prepared for the California Energy Commission, CEC-400-2006-005, 2006; and KEMA-XENERGY, Itron RoperASW, California Statewide Residential Appliance Saturation Study – Volume 2, Study Results Final Report, CEC Consultant Report, June 2004.

Table 7.1
 ESTIMATED GREENHOUSE GAS (CO₂) EMISSIONS FROM PROPOSED SPECIFIC PLAN-FACILITATED DEVELOPMENT

Source	Calculation Methodology	Estimated Emissions (in metric tons per year)
Area Sources	URBEMIS2007	2,510
Indirect Sources	Electricity consumption and PG&E emission rate	1,010
Mobile Sources	URBEMIS2007	<u>7,259</u>
TOTAL		10,779
Emissions Rate per Capita (1,485 residents + 136 employees)		6.65

SOURCE: Illingworth & Rodkin, Inc., 2009.

Study (published for CEC). CO₂ emission rates for electricity use in the PG&E service grid are 0.456 pound of CO₂ per kilowatt-hour.¹ It should be noted that the PG&E rate is about 52 percent of the statewide average emission rate for electricity production and 35 percent of the national average.

Possibility of Reduced Operational Emissions. The results reported in Table 7.1 are based primarily on a “business-as-usual” scenario, in which current emission rates would apply. This will not likely be the case, as AB 32 will require GHG emission reductions in all sectors. Transportation emission rates will likely decrease due to increased fuel efficiency and lower carbon content in fuels. Fuel efficiency is regulated by the U.S. Department of Transportation and current CARB regulations that address climate change. Newer fuel standards would increase light-duty automobile and light-duty truck fuel efficiency by 10 miles per gallon (to 34 miles per gallon for cars sold in 2020). The CARB proposes more efficient standards as part of the State’s efforts to reduce GHG emissions. These standards would apply to new vehicles sold and therefore would gradually affect the overall fleet as these new vehicles replace older vehicles.

Emissions from Construction of Specific Plan-Facilitated Development. In addition to ongoing operational emissions, construction of Specific Plan-facilitated development would involve emissions associated with equipment and vehicles used for demolition, grading, and construction of the project as well as emissions associated with manufacturing materials used to construct the project. Construction phases may include mass site grading, fine site grading, trenching, paving, building construction, and architectural coatings.

¹CARB, CCAR, ICLEI, *Local Government Operations Protocol for the quantification and reporting of Greenhouse Gas Emissions, Version 1.0*, September 2008.

The URBEMIS2007 model was used to provide preliminary estimates of construction-related emissions. The URBEMIS2007 model can be used to estimate the emissions associated with construction equipment and vehicle activity. However, there are no reliable methods to estimate construction-related emissions associated with the manufacturing of project materials.

The predictions assume a highly aggressive buildout schedule of 3 years. This assumption likely results in an overestimate of annual construction GHG emissions, particularly since, as described in chapter 2, Project Description, of this EIR, development within the plan area is expected to be completed within 8 to 12 years after approval of the final subdivision map for the first phase of development.

There are no existing or proposed federal, State, regional, or local thresholds for construction emissions of GHGs. Therefore, the emissions shown in Table 7.2 are provided for informational purposes only.

Mitigation 7-1. The proposed Specific Plan contains measures to encourage energy efficiency in new Specific Plan-facilitated development. To further ensure that the proposed Specific Plan facilitates growth in a manner that reduces the rate of associated greenhouse gas emissions increase, discretionary approvals for Specific Plan-related individual residential, commercial, agricultural, and public services projects in the Specific Plan area shall be required to comply with the Climate Action Plan to be developed and adopted by the County. In the interim, Specific Plan-related discretionary approvals shall incorporate an appropriate combination of the following greenhouse gas emissions reduction measures (from Table 7.3):

- features in the project design that would accommodate convenient public transit and promote direct access for pedestrians and bicyclists to major destinations;
- adoption of a project design objective for public buildings to achieve Leadership in Energy and Environmental Design (LEED) New Construction "Silver" Certification or better, in addition to compliance with California Code of Regulations Title 24 Energy Efficient Standards;
- planting of trees and vegetation near structures to shade buildings and reduce energy requirements for heating and cooling;
- preservation or replacement of existing onsite trees;
- construction and demolition waste recycling (see *Mitigation 16-12* of this EIR); and

(continued)

Table 7.2
 ESTIMATED GREENHOUSE GAS (CO₂) EMISSIONS FROM CONSTRUCTION OF
 PROPOSED SPECIFIC PLAN-FACILITATED DEVELOPMENT

Year	Calculation Methodology	Estimated Emissions (in metric tons)
2010	URBEMIS2007 Construction (mass grading and paving)	66
2011	URBEMIS2007 Construction (mass grading, paving, and building)	1,443
2012	URBEMIS2007 Construction (building and coating)	1,233

SOURCE: Illingworth & Rodkin, Inc., 2009.

Mitigation 7-1 (continued):

- preference for replacement of project exterior lighting, street lights and other electrical uses with energy efficient bulbs and appliances.

Implementation of appropriate combinations of these mitigation measures in individual Specific Plan-related developments would substantially reduce Specific Plan-related greenhouse gas emissions impacts. However, because the effectiveness of this mitigation program in reducing the Specific Plan-related contribution to cumulative greenhouse gas emissions in the region cannot be reasonably quantified, it has been determined that the Specific Plan, when combined with anticipated overall cumulative development in the region as a whole, would potentially produce a substantial net increase in greenhouse gas emissions, representing a ***significant unavoidable project and cumulative climate change impact***.

Table 7.3 lists specific GHG emissions reduction measures that could be incorporated into the proposed Specific Plan. The list has been derived from the June 2008 OPR *Technical Advisory, CEQA and Climate Change*, Attachment 3: Examples of GHG Reduction Measures, and other sources.

Table 7.3
 SPECIFIC PLAN CONSISTENCY WITH APPLICABLE STATE OPR-IDENTIFIED GHG
 REDUCTION MEASURE EXAMPLES

GHG Reduction Measure Examples from State of California Governor's Office of Planning and Research (OPR) ¹	Specific Plan Consistency
<i>Land Use and Transportation Measures:</i>	
<ul style="list-style-type: none"> ▪ Implement land use strategies to encourage jobs/housing proximity, promote transit-oriented development, and encourage high density development along transit corridors. Encourage compact, mixed-use projects, forming urban villages designed to maximize affordable housing and encourage walking, bicycling and the use of public transit systems. 	<p><i>Partially Consistent.</i> While the Specific Plan would provide for relatively compact housing development, it would not promote “transit-oriented” or “mixed-use” development.</p>
<ul style="list-style-type: none"> ▪ Encourage infill, redevelopment, and higher density development, whether in incorporated or unincorporated settings. 	<p><i>Partially Consistent.</i> While the Specific Plan would provide for relatively compact housing development, it would not represent infill development or redevelopment.</p>
<ul style="list-style-type: none"> ▪ Encourage new developments to integrate housing, civic and retail amenities (jobs, schools, parks, shopping opportunities) to help reduce VMT resulting from discretionary automobile trips. 	<p><i>Partially Consistent.</i> The Specific Plan would integrate housing with certain civic and retail amenities (parks, limited retail, and a possible school), but it would not provide for a substantial number of new jobs.</p>
<ul style="list-style-type: none"> ▪ Apply advanced technology systems and management strategies to improve operational efficiency of transportation systems and movement of people, goods and services. 	<p>Not highly applicable to the proposed Specific Plan.</p>
<ul style="list-style-type: none"> ▪ Incorporate features into project design that would accommodate frequent, reliable and convenient public transit. 	<p>Mitigation 7-1 of this EIR calls for incorporation of a similar measure into the Specific Plan.</p>
<ul style="list-style-type: none"> ▪ Implement street improvements that are designed to relieve pressure on a region's most congested roadways and intersections. 	<p>Mitigation measures are identified in chapter 17, Transportation, of this EIR to relieve roadway and intersection congestion.</p>
<ul style="list-style-type: none"> ▪ Limit idling time for commercial vehicles, including delivery and construction vehicles. 	<p>Such measures would need to be implemented on a countywide basis, perhaps as part of the County's anticipated Climate Action Plan, rather than within the Specific Plan area only.</p>
<i>Urban Forestry Measures:</i>	
<ul style="list-style-type: none"> ▪ Plant trees and vegetation near structures to shade buildings and reduce energy requirements for heating/cooling. 	<p>Mitigation 7-1 of this EIR calls for incorporation of a similar measure into the Specific Plan.</p>
<ul style="list-style-type: none"> ▪ Preserve or replace onsite trees (that are removed due to development) as a means of providing carbon storage. 	<p>Mitigation 7-1 of this EIR calls for incorporation of a similar measure into the Specific Plan.</p>

Energy Conservation Policies and Actions:

- Replace traffic lights, street lights, and other electrical uses to energy efficient bulbs and appliances.
- Incorporate on-site renewable energy production, including installation of photovoltaic cells or other solar options.
- Retrofit municipal water and wastewater systems with energy efficient motors, pumps and other equipment, and recover wastewater treatment methane for energy production.

- Offer government incentives to private businesses for developing buildings with energy and water efficient features and recycled materials. The incentives can include expedited plan checks and reduced permit fees.

- Offer rebates and low-interest loans to residents that make energy-saving improvements on their homes.

- Create bicycle lanes and walking paths directed to the location of schools, parks and other destination points.

Mitigation 7-1 of this EIR calls for incorporation of a similar measure into the Specific Plan.

Consistent. The proposed Specific Plan includes a similar measure.

Recovery of wastewater treatment methane for energy production could be considered if an onsite wastewater treatment plant is developed. Otherwise, such measures would need to be implemented by the City of Fairfield and Fairfield-Suisun Sewer District, which provide municipal water and wastewater service in the vicinity. (See chapter 16, Public Services and Utilities, of this EIR.)

Such measures would need to be implemented on a countywide basis, perhaps as part of the County's anticipated Climate Action Plan, rather than within the Specific Plan area only.

Mitigation 7-1 of this EIR calls for incorporation of a similar measure into the Specific Plan.

Consistent. Such measures are already included in the proposed Specific Plan.

Programs to Reduce VMT:

- Encourage large businesses to develop commute trip reduction plans that encourage employees who commute alone to consider alternative transportation modes.

- Develop shuttle systems around business district parking garages to reduce congestion and create shorter commutes.

- Create an online ridesharing program that matches potential carpoolers immediately through email.

Not highly applicable to the proposed Specific Plan, which does not provide for large-scale business development.

Not highly applicable to the proposed Specific Plan.

Not highly applicable to the proposed Specific Plan.

Programs to Reduce Solid Waste:

- Create incentives to increase recycling and reduce generation of solid waste by residential users.

The Solano County General Plan contains policies and other provisions calling for source reduction and recycling in construction and ongoing operations.

- Implement a Construction and Demolition Waste Recycling Ordinance to reduce the solid waste created by new development.

The Solano County General Plan contains policies and other provisions calling for source reduction and recycling in construction and ongoing operations. In addition, Mitigation 16-12 calls for each project applicant in the Specific Plan area to prepare and implement a recycling plan for the construction phase of the project.

SOURCE: Wagstaff and Associates, 2009.

GHG = Greenhouse Gas, VMT = Vehicle Miles Traveled

¹ State of California Governor's Office of Planning and Research (OPR). *Technical Advisory, CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review*; June 19, 2008; Attachment 3: Examples of GHG Reduction Measures.