

SECTION 4.5

CLIMATE CHANGE AND GREENHOUSE GASES

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

This section provides an analysis of potential climate change and greenhouse gases (GHG) impacts related to construction, operation, and maintenance of the proposed project. Information in this section is derived from California Air Resources Board, California Public Utility Commission, California Energy Commission, and International Panel on Climate Change sources, as well information provided in the Air Quality Assessment prepared for the project by Ldn Consulting, Inc. (Ldn, 2012a).

Atmospheric gases that absorb and emit infrared radiation are called greenhouse gases (GHG). Common GHGs include carbon dioxide (CO₂), water vapor (H₂O), methane (CH₄), nitrous oxide (N₂O), fluorinated gases, and ozone (O₃). Of these gases, CO₂ and CH₄ are emitted in the greatest quantities from human activities. Emissions of CO₂ are largely byproducts of fossil fuel combustion, whereas CH₄ results from off-gassing associated with agricultural practices and landfills. Man-made GHGs, many of which have greater heat-absorption potential than CO₂, include fluorinated gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). Terminology unique to this chapter includes: carbon dioxide equivalents (CO₂e), a term used to describe the concentration of CO₂ that would cause the same level of radiative forcing (i.e., the change in net irradiance between different layers of the atmosphere) as a given type and concentration of greenhouse gas, and two units of measures, metric tons (MT) and million metric tons (MMT)

The accumulation of GHG in the atmosphere regulates Earth's temperature. Without the natural heat trapping effect of GHG, Earth's surface would be about 34°C (degrees Celsius) cooler. However, it is believed that emissions from human activities, particularly the consumption of fossil fuels for transportation and electricity generation, have elevated the concentration of these gases in the atmosphere beyond the level of naturally occurring concentrations. This phenomenon is commonly referred to as climate change.

4.5.1 REGULATORY FRAMEWORK

BACKGROUND

In 1988, the United Nations and the World Meteorological Organization established the Intergovernmental Panel on Climate Change (IPCC) to assess "the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation." The most recent reports of the IPCC have emphasized the scientific consensus that real and measurable changes to the climate are occurring, that they are caused by human activity, and that significant adverse impacts on the environment, the economy, and human health and welfare are unavoidable.

The United States joined other countries around the world in signing the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC was entered on March 21, 1994. Under the convention, governments gather and share information on greenhouse gas emissions (GHGs), national policies, and best practices; launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change.

The Kyoto Protocol is a treaty made under the UNFCCC. Countries can sign the treaty to demonstrate their commitment to reduce their emissions of greenhouse gases or engage in emissions trading. More than 160 countries, 55 percent of global emissions, are under the protocol. United States Vice President Al Gore symbolically signed the Protocol in 1998. However, in order for the Kyoto Protocol to be formally adopted, or ratified, it must be adopted by the U.S. Senate, which was not done by the Clinton administration. To date, the U.S. has not ratified the Kyoto Protocol.

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

A. FEDERAL

In October 1993, President Clinton announced his Climate Change Action Plan, which had a goal to return greenhouse gas emissions to 1990 levels by the year 2000. This was to be accomplished through 50 initiatives that relied on innovative voluntary partnerships between the private sector and government aimed at producing cost-effective reductions in greenhouse gas emissions.

Environmental Protection Agency

On June 30, 2009, the EPA granted California's request for a waiver to directly limit GHG tailpipe emissions for new motor vehicles beginning with the current model year. On December 7, 2009, the EPA determined that emissions of GHGs contribute to air pollution that "endangers public health and welfare" within the meaning of the Clean Air Act. This action finalizes the EPA's "endangerment determination" initially proposed on April 17, 2009, and now obligates the EPA to regulate GHG emissions from new motor vehicles.

On December 7, 2009, the EPA Administrator signed two distinct findings regarding GHG under Section 202(a) of the Federal Clean Air Act (CAA):

- **Endangerment Finding:** The Administrator finds that the current and projected concentrations of the six key well-mixed GHG (CO₂, CH₄, N₂O, hydrofluorocarbons [HFCs], perfluorocarbons [PFCs], and SF₆) in the atmosphere threaten the public health and welfare of current and future generations.
- **Cause or Contribute Finding:** The Administrator finds that the combined emissions of these well-mixed GHG from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare.

These findings do not themselves impose any requirements on industry or other entities. However, this action is a prerequisite to finalizing EPA's proposed GHG emission standards for light-duty vehicles, which were jointly proposed by EPA and the United States Department of Transportation National Highway Safety Administration of September 15, 2009.

EPA Greenhouse Gas Tailor Rule

On May 13, 2010, EPA issued the Prevention of Significant Deterioration and Title V Greenhouse Gas Tailor Rule. This final rule sets thresholds for greenhouse gas (GHG) emissions that define when permits under the New Source Review Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs are required for new and existing industrial facilities.

The rule establishes a schedule that will initially focus permitting programs on the largest sources and then expands beyond certain permitting programs to cover the largest sources of GHG that may not have been previously covered by the CAA for other pollutants. Step 1 occurred from January 2, 2011 to June 30, 2011. During Step 2, from July 1, 2011 to June 30, 2013, PSD permitting requirements will cover for the first time new construction projects that emit GHG emissions of at least 100,000 tons (90,718 MT) per year even if they do not exceed the permitting thresholds for any other pollutant. Modifications at existing facilities that increase GHG emissions by at least 75,000 tons (68,039 MT) per year will be subject to permitting requirements, even if they do not significantly increase emissions of any other pollutant. In Step 2, operating permit requirements will apply to sources based on their GHG emissions even if they would not apply based on emissions of any other pollutant. Facilities that emit at least 100,000 tons (90,718 MT) per year of CO_{2e} will be subject to Title V permitting requirements.

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

As part of this rule, EPA also commits to undertake another rulemaking, to begin in 2011 and conclude no later than July 1, 2012. That action will consist of an additional Step 3 for phasing in GHG permitting. Step three, if established, will not require permitting for sources with greenhouse gas emissions below 50,000 tons (45,359 MT) per year.

As a stationary source, the proposed project would not emit more than 100,000 tons of CO₂e per year, and thus would not fall within the PSD permitting requirements described above.

B. STATE

California Code of Regulations Title 24

Although not originally intended to reduce greenhouse gas emissions, California Code of Regulations Title 24 Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings were first established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. Energy efficient buildings require less electricity, natural gas, and other fuels. Electricity production from fossil fuels and on-site fuel combustion (typically for water heating) results in greenhouse gas emissions. Therefore, increased energy efficiency results in decreased greenhouse gas emissions. CARB's greenhouse gas inventory is based on 2006 Title 24 standards.

State Standards Addressing Vehicular Emissions

California Assembly Bill 1493 (Pavley) enacted on July 22, 2002, required CARB to develop and adopt regulations that reduce greenhouse gases emitted by passenger vehicles and light duty trucks. Regulations adopted by CARB will apply to 2009 and later model year vehicles. CARB estimates that the regulation will reduce climate change emissions from light duty passenger vehicle fleet by an estimated 22 percent in 2012 and 30 percent in 2016. The federal Corporate Average Fuel Economy (CAFE) standard determines the fuel efficiency of certain vehicle classes in the United States. In 2007, as part of the Energy and Security Act of 2007, CAFE standards were increased for new light-duty vehicles to 35 miles per gallon by 2020.

Executive Order S-01-07

Executive Order S-01-07 was enacted by the Governor on January 18, 2007. The order mandates the following: 1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020; and 2) that a Low Carbon Fuel Standard ("LCFS") for transportation fuels be established for California. It is assumed that the effects of the LCFS would be a 10 percent reduction in GHG emissions from fuel use by 2020.

Executive Order S-3-05

Executive Order S-3-05, signed by Governor Schwarzenegger on June 1, 2005, calls for a reduction in GHG emissions to 1990 levels by 2020 and for an 80 percent reduction in GHG emissions by 2050. Executive Order S-3-05 also calls for the California EPA (CalEPA) to prepare biennial science reports on the potential impact of continued GCC on certain sectors of the California economy. The first of these reports, "Our Changing Climate: Assessing Risks to California," and its supporting document "Scenarios of Climate Change in California: An Overview" were published by the California Climate Change Center in 2006.

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

Assembly Bill 32, the California Global Warming Solutions Act of 2006

In September 2006, Governor Schwarzenegger signed California AB 32, the global warming bill, into law. AB 32 directs CARB to do the following:

- Make publicly available a list of discrete early action GHG emission reduction measures that can be implemented prior to the adoption of the statewide GHG limit and the measures required to achieve compliance with the statewide limit.
- Make publicly available a GHG inventory for the year 1990 and determine target levels for 2020.
- On or before January 1, 2010, adopt regulations to implement the early action GHG emission reduction measures.
- On or before January 1, 2011, adopt quantifiable, verifiable, and enforceable emission reduction measures by regulation that will achieve the statewide GHG emissions limit by 2020, to become operative on January 1, 2012, at the latest. The emission reduction measures may include direct emission reduction measures, alternative compliance mechanisms, and potential monetary and nonmonetary incentives that reduce GHG emissions from any sources or categories of sources that CARB finds necessary to achieve the statewide GHG emissions limit.
- Monitor compliance with and enforce any emission reduction measure adopted pursuant to AB 32.

CARB has estimated that the 1990 GHG emissions level was 427 MMT net CO₂e. In 2004, the emissions were estimated at 480 MMT net CO₂e. CARB estimates that a reduction of 173 MMT net CO₂e emissions below business-as-usual would be required by 2020 to meet the 1990 levels. This amounts to a 15 percent reduction from today's levels and a 30 percent reduction from projected business-as-usual levels in 2020.

Assembly Bill 32- Climate Change Scoping Plan

In 2008, CARB adopted its *Climate Change Scoping Plan* (Scoping Plan), which functions as a roadmap of CARB's plans to achieve GHG reductions in California required by AB 32 through subsequently enacted regulations. The Scoping Plan contains the main strategies California will implement to reduce CO₂e emissions by 169 MMT, or approximately 30 percent, from the state's projected 2020 emissions level of 596 MMT of CO₂e under a business-as-usual scenario. (This is a reduction of 42 MMT CO₂e, or almost 10 percent, from 2002–2004 average emissions, but requires the reductions in the face of population and economic growth through 2020.) The Scoping Plan also breaks down the amount of GHG emissions reductions CARB recommends for each emissions sector of the state's GHG inventory. The Scoping Plan calls for the largest reductions in GHG emissions to be achieved by implementing the following measures and standards:

- improved emissions standards for light-duty vehicles (estimated reductions of 31.7 MMT CO₂e),
- the Low-Carbon Fuel Standard (15.0 MMT CO₂e),
- energy efficiency measures in buildings and appliances and the widespread development of combined heat and power systems (26.3 MMT CO₂e), and
- a renewable portfolio standard for electricity production (21.3 MMT CO₂e).

The Cal-EPA 2012 Greenhouse Gas Reduction Report Card (January, 2012) reported that in 2010, the date for which the most current data are available, California had achieved a reduction of 8.1 MMT CO₂e

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

from implementation of various measures carried out by State agencies and that a reduction of 157.8 MMT CO₂e is expected by 2020.

Senate Bill 97

Senate Bill 97, enacted in 2007, amends the CEQA statute to clearly establish that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis. It directs OPR to develop draft CEQA guidelines “for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions” by July 1, 2009, and directs the Resources Agency to certify and adopt the CEQA Guidelines by January 1, 2010.

On December 30, 2009, the Natural Resources Agency adopted amendments to the CEQA Guidelines in the California Code of Regulations. The amendments went into effect on March 18, 2010, and are summarized below:

- Climate action plans and other greenhouse gas reduction plans can be used to determine whether a project has significant impacts, based upon its compliance with the plan.
- Local governments are encouraged to quantify the greenhouse gas emissions of proposed projects, noting that they have the freedom to select the models and methodologies that best meet their needs and circumstances. In addition, consideration of several qualitative factors may be used in the determination of significance, such as the extent to which the given project complies with state, regional, or local GHG reduction plans and policies. The Guidelines do not set or dictate specific thresholds of significance.
- When creating their own thresholds of significance, local governments may consider the thresholds of significance adopted or recommended by other public agencies, or recommended by experts.
- New amendments include guidelines for determining methods to mitigate the effects of greenhouse gas emissions in Appendix G of the CEQA Guidelines.
- The Guidelines are clear to state that “to qualify as mitigation, specific measures from an existing plan must be identified and incorporated into the project; general compliance with a plan, by itself, is not mitigation.”
- The Guidelines promote the advantages of analyzing GHG impacts on an institutional, programmatic level, and therefore approve tiering of environmental analyses and highlights some benefits of such an approach.
- Environmental impact reports (EIRs) must specifically consider a project's energy use and energy efficiency potential, pursuant to Appendix F of the CEQA Guidelines.

Senate Bill 375

Senate Bill 375 requires that regions within the State, which have a metropolitan planning organization, must adopt a sustainable communities strategy as part of their regional transportation plans. The strategy must be designed to achieve certain goals for the reduction of GHG emissions. The bill finds that GHG from autos and light trucks can be substantially reduced by new vehicle technology, but even so, “it will be necessary to achieve significant additional greenhouse gas reductions from changed land use patterns and improved transportation. Without improved land use and transportation policy, California will not be able to achieve the goals of AB 32.” SB 375 provides that new CEQA provisions be enacted to encourage developers to submit applications and local governments to make land use

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

decisions that will help the State achieve its goals under AB 32," and that "current planning models and analytical techniques used for making transportation infrastructure decisions and for air quality planning should be able to assess the effects of policy choices, such as residential development patterns, expanded transit serve and accessibility, the walkability of communities, and the use of economic incentives and disincentives."

Senate Bill 1078, Senate Bill 107, and Executive Order S-14-08

SB 1078 initially set a target of 20 percent of energy to be sold from renewable sources by the year 2017. The schedule for implementation of the RPS was accelerated in 2006 with the Governor's signing of SB 107, which accelerated the 20 percent RPS goal from 2017 to 2010. On November 17, 2008, the Governor signed Executive Order S-14-08, which requires all retail sellers of electricity to serve 33 percent of their load with renewable energy by 2020.

Executive Order S-21-09

Executive Order S-21-09 was enacted by the Governor on September 15, 2009. Executive Order S-21-09 requires that the CARB, under its AB 32 authority, adopt a regulation by July 31, 2010 that sets a 33 percent renewable energy target as established in Executive Order S-14-08. Under Executive Order S-21-09, the CARB will work with the Public Utilities Commission and California Energy Commission to encourage the creation and use of renewable energy sources, and will regulate all California utilities. The CARB will also consult with the Independent System Operator and other load balancing authorities on the impacts on reliability, renewable integration requirements, and interactions with wholesale power markets in carrying out the provisions of the Executive Order. The order requires the CARB to establish highest priority for those resources that provide the greatest environmental benefits with the least environmental costs and impacts on public health.

California Renewables Portfolio Standard (RPS)

Established in 2002 under Senate Bill 1078 and modified in 2006 under Senate Bill 107 and in 2011 under Senate Bill 2, California's Renewables Portfolio Standard (RPS) is one of the most ambitious renewable energy standards in the country. The RPS program requires investor-owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 33 percent of total procurement by 2020. Solar generated electricity is considered an eligible renewable energy source for the RPS program. A Proposed Decision will be issued in the first quarter of 2012 implementing the new compliance rules and resolving initial transition issues between compliance rules for the 20 percent RPS program and new 33 percent RPS program compliance rules set by SB 2.

Senate Bill 1368

Senate Bill 1368 limits long-term investments in baseload generation by the State's utilities to power plants that meet an emissions performance standard (EPS) jointly established by the California Energy Commission and the California Public Utilities Commission.

C. LOCAL

Pursuant to the requirements of SB 97, the Resources Agency adopted amendments to the State CEQA Guidelines to provide regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents, while giving lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHG and GCC impacts. Imperial County has not established formal quantitative or qualitative thresholds through a public rulemaking process, but CEQA permits the lead

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

agency to establish a project-specific threshold of significance if backed by substantial evidence, until such time as a formal threshold is approved.

Imperial County Air Pollution Control District (ICAPCD)

The ICAPCD has not adopted GHG thresholds for development projects. However, ICAPCD has adopted Rule 904, Prevention of Significant Deterioration (PSD) Program, to regulate GHG emissions for new and modified major stationary sources. Affected sources will be subject to the Best Available Control Technology (BACT), which considers technical feasibility, cost and other energy, environmental and economic impacts. Rule 904 applies to projects that would result in 75,000 or more tons per year of CO₂e.

4.5.2 ENVIRONMENTAL SETTING

A. GLOBAL CLIMATE CHANGE

Global climate change (GCC) is a change in the average weather of the earth that is measured by temperature, wind patterns, precipitation, and storms over a long period of time. The baseline, against which these changes are measured, originates in historical records identifying temperature changes that have occurred in the past, such as during previous ice ages. The global climate is continuously changing, as evidenced by repeated episodes of substantial warming and cooling documented in the geologic record. The rate of change has typically been incremental, with warming or cooling trends occurring over the course of thousands of years. The past 10,000 years have been marked by a period of incremental warming, as glaciers have steadily retreated across the globe. However, scientists have observed an unprecedented acceleration in the rate of warming during the past 150 years. GCC is a documented effect. Although the degree to which the change is caused by anthropogenic (man-made) sources is still under study, the increase in warming has coincided with the global industrial revolution, which has seen the widespread reduction of forests to accommodate urban centers, agriculture, and the use of fossil fuels – primarily the burning of coal, oil, and natural gas for energy. The majority of scientists agree that anthropogenic sources are a main, if not primary, contributor to the GCC warming.

The effects of increasing global temperature are far-reaching and extremely difficult to quantify. The scientific community continues to study the effects of global climate change. In general, increases in the ambient global temperature as a result of increased GHGs is anticipated to result in rising sea levels, which could threaten coastal areas through accelerated coastal erosion, threats to levees and inland water systems and disruption to coastal wetlands and habitat.

If the temperature of the ocean warms, it is anticipated that the winter snow season would be shortened. Snowpack in the Sierra Nevada provides both water supply (runoff) and storage (within the snowpack before melting), which is a major source of supply for the state. According to a California Energy Commission report, the snowpack portion of the supply could potentially decline by 70 percent to 90 percent by the end of the 21st century (CEC, 2006). This phenomenon could lead to significant challenges securing an adequate water supply for a growing state population. Further, the increased ocean temperature could result in increased moisture flux into the state; however, since this would likely increasingly come in the form of rain rather than snow in the high elevations, increased precipitation could lead to increased potential and severity of flood events, placing more pressure on California's levee/flood control system.

Sea level has risen approximately seven inches during the last century and, according to the CEC report, it is predicted to rise an additional 22 to 35 inches by 2100, depending on the future GHG emissions

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

levels (CEC, 2006). If this occurs, resultant effects could include increased coastal flooding, saltwater intrusion and disruption of wetlands (CEC, 2006). As the existing climate throughout California changes over time, mass migration of species, or failure of species to migrate in time to adapt to the perturbations in climate, could also result. Under the emissions scenarios of the Climate Scenarios report (California Climate Change Center, 2006), the impacts of global warming in California are anticipated to include, but are not limited to, the following.

Public Health

Higher temperatures are expected to increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, days with weather conducive to ozone formation are projected to increase from 25 percent to 35 percent under the lower warming range, to 75 percent to 85 percent under the medium warming range. In addition, if global background ozone levels increase as predicted in some scenarios, it may become impossible to meet local air quality standards. Air quality could be further compromised by increases in wildfires, which emit fine particulate matter that can travel long distances depending on wind conditions. The Climate Scenarios report indicates that large wildfires could become up to 55 percent more frequent if GHG emissions are not significantly reduced.

In addition, under the higher warming scenario, there could be up to 100 more days per year with temperatures above 90°F in Los Angeles and 95°F in Sacramento by 2100. This is a large increase over historical patterns and approximately twice the increase projected if temperatures remain within or below the lower warming range. Rising temperatures will increase the risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat.

Water Resources

A vast network of man-made reservoirs and aqueducts capture and transport water throughout the state from northern California and the Colorado River. The current distribution system relies on Sierra Nevada snow pack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snow pack, increasing the risk of summer water shortages.

The state's water supplies are also at risk from rising sea levels. An influx of saltwater would degrade California's estuaries, wetlands, and groundwater aquifers. Saltwater intrusion caused by rising sea levels is a major threat to the quality and reliability of water within the southern edge of the Sacramento/San Joaquin River Delta, a major state fresh water supply. Global warming is also projected to seriously affect agricultural areas, with California farmers projected to lose as much as 25 percent of the water supply they need; decrease the potential for hydropower production within the state (although the effects on hydropower are uncertain); and seriously harm winter tourism. Under the lower warming range, the snow dependent winter recreational season at lower elevations could be reduced by as much as one month. If temperatures reach the higher warming range and precipitation declines, there might be many years with insufficient snow for skiing and snowboarding and other snow dependent recreational activities.

If GHG emissions continue unabated, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snow pack by as much as 70 percent to 90 percent. Under the lower warming scenario, snow pack losses are expected to be only half as large as those expected if temperatures were to rise to the higher warming range. How much snow pack will be lost depends in part on future precipitation patterns, the projections for which remain uncertain. However, even under the wetter climate projections, the loss of snow pack would pose challenges to

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

water managers, hamper hydropower generation, and nearly eliminate all skiing and other snow-related recreational activities.

Summary and overview of the impacts of global climate change on various sectors of California's economy and natural resources is provided below.

Agriculture

Increased GHG emissions are expected to cause widespread changes to the agriculture industry reducing the quantity and quality of agricultural products statewide. Although higher carbon dioxide levels can stimulate plant production and increase plant water-use efficiency, California's farmers will face greater water demand for crops and a less reliable water supply as temperatures rise.

Plant growth tends to be slow at low temperatures, increasing with rising temperatures up to a threshold. However, faster growth can result in less-than optimal development for many crops, so rising temperatures are likely to worsen the quantity and quality of yield for a number of California's agricultural products. Products likely to be most affected include wine grapes, fruits and nuts, and milk.

Crop growth and development will be affected, as will the intensity and frequency of pest and disease outbreaks. Rising temperatures will likely aggravate ozone pollution, which makes plants more susceptible to disease and pests and interferes with plant growth.

In addition, continued global warming will likely shift the ranges of existing invasive plants and weeds and alter competition patterns with native plants. Range expansion is expected in many species while range contractions are less likely in rapidly evolving species with significant populations already established. Should range contractions occur, it is likely that new or different weed species will fill the emerging gaps. Continued global warming is also likely to alter the abundance and types of many pests, lengthen pests' breeding season, and increase pathogen growth rates.

Forests and Landscapes

Global warming is expected to alter the distribution and character of natural vegetation thereby resulting in a possible increased risk of large wildfires. If temperatures rise into the medium warming range, the risk of large wildfires in California could increase by as much as 55 percent, which is almost twice the increase expected if temperatures stay in the lower warming range. However, since wildfire risk is determined by a combination of factors, including precipitation, winds, temperature, and landscape and vegetation conditions, future risks will not be uniform throughout the state. For example, if precipitation increases as temperatures rise, wildfires in southern California are expected to increase by approximately 30 percent toward the end of the century. In contrast, precipitation decreases could increase wildfires in northern California by up to 90 percent.

Moreover, continued global warming will alter natural ecosystems and biological diversity within the state. For example, alpine and sub-alpine ecosystems are expected to decline by as much as 60 percent to 80 percent by the end of the century as a result of increasing temperatures. The productivity of the state's forests is also expected to decrease as a result of global warming.

Rising Sea Levels

Rising sea levels, more intense coastal storms, and warmer water temperatures will increasingly threaten the state's coastal regions. Under the higher warming scenario, sea level is anticipated to rise 22 to 35 inches by 2100. Elevations of this magnitude would inundate coastal areas with saltwater,

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats.

B. SOURCES AND GLOBAL WARMING POTENTIALS OF GREENHOUSE GASES

The State of California GHG Inventories performed by the California Air Resources Board (CARB), compiled statewide anthropogenic GHG emissions and sinks and includes estimates for CO₂, CH₄, N₂O, SF₆, HFCs, and PFCs. The first inventory covers the years 1990 to 2004 and the second inventory covers the years 2000 to 2008. Based on data from the inventories, a summary of emissions from economic sectors is summarized in **Table 4.5-1**. Each inventory is divided into seven broad sectors and categories including: agriculture; commercial; electricity generation; forestry; industrial; residential; and transportation. When accounting for GHGs, all types of GHG emissions are expressed in terms of CO₂e and are typically quantified in metric tons (MT) or millions of metric tons (MMT). Data sources used to calculate this GHG inventory include California and federal agencies, international organizations, and industry associations. The current inventory (2000 – 2008) uses global warming potential (GWP) values from the IPCC Second Assessment Report. To date, no GHG inventory has been prepared for Imperial County.

TABLE 4.5-1
CALIFORNIA GREENHOUSE GAS INVENTORY FOR 1990 AND 2008 – SUMMARY BY ECONOMIC SECTOR

Sector	1990		2008	
	MMT CO ₂ e	Percent	MMT CO ₂ e	Percent
Electricity Generation	110.63	25.5%	117.32	24.8%
Transportation	150.67	34.8%	174.99	36.9%
Industrial	103.03	23.8%	100.03	21.1%
Commercial	14.43	3.3%	14.69	3.1%
Residential	29.66	6.8%	28.45	6.0%
Agriculture & Forestry	16.93	3.9%	28.25	6.0%
Not Specified	1.27	0.3%	14.02	3.0%
Forest/Rangeland Sinks	6.69	1.5%	-3.98	-0.8%

Source: CARB, 2007; CARB, 2010a.

When accounting for GHGs, all types of GHG emissions are expressed in terms of CO₂e and are typically quantified in metric tons (MT) or millions of metric tons (MMT). GHGs have varying GWPs. The GWP is the potential of a gas or aerosol to trap heat in the atmosphere; it is the cumulative radiative forcing effect of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas. The reference gas for GWP is CO₂; therefore, CO₂ has a GWP of 1. The other main greenhouse gases that have been attributed to human activity include CH₄, which has a GWP of 21, and N₂O, which has a GWP of 310.

Human-caused sources of CO₂ include combustion of fossil fuels (coal, oil, natural gas, gasoline and wood). Data from ice cores indicate that CO₂ concentrations remained steady prior to the current period for approximately 10,000 years. Concentrations of CO₂ have increased in the atmosphere since the industrial revolution.

CH₄ is the main component of natural gas and also arises naturally from anaerobic decay of organic matter. Human-caused sources of natural gas include landfills, fermentation of manure and cattle farming. Human-caused sources of N₂O include combustion of fossil fuels and industrial processes such

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

as nylon production and production of nitric acid. Other GHGs are present in trace amounts in the atmosphere and are generated from various industrial or other uses.

Greenhouse Gases and Electricity Generation

The generation of electricity can produce GHG with the criteria air pollutants that have been traditionally regulated under the Federal and State CAAs. For fossil fuel-fired power plants, the GHG emissions include primarily CO₂, with much smaller amounts of N₂O and CH₄ (often from incomplete combustion of natural gas). For PV solar energy generation projects, the stationary source GHG emissions are much smaller than fossil fuel-fired power plants because PV facilities do not burn carbon-based fuels and therefore do not emit greenhouse gases. However, the associated maintenance vehicle emissions are the same. Other sources of GHG emissions include SF₆ from high voltage equipment and HFCs and PFCs from refrigeration/chiller equipment. GHG emissions from the electricity sector are dominated by CO₂ emissions from carbon-based fuels.

Status of RPS Procurement and New Renewable Capacity

The Renewables Portfolio Standard Quarterly Report issued by the CPUC in third quarter 2011 (CPUC, 2011) identified the following related to the status of RPS procurement and renewable capacity:

- Collectively, the large investor-owned utilities (IOUs) reported in their August 2011 RPS Compliance Filings that they served 17.0 percent of their electricity with RPS-eligible generation in 2010. Pacific Gas & Electric served 15.9 percent of its 2010 load with RPS-eligible renewable energy, Southern California Edison with 19.3 percent, and San Diego Gas & Electric with 11.9 percent.
- By the third quarter of 2011, 2,541 MW of new renewable capacity achieved commercial operation under the RPS program. Over 996 MW of new renewable capacity was forecasted to come online by the end of the 2011.
- All of the new generation that has come online in 2011 has been wind and solar photovoltaic (PV) projects.

C. SOLAR GENERATION FACILITY

The discussion provided below summarizes the primary project components and provides an overview of GHGs currently generated on the project site and the carbon sequestration potential of the project site.

The proposed project consists of two primary components located in unincorporated western Imperial County north of the Imperial Valley Substation: 1) a solar energy generation facility and associated improvements on privately owned land; and 2) the Gen-tie Line that will connect the solar energy generation facility with the Imperial Valley Substation. Project construction would occur over 12 to 24 months. Following construction, the project would operate 365 days per year and generate power during daylight hours. The project would generate over 140 megawatts of alternating current daily. The proposed project is described in detail in Chapter 2, Project Description.

All of the parcels that comprise the solar energy generation site are agricultural lands. Of the project site's 1,990 acres, approximately 1,852 acres of agricultural land would be converted to accommodate the proposed project. Of the 1,852 acres, approximately 1,822 acres (predominantly alfalfa hay) are important farmlands. The portion of the proposed gen-tie on BLM land is located entirely within an area designated by the BLM for utilities and infrastructure corridors.

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

Much of the project site would be located on lands that are in active agricultural production. There are limited “point source” quantities of GHGs currently being produced on the project site in the form of emissions associated with agricultural equipment use (trucks, tractors, etc.). These are not considered major GHG sources, and as such, the existing use of the land is not a major or significant generator of GHGs. The existing agricultural operations on the site produce primarily alfalfa and Bermuda grass, which have little to no value for biomass carbon sequestration. Additionally, these crops are harvested periodically, which further reduces their value as carbon sequestration elements. As such, the existing land has little to no value for carbon sequestration, and do not provide positive impacts related to GHG reductions.

4.5.3 IMPACTS AND MITIGATION MEASURES

A. STANDARDS OF SIGNIFICANCE

The impact analysis provided below is based on the following State CEQA Guidelines, as listed in Appendix G. The project would result in a significant impact to climate change and greenhouse gases if it would result in any of the following:

- a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment. For this project, a threshold of 10,000 metric tons of CO₂-equivalent GHG emissions on an annual basis has been established.
- b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gasses.

To determine if a project would generate GHG emissions that would directly or indirectly have a significant impact on the environment and would warrant the imposition of GHG-reducing mitigation measure, the South Coast Air Quality Management District (SCAQMD) proposed a threshold of 10,000 metric tons of CO₂e for industrial projects (SCAQMD, 2008). Pursuant to CEQA Guidelines Section 15064.4(b) and 15064.7, Imperial County has determined that 10,000 metric tons of CO₂e annually is the appropriate threshold of significance to apply to the proposed project, based on the recommendation from the SCAQMD.

B. METHODOLOGY

Greenhouse Gas Emissions

The *Air Quality Assessment* prepared by Ldn Consulting (Ldn, 2012a) for the proposed project identified CO₂ emissions that would occur during the construction and operation/maintenance phases of the proposed project. The *Air Quality Assessment* is provided on the attached CD of Technical Appendices as **Appendix C** of this EIR.

Project Construction

Air quality impacts related to construction were calculated using the latest URBEMIS2007 air quality model, which was developed by CARB. URBEMIS2007 has been approved by Imperial County Air Pollution Control District and the County for construction emission calculations. URBEMIS incorporates emission factors from the EMFAC2007 model for on-road vehicle emissions and the OFFROAD2007 model for off-road vehicle emissions. Default settings were used within the model.

Project construction activities are expected to require approximately 12 to 24 months. The applicant anticipates construction to start in the second quarter of 2012 following County approval of a

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

Conditional Use Permit (CUP). According to the applicant, the construction workforce is expected to reach a peak during the seventh month, which is anticipated to occur during the first quarter of 2013. Ldn Consulting used the project engineer's worst case schedule which assumes that simultaneous construction activities may occur with PV array and facility installations along transmission line installation. This peak construction activity would occur during month seven of the project construction schedule and is expected to generate 375 average daily trips from construction workers, deliveries, and vendors.

Project Operation and Maintenance

Daily operations of the project will involve primarily periodic maintenance and worker trips only and although emissions are expected, they would be minimal given the project only expects to add 15 to 20 ADT (average daily trips) and on occasion (up to four times annually) the project could add up to 50 ADT during periodic PV module cleaning periods. With this being said, for purposes of a worst case analysis, Ldn Consulting modeled the daily trips with respect to construction (375 ADT) and reported it as operations.

C. PROJECT/CUMULATIVE IMPACTS AND MITIGATION MEASURES

Due to the global nature of climate change and GHG emissions and their potential effects, GHG emissions generated by an individual project are evaluated on a cumulative basis.

Generation of Greenhouse Gas Emissions

Impact 4.5.1 The proposed project would generate greenhouse gas emissions. This impact is considered **less than significant**.

During construction, the project would result in daily activities, including worker trips, grading, demolition, construction, and paving, that would generate up to 18,791.23 pounds or 8.5 metric tons (18,791.23 pounds ÷ 2,204.62 pounds per metric ton) of CO₂ per day during peak construction periods. Less intense phases of construction would result in lesser emissions. Because construction activity impacts are relatively short-term, they contribute a relatively small portion of the overall GHG emissions during the lifetime of the project. Thus, the construction-related emissions are amortized over the maximum projected CUP term of 40 years (20 to 30 years with potential for an additional 10 years) resulting in 155.1 metric tons per year (8.5 metric tons per day x 365 days per year x 2 years of construction ÷ 40 years [40 year maximum CUP term]) or 0.4 metric tons per day (147.7 metric tons per year ÷ 365 days).

Once operational, there would be no direct emissions associated with the operation of the solar modules and the gen-tie line. However, the project would result in small amount of emissions associated with daily worker trips and periodic maintenance activities, which would result in the generation of up to 2,779.37 pounds or 1.4 metric tons (2,779.37 pounds ÷ 2,204.62 pounds per metric ton) of CO₂ per day. CO₂ is the most common and prolific type of greenhouse gas. It is anticipated that the daily emissions would be much lower as periodic maintenance activities, such as cleaning the solar arrays, and would not be conducted on a daily basis.

Emissions associated with operation and maintenance and the amortized construction emissions would result in 1.8 metric tons of CO₂ per day (1.4 metric tons + 0.4 metric tons) over the life of the project. Assuming the project operated 365 days per year, the proposed project would generate up to 657 metric tons per year of CO₂ (1.8 metric tons per day x 365 days per year). However, this is likely an overly conservative (worst-case) estimate, and actual GHG emissions on an annual basis would likely be

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

considerably lower due to the fact that the majority of the project's GHG emissions come from vehicle trips associated with maintenance activities, and maintenance of the project site during operations would not occur on a daily basis.

As further described in the project description, the emissions associated with the project would be due to limited vehicle trips and periodic maintenance of the project. The solar energy conversion process would not generate GHGs. The use of project site would not result in the loss of any carbon sequestration benefits associated with the agricultural use of the project site as the project site is regularly harvested, thus releasing carbon sequestered by the crops on a regular basis. Moreover, the project will avoid CO₂ emissions that would otherwise be generated by fossil-fuel fired power plants to produce the electricity.

Even under the worst-case GHG emissions scenario described above, the proposed project may generate up to 657 metric tons per year of CO₂. This is significantly below the established threshold of 10,000 metric tons per year. Therefore, this is a less than significant impact and the project would not have a considerable contribution to cumulative GHG impacts.

Mitigation Measures

None required.

Significance After Mitigation

Not applicable.

Conflict with an Applicable Plan, Policy, or Regulation Adopted to Reduce Greenhouse Gas Emissions

Impact 4.5.2 The project would not conflict with an applicable plan, policy, or regulation adopted to reduce greenhouse gas emissions. There is **no impact**.

There are multiple state-level programs and plans in place that aim to reduce GHG levels in California. IPACD has also adopted rules to regulate GHG emissions for existing and new stationary sources. State and local GHG-related programs that are applicable to the project include:

California Executive Orders S-3-05 and Assembly Bill 32

On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05. The goal of this Executive Order is to reduce California's GHG emissions to: 1) 2000 levels by 2010, 2) 1990 levels by 2020, and 3) 80 percent below the 1990 levels by 2050.

In 2006, this goal was further reinforced with the passage of Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006. AB 32 sets the same overall GHG emissions reduction goals while further mandating that CARB create a plan, which includes market mechanisms, and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." Executive Order S-20-06 further directs state agencies to begin implementing AB 32, including the recommendations made by the state's Climate Action Team (CAT). Each CAT working group will develop a Near-term Implementation Plan (CATNIPs) for the specific climate change mitigation measures and adaptation strategies being addressed by the working group. These will be the measures and strategies that will be underway or completed by the end of 2010. The Energy Working Group of the Climate Action Team focuses its efforts on both greenhouse gas emission reduction and adaptation actions affecting the energy sector. The CAT prepares an annual report to the Governor consistent with the requirements of Executive Order S-3-05.

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

The proposed project would assist in the reduction of California's GHG emissions consistent with the goals of Executive Order S-3-05 and Assembly Bill 32. As discussed above, the project will avoid CO₂ emissions that would otherwise be generated by fossil-fuel fired power plants to produce the electricity.

Assembly Bill 32- Climate Change Scoping Plan

On December 11, 2008 CARB adopted its *Climate Change Scoping Plan* (Scoping Plan), which functions as a roadmap of CARB's plans to achieve GHG reductions in California required by AB 32 through subsequently enacted regulations. The Scoping Plan contains the main strategies California will implement to reduce CO₂e emissions by 169 million metric tons (MMT), or approximately 30 percent, from the state's projected 2020 emissions level of 596 MMT of CO₂e under a business-as-usual scenario. (This is a reduction of 42 MMT CO₂e, or almost 10 percent, from 2002–2004 average emissions, but requires the reductions in the face of population and economic growth through 2020.) The Scoping Plan also breaks down the amount of GHG emissions reductions CARB recommends for each emissions sector of the state's GHG inventory. The Scoping Plan calls for the largest reductions in GHG emissions to be achieved by implementing the following measures and standards:

- improved emissions standards for light-duty vehicles (estimated reductions of 31.7 MMT CO₂e),
- the Low-Carbon Fuel Standard (15.0 MMT CO₂e),
- energy efficiency measures in buildings and appliances and the widespread development of combined heat and power systems (26.3 MMT CO₂e), and
- a renewable portfolio standard for electricity production (21.3 MMT CO₂e).

The Cal-EPA 2012 Greenhouse Gas Reduction Report Card (January, 2012) reported that in 2010, the date for which the most current data are available, California had achieved a reduction of 8.1 MMT CO₂e from implementation of various measures carried out by State agencies and that a reduction of 157.8 MMT CO₂e is expected by 2020. The proposed project would result in a net reduction in GHGs and assist the state-wide effort in meeting the renewable portfolio standard for energy production.

Emissions Performance Standard

SB 1368 requires the California Energy Commission (CEC) and the California Public Utilities Commission (CPUC) to set a global warming emissions standard for electricity used in California — regardless of whether it's generated in-state or purchased from plants in other states. The new standard applies to any new long-term financial contracts for base load electricity, and applies both to investor-owned utilities and municipal utilities. The standard for baseload generation owned by, or under long-term contract to publicly owned utilities, is an EPS of 1,100 lbs. CO₂ per MWh. While the solar facility would not result in any direct emissions of greenhouse gases, indirect emissions associated with construction activities amortized over the life of the project as well as vehicle trips and periodic maintenance activities could result in up to 3,968.3 pounds of CO₂ per day (1.8 metric tons of CO₂ per day x 2,204.62 pounds per metric ton) during peak maintenance periods, which would equate to approximately 267.6 pounds of CO₂ per MWh (3,968.3 pounds of CO₂ ÷ 10 hours of daylight per day [estimated average]) . These project-related emissions are below the threshold of 1,100 pounds of CO₂ per MWh, resulting in the project's compliance with the EPS.

California Renewables Portfolio Standard (RPS)

Established in 2002 under Senate Bill 1078, accelerated in 2006 under Senate Bill 107, and expanded under Senate Bill 2, California's Renewables Portfolio Standard (RPS) is one of the most ambitious

4.5 CLIMATE CHANGE AND GREENHOUSE GASES

renewable energy standards in the country. Senate Bill 1078 established the RPS program, requiring electric corporations to increase procurement from eligible renewable energy resources by at least 1 percent of their retail sales annually, until they reach 20 percent by 2010. Executive Order S-14-08 set a new target of 33 percent renewable energy by 2020 and Executive Order S-21-09 directed CARB to adopt regulations increasing the RPS to 33 percent by 2020. In 2011, Senate Bill 2 codified the 33 percent renewable energy by 2020 requirement into law. The proposed project provides a new source of renewable energy and will assist the State in meeting the 33 percent renewable energy requirement by 2030.

Imperial County Air Pollution Control District

While ICAPCD has not adopted GHG thresholds for development projects, the ICAPCD has adopted Rule 904, Prevention of Significant Deterioration (PSD) Program, to regulate GHG emissions for new and modified major stationary sources. The proposed project would not emit 75,000 or more tons per year of CO₂e and thus this rule does not apply to the project.

As described above, the proposed project is consistent with applicable local and State plans, policies, and regulations adopted to reduce GHG levels. There is no impact.

Mitigation Measures

None required.

Significance After Mitigation

Not applicable.