Revised
Salinas Ag-Industrial Center
Greenhouse Gas Analysis

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Acronyms Used in this Report

AB – (California) Assembly Bill
AG – (California) Attorney General
ARB – (California) Air Resources Board
ASHRAE- American Society of Heating, Refrigeration and Air-Conditioning Engineers
CAPCOA – California Air Pollution Control Officers Association
CAT – Climate Action Team
CEQA – California Environmental Quality Act
CFC - chlorofluorocarbons
CO_2 – carbon dioxide
CO_2e – carbon dioxide equivalent
CH_4 - methane
EIR – environmental impact report
GBP – Salinas Ag-Industrial Center Green Building Plan
GHG – greenhouse gas
GWP – global warming potential
HVAC&R – heating, ventilation, air conditioning, and refrigeration
IPCC – Intergovernmental Panel on Climate Change
LCFS – Low Carbon Fuels Standard
LED – light emitting diode
LEED – Leadership in Energy and Environmental Design
MBUAPCD – Monterey Bay Unified Air Pollution Control District
OPR – (California) Office of Planning and Research
N_2O – nitrous oxide
SB – (California) Senate Bill
TAC – toxic air contaminant
UNFCCC – United Nations Framework Convention on Climate Change

Executive Summary

The proposed Salinas Ag-Industrial Center (Center) consists of a planned 257 acre development. Seventeen acres are located within the City of Salinas, California. The remaining 240 acres are located within unincorporated Monterey County, adjacent to Salinas' southern boundary, but outside of Salinas' future growth boundary and sphere-of-influence. The project includes 235 acres consisting of five master parcels and 22 acres of right-of-way for streets and associated right-of-way.

The project is currently in agricultural production. For several years, lettuce, cauliflower, and broccoli have been grown on the site.

This report examines the Center's greenhouse gas (GHG) emissions. The report first describes how GHGs cause climate change, along with goals and policies that have been adopted to combat climate change. The report then estimates the project's GHG emissions under two representative buildout scenarios, and compares them to GHG emissions at the local, state, national, and international level.

Table ES-1 summarizes the Center's GHG emissions. The Center would generate 6,444 metric tons of CO_2e during the six year construction period (2010-2014).

Once the project is fully built-out (expected by 2015), the project would generate 383,949 metric tons CO2e per year for Scenario 2, and 389,017 metric tons for Scenario 1. These estimates are without any GHG reduction measures. With GHG reduction measures, the project would generate 227,604 metric tons CO2e per year for Scenario 2, and 280,678 metric tons for Scenario 1. GHG reductions assume implementation of measures included in the Salinas Ag-Industrial Center Specific Plan's Green Building Plan plus recently enacted state measures to reduce GHG emissions from California's transportation sector.

Table ES-1 also shows emissions excluding field and line haul truck emissions. These trucks generate approximately 70% of the Center's total CO_2e emissions and represent a component of the project's emissions over which neither the applicant nor the City of Salinas have control.

In December 2008, the California Air Resources Board enacted a truck efficiency rule designed to reduce emissions from line haul trucks. That rule would take effect by 2015 and would reduce line haul truck CO_2e emissions by 10 percent. In April 2009, the California Air Resources Board approved a Low Carbon Fuels Standard (LCFS), which will reduce motor vehicle emissions by 10% by 2020. This report assumes that by 2015, LCFS will reduce motor vehicle emissions by an additional 2.5%.

Table ES-1 compares the Center's GHG emissions to emissions for California, the United States, and worldwide. When fully built out and operating, the Center would generate

Table ES-1. Salinas Ag-Industrial Center Greenhouse Gas Construction and Operational Emissions

Project or Area	Metric Tons/Year CO_2e
Construction Cumulative (2010-2014)	6,445
Operational without GHG reduction measures (2015)	383,949 – 389,017
Operational with GHG reduction measures (2015)	277,604 – 280,678
Operational w/o GHG reduction measures and w/o field and line haul trucks (2015)	110,954 – 116,011
Operational w/ GHG reduction measures and w/o field and line haul trucks (2015)	58,379 – 61,454
California (2004)	523,900,000
United States (2006)	6,326,491,790
Worldwide (2006)	36,000,000,000

Notes:
Construction emissions are cumulative over the 5 year construction period.
Operational emissions are annual for 2015, the first full year of expected buildout.
Emissions for California from California Air Resources Board's Draft California Greenhouse Gas Inventory (California Air Resources Board, 2007).
U.S emissions based on Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2006 (U.S. EPA, 2008a)
Worldwide emissions based on World Resources Institute (2008).

approximately 0.05 percent of total California GHG emissions, and a substantially lower percentage of national and worldwide emissions.

The Center's Green Building Plan contains an extensive set of GHG reduction strategies. They represent a "state of the art" Plan that is the first known attempt to incorporate a comprehensive set of GHG reducing energy efficiency standards into an agricultural industrial planning area anywhere in the United States.

The Plan ensures that development within the Center will meet strict energy efficiency and refrigerant standards that minimize GHG emissions. When combined with California's truck emission rules, the Green Building Plan will reduce GHG emissions by up to 28 percent compared to business as usual. When line-haul and field trucks are omitted from the calculations, the Plan will reduce GHG emissions by up to 47 percent.

The Green Building Plan, by requiring a wide-ranging set of GHG reducing strategies, places the Center solidly in the forefront as a state and national leader for agricultural industrial developments.

Introduction

The proposed Salinas Ag Industrial Center (Center) project consists of a planned 257 acre development. Seventeen acres are located within the City of Salinas, California. The remaining 240 acres are located within unincorporated Monterey County, adjacent to Salinas' southern boundary, but outside of Salinas' future growth boundary and sphere-of-influence. The project includes 235 acres consisting of five master parcels and 22 acres of right-of-way for streets and associated utilities.

Figure 1 shows the project's regional location with respect to the City of Salinas and surrounding areas. Figure 2 shows a closer view of the project location with respect to the southern part of Salinas.

The project is currently in agricultural production. For several years, lettuce, cauliflower, and broccoli have been grown on the site. The project site is completely outside of the 100-year flood boundaries as defined by the Federal Emergency Management Agency (FEMA). Consequently, the proposed Center's land uses would not be vulnerable to increased flooding that could result from global warming.

The Center's location is adjacent to compatible industrial uses and is not near existing or proposed sensitive receptors such as residences, schools, hospitals, or parks. Many existing ag-industrial land uses that are currently located in Salinas near sensitive receptors may relocate to the Center. These relocated businesses would reduce human exposure to criteria pollutants and toxic air contaminants, which is an added benefit of this project.

This report examines the Center's greenhouse gas (GHG) emissions. The report first describes how GHGs cause climate change, along with goals and policies that have been adopted to combat climate change. The report then estimates the project's GHG emissions, and compares them to GHG emissions at the local, state, national, and international level.

Figure 1. Regional Project Location

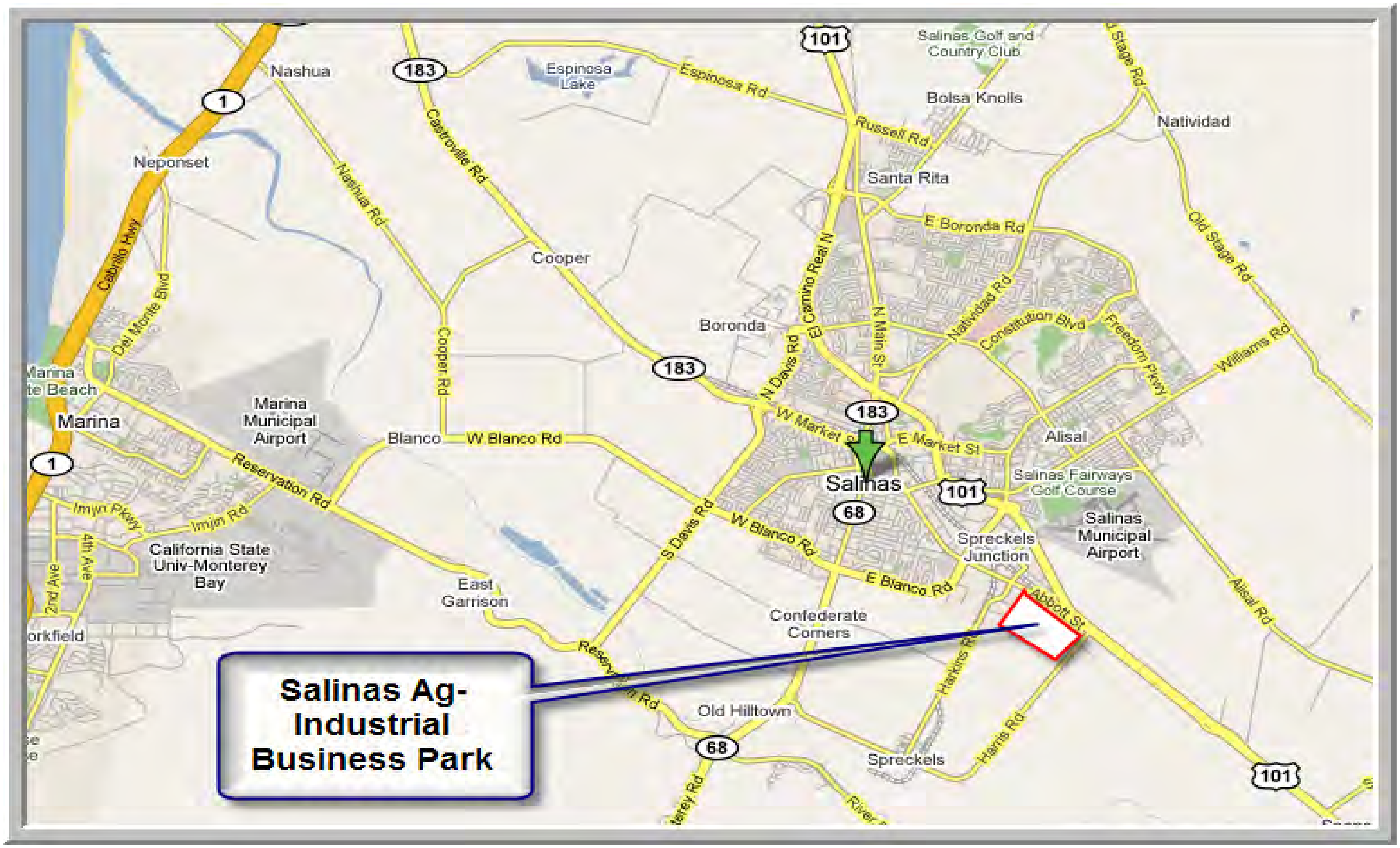
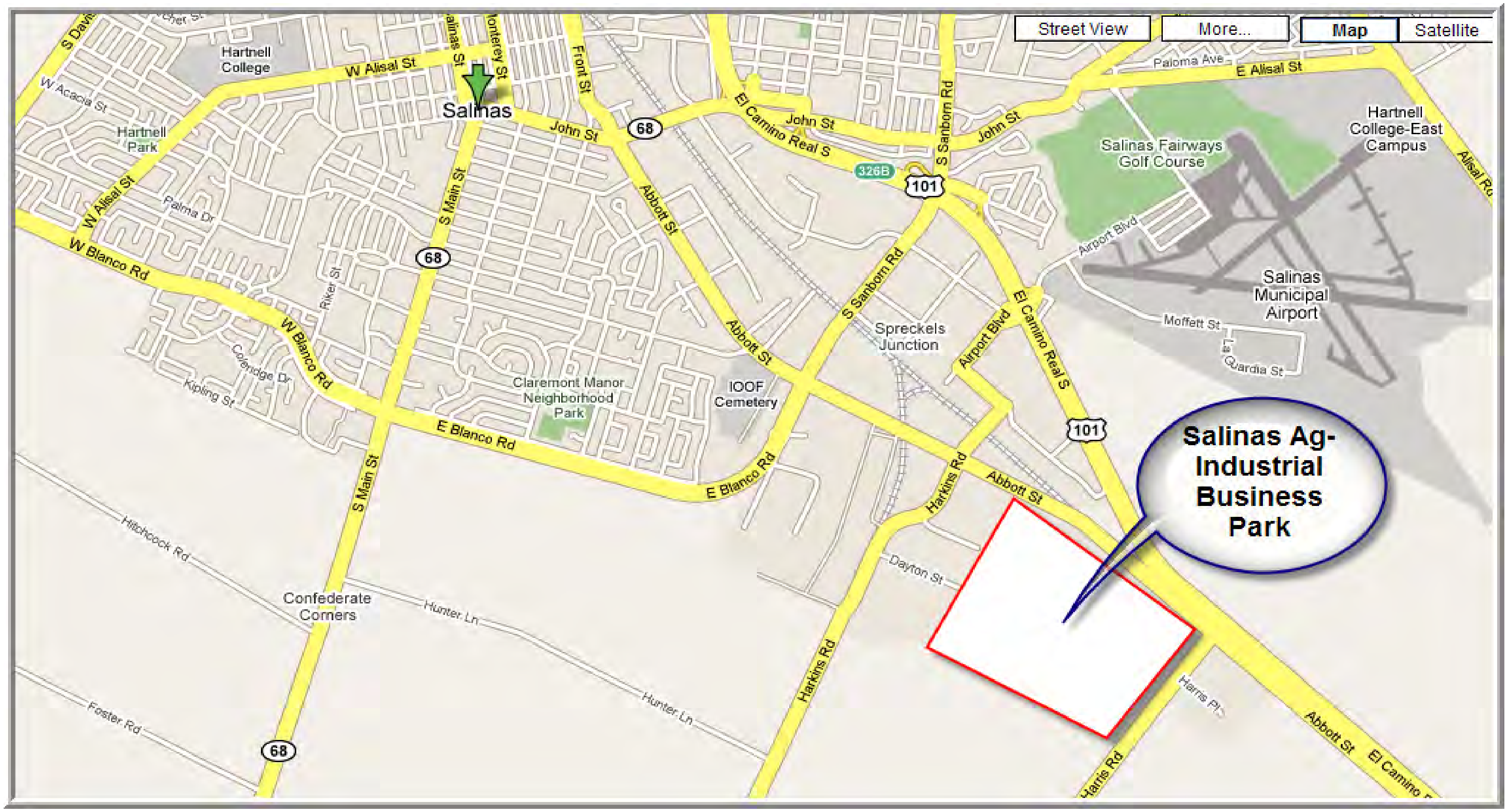


Figure 2. Project Location within Salinas



Emissions are analyzed for two representative buildout scenarios, as shown in Table 1. For the purpose of this analysis, proposed uses are separated into five categories:

- major agricultural processing,
- minor agricultural processing (coolers),
- agricultural manufacturing,
- agricultural support, and
- retail.

For the two scenarios, all land use assumptions are identical except for the Ag Support category. In Scenario 1, Ag Support uses are assumed to be entirely office and visitor space (retail, classroom, educational). In contrast, Scenario 2 assumes that Ag Support has 213,550 square feet dedicated to office and visitor space with the remaining 854,201 square feet dedicated to other uses such as warehousing or manufacturing.

Table 1. Square Footage Assumptions for Salinas Ag-Industrial Center

Scenario 1 (Higher percentage office/visitor)				
	Total Acreage	Total Building (sf)	Office/Visitor (sf)	Remainder (sf)
Major Ag Processing	101	1,319,868	237,576	1,082,292
Minor Ag Processing (Coolers)	33	711,834	142,367	569,467
Ag Manufacturing	41	889,793	177,959	711,834
Ag Support	49	1,067,751	1,067,751	0
Retail	11	249,142	249,142	0
Total	235	4,238,388	1,874,795	2,363,593
			44%	56%

Scenario 2 (Higher percentage non-office/visitor)				
	Total Acreage	Total Building (sf)	Office/Visitor (sf)	Remainder (sf)
Major Ag Processing	101	1,319,868	237,576	1,082,292
Minor Ag Processing (Coolers)	33	711,834	142,367	569,467
Ag Manufacturing	41	889,793	177,959	711,834
Ag Support	49	1,067,751	213,550	854,201
Retail	11	249,142	249,142	0
Total	235	4,238,388	1,020,594	3,217,794
			24%	76%

Greenhouse Gases and Climate Change

Global climate change is caused by GHG emissions, which are caused by several activities, including combustion of fossil fuels, deforestation, and land use change.

GHGs play a critical role in the Earth's radiation budget by trapping infrared radiation emitted from the Earth's surface, which could have otherwise escaped to space. Prominent GHGs contributing to this process include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and certain refrigerants that include chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and hydrofluorocarbons (HFCs). This phenomenon, known as the "greenhouse effect", keeps the Earth's atmosphere near the surface warmer than it would be otherwise and allows for successful habitation by humans and other forms of life.

Global warming potential (GWP) is a measure of how much a given mass of GHG is estimated to contribute to global warming. It is a relative scale which compares the gas in question to that of the same mass of carbon dioxide (whose GWP is by definition 1). In this analysis, CH_4 is assumed to have a GWP of 21 and N_2O has a GWP of 310 (California Climate Action Registry, 2007). Refrigerants have GWP's that range from 76 up to 12,240 (U.S. Green Building Council, 2007). Consequently, using each pollutant's GWP, emissions of CO_2, CH_4, N_2O, CFCs, HCFCs, and HFCs can be converted into CO_2 equivalence, also denoted as CO_2e.

Fossil fuel combustion removes carbon stored underground and releases it into the active carbon cycle, thus increasing concentrations of GHGs in the atmosphere. Emissions of GHGs in excess of natural ambient concentrations are theorized to be responsible for the enhancement of the greenhouse effect and contribute to what is termed "global warming", a trend of unnatural warming of the Earth's natural climate. Increases in these gases lead to more absorption of radiation and warm the lower atmosphere further, thereby increasing evaporation rates and temperatures near the surface. Climate change is a global problem, and GHGs are global pollutants, unlike criteria pollutants (such as ozone, carbon monoxide, and particulate matter) and toxic air contaminants (TACs), which are pollutants of regional and local concern.

The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization and United Nations Environment Programme. IPCC's mission is to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, including the potential impacts and options for adaptation and mitigation. IPCC predicts substantial increases in global temperatures of between 1.1 to 6.4 degrees Celsius, depending on the scenario (Intergovernmental Panel on Climate Change 2007).

Climate change could impact California's natural environment in the following ways (California Energy Commission 2005):

- Rising sea levels along the California coastline, particularly in San Francisco and the Sacramento-San Joaquin River Delta due to ocean expansion;

- Extreme heat conditions, such as heat waves and very high temperatures, which could last longer and become more frequent;

- An increase in heat-related human deaths and infectious diseases and a higher risk of respiratory problems caused by deteriorating air quality;

- Reduce snow pack and stream flow in the Sierra Nevada mountains, affecting winter recreation and water supplies;

- Potential increase in the severity of winter storms, affecting peak stream flows and flooding;

- Changes in growing season conditions that could affect California agriculture, causing variations in crop quality and yield; and

- Changes in distribution of plant and wildlife species due to changes in temperature, competition of colonizing species, changes in hydrologic cycles, changes in sea levels, and other climate-related effects.

These changes in California's climate and ecosystems could occur at a time when California's population is expected to increase from 34 million to 59 million by the year 2040 (California Energy Commission 2005).

Consequently, for a "business as usual" scenario, increases are expected in the amount of anthropogenic GHG emissions and the number of people potentially affected by climate change. Similar changes as those noted above for California would also occur in other parts of the world.

Transportation generates 41 percent of California's GHG emissions, followed by the industrial sector (23%), electricity generation (20%), agriculture and forestry (8%), and other sources (8%). Emissions of CO_2 and N_2O are byproducts of fossil fuel combustion, among other sources. Methane, a highly potent GHG, results from off-gassing associated with agricultural practices and landfills. Sinks of carbon dioxide include uptake by vegetation and dissolution into the ocean. In 2004, California generated 524 million metric tons of GHG measured as CO_2 equivalent (CO_2e) emissions (California Air Resources Board, 2007).

Greenhouse Gas Regulatory Environment

International and National Regulation of Greenhouse Gases

International and Federal legislation has been enacted to deal with climate change issues. The Montreal Protocol was originally signed in 1987 and substantially amended in 1990 and 1992. In 1988, the United Nations and the World Meteorological Organization established the Intergovernmental Panel on Climate Change (IPCC) to assess the scientific, technical, and socioeconomic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation.

In October 1993, President Clinton announced his Climate Change Action Plan, which had a goal to return GHG emissions to 1990 levels by 2000. On March 21, 1994, the United States joined with several countries to sign the United Nations Framework Convention on Climate Change (UNFCCC). Under the Convention, governments agreed to gather and share information on GHG emissions, national policies, and best practices, and to launch national strategies for addressing GHG emissions (CAPCOA 2008).

The Kyoto Protocol is a protocol to the United Nations Framework Convention on Climate Change with the objective of reducing GHG that cause climate change. The protocol was agreed to at the 3rd Conference of the Parties in Kyoto, Japan in December 1997. As of November 2007, 175 parties had ratified the protocol. Of these, 36 developed countries are required to reduce GHG emissions to the levels specified for each of them in the treaty (representing over 61.6% of emissions from Annex I countries). One hundred and thirty-seven (137) developing countries have ratified the protocol, including Brazil, China and India, but have no obligation beyond monitoring and reporting emissions. Several subsequent international conventions have been held by the United Nations Framework Convention on Climate Change, including a 2007 conference in Bali, Indonesia and a 2008 conference in Bangkok, Thailand (United Nations Framework on Climate Change, 2008).

State Regulation of Greenhouse Gases

Executive Order S-3-05

On June 1, 2005, Governor Schwarzenegger issued Executive Order S-3-05. It included the following GHG emission reduction targets: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; by 2050, reduce GHG emissions to 80 percent below 1990 levels. To meet the targets, the Governor directed several state agencies to cooperate in the development of a Climate Action Plan. The Secretary of CalEPA leads a Climate Action Team (CAT) whose goal is to implement global warming emission reduction programs identified in the Climate Action Plan and to report on the progress made toward meeting the emission reduction targets established in the Executive Order.

The first report to the Governor and the Legislature was released in March 2006 and will be issued bi-annually thereafter. The CAT Report to the Governor contains recommendations and strategies to help ensure the targets in Executive Order S-3-05 are met (California EPA 2006).

California Global Warming Solutions Act of 2006 (AB32)

In 2006, the California state legislature adopted the California Global Warming Solutions Act of 2006. AB32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB32, GHG are defined as CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

AB32 requires that ARB:

- Adopt early action measures to reduce GHG;
- Establish a statewide GHG emissions cap for 2020 based on 1990 emissions;
- Adopt mandatory report rules for significant GHG sources;
- Adopt a scoping plan indicating how emission reductions will be achieved via regulations, market mechanisms, and other actions; and
- Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs.

Senate Bill 97

Senate Bill (SB) 97, signed in August 2007, acknowledges that climate change is an important environmental issue that requires analysis under the California Environmental Quality Act (CEQA). The bill directs the California Office of Planning and Research (OPR) to prepare, develop, and transmit to the Resources Agency guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions, by July 1, 2009. The Resources Agency is required to certify or adopt those guidelines by January 1, 2010.

Actions Taken by California Office of Planning and Research

In June 2008, OPR issued a Technical Advisory on CEQA and Climate Change (OPR 2008). For projects subject to CEQA, this document recommends that emissions be calculated and mitigation measures be identified to reduce those emissions. The OPR Technical Advisory does not identify emission thresholds for GHGs, but instead recommends that each lead agency develop their own thresholds.

On April 13, 2009, OPR submitted to the Secretary for Natural Resources its proposed amendments to the state CEQA Guidelines for greenhouse gas emissions, as required by Senate Bill 97 (Chapter 185, 2007). These proposed CEQA Guideline amendments would provide guidance to public agencies regarding the analysis and mitigation of the effects of greenhouse gas emissions in draft CEQA documents. The Natural Resources Agency will conduct formal rulemaking in 2009, prior to certifying and adopting the amendments, as required by Senate Bill 97 (California Office of Planning and Research, 2009).

Actions Taken by California Attorney General's Office

The California Attorney General (AG) has filed comment letters under CEQA about a number of proposed projects. The AG has also filed several complaints and obtained settlement agreements for CEQA documents covering general plans and individual programs that the AG found either failed to analyze GHG emissions or failed to provide adequate GHG mitigation. The AG's office has prepared a report that lists measures that local agencies should consider under CEQA to offset or reduce global warming impacts. The AG's office also has prepared a chart of modeling tools to estimate GHG emissions impacts of projects and plans. Information on the AG's actions can be found on at the California Department of Justice Office of Attorney General web site (California Department of Justice 2008).

California Air Pollution Control Officers Association (CAPCOA) Guidance

The California Air Pollution Control Officers Association (CAPCOA) released a report in January 2008 that describes methods to estimate and mitigate GHG emissions from projects subject to CEQA. The CAPCOA report evaluates several GHG thresholds that could be used to evaluate the significance of a project's GHG emissions. The CAPCOA report, however, does not recommend any one threshold. Instead, the report is designed as a resource for public agencies as they establish agency procedures for reviewing GHG emissions from projects subject to CEQA (California Air Pollution Control Officers Association, 2008).

Local Regulation of Greenhouse Gases

Monterey Bay Unified Air Pollution Control District

The project is within the jurisdiction of the Monterey Bay Unified Air Pollution Control District (MBUAPCD). The MBUAPCD has not yet adopted any CEQA based air quality significance thresholds for GHGs (Monterey Bay Unified Air Pollution Control District, 2008; Getchell, J., pers. com.).

City of Salinas

In its Final Supplement for the Salinas General Plan Final Program EIR (SEIR), the City of Salinas adopted nine mitigation measures to development projects throughout the City where feasible to reduce the cumulatively significant incremental contribution to global climate change (City of Salinas, 2007). These measures and their applicability to the Center are described in Appendix A of this report.

Salinas Ag-Industrial Center Greenhouse Gas Footprint

This section describes the Center's GHG emissions, and includes measures designed to reduce the generation of those emissions. The project's construction emissions are described, followed by the project's operational emissions. A detailed description of the methodologies and tools used to estimate GHG emissions is included in Appendix B.

Construction GHG Footprint

The project's construction-related GHG emissions are summarized in Table 2. Construction emissions would not differ between Scenarios 1 and 2. The project's infrastructure would be constructed by the end of 2010. Infrastructure related construction includes demolition, mass and fine site grading, paving of roads, and trenching with electric, gas, and water utility installation. Construction emissions would remain relatively steady between 2010 and 2014, primarily because this analysis assumes a relatively constant amount of building construction during this period, once the Center's basic infrastructure is completed. Construction GHG emissions are based on information provided in Appendix B.

Table 2. Salinas Ag-Industrial Center Greenhouse Gas Emissions from Construction

Year	Metric Tons (CO_2e)	Phase
2010	1,168	Demolition, Mass Grading, Fine Grading, Road/Parking Lot Paving, Trenching (and Wet and Dry Utilities)
2011	1,316	Building Construction, Road/Parking Lot Paving
2012	1,320	Building Construction, Road/Parking Lot Paving
2013	1,320	Building Construction, Road/Parking Lot Paving
2014	1,320	Building Construction, Road/Parking Lot Paving
Total	6,445	

Notes: Estimates based on URBEMIS2007 model. Detailed URBEMIS results found in Appendix B.
Emission estimates assume the following phasing:
Demolition for 1 week beginning January 2010;
Mass Grading for 2.5 months beginning in mid January 2010;
Fine Grading for 1 month in April 2010;
Trenching and Utilities Installation for 1 month in June 2010;
Building for 4.5 years from July 2010 through December 2014;
Asphalt Paving for 1 month in May 2010, 2011, 2012, 2013, and 2014;
A total of 125 acres assumed to be paved, with an average of 25 acres paved per year. The majority of paving in 2010 expected to be roads, while majority of paving in subsequent years expected to be parking lots.

Operational GHG Footprint – Without Reductions

Operational GHG emissions consist of area source emissions and transportation emissions. Area emissions include combustion of natural gas needed for manufacturing processes, and for space and water heating. Area source GHG emissions also include the emissions produced by the electricity generation used to supply the project. Electricity used to pump water and to treat wastewater is also considered an area source. Finally, the use of refrigerants is often considered an area source, although refrigerant use and associated emissions are shown as a separate category in the emission estimates that follow. Transportation GHG emissions consist of exhaust emissions for all vehicles that would travel to and from the land uses constituting the project.

The proposed Center would be built on land currently used for agriculture. Lettuce, cauliflower, and broccoli have historically been grown and cultivated on the site. The GHG emissions associated with these agricultural crops include tilling, planting, and harvesting with diesel powered farm equipment. The GHG emissions associated with these operations equal approximately 22 metric tons CO_2e per year, which represents less than one percent of the project's total emissions.

Table 3 summarizes the project's operational GHG emissions for Scenarios 1 and 2 in 2015, which represents the year when the project would likely be fully built-out and operating. Emissions are shown for water use, refrigerant use, area source type – natural gas and electricity – and for three types of vehicle trips: employees, field truck trips, and line haul trips. The Table 3 emissions are illustrated in Figure 3.

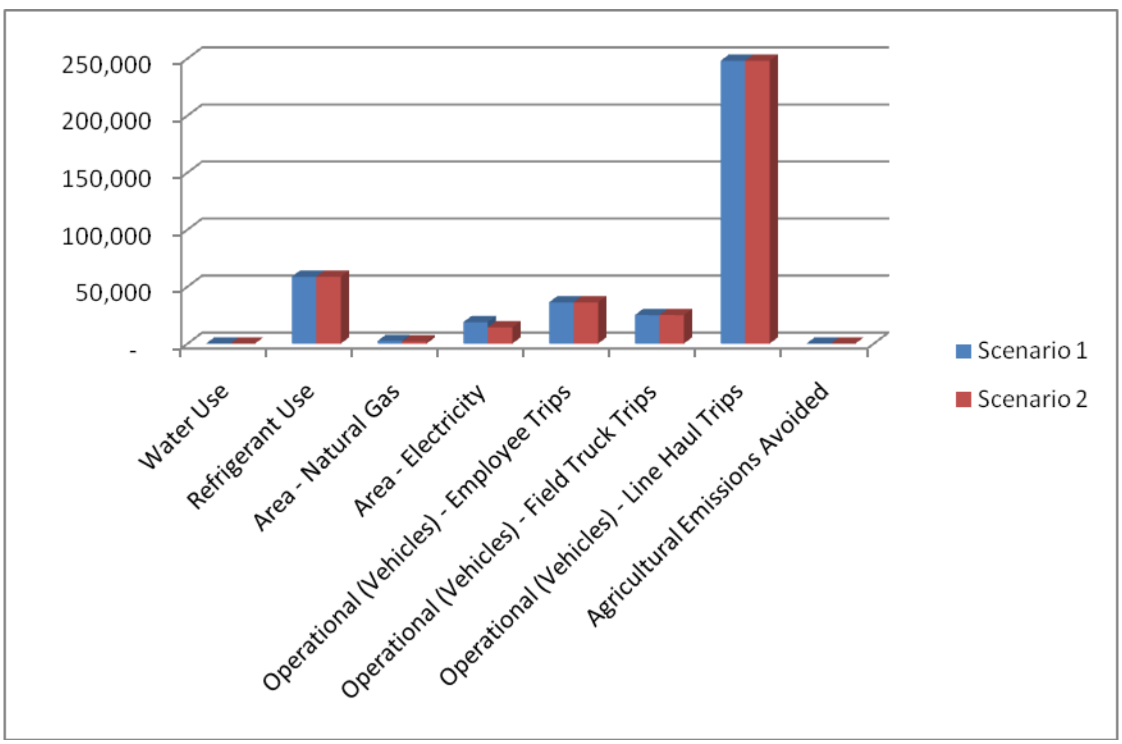
Table 3 and Figure 3 show that vehicles are the largest source of emissions. The majority of the vehicle emissions are associated with truck trips, and the majority of truck trip emissions are the result of line haul trips. Line haul trips are those that haul agricultural products to points throughout the United States. Table 3 also shows that with regard to area sources, refrigerant use is the largest source of GHG emissions. Scenario 2 has slightly lower emissions that Scenario 1, primarily because Scenario 2 has less office/visitor square footage for the agricultural support land use. The office/visitor square footage typically uses more energy than the other category, which for this land use would likely be warehouse and storage uses.

Table 3. Salinas Center Scenario 1 and 2 Operational Greenhouse Gas Emissions (without reductions)

	Scenario 1	Scenario 2
	Metric Tons CO_2e/year	Metric Tons CO_2e/year
Emission Category	Totals	Totals
Water Use	2	2
Refrigerant use	58,671	58,671
Area - Natural Gas	2,349	1,849
Area – Electricity	18,798	14,229
Operational (Vehicles) - Employee Trips	36,213	36,213
Operational (Vehicles) - Field Truck Trips	25,027	25,027
Operational (Vehicles) - Line Haul Trips	247,980	247,980
Subtotal	389,040	383,972
Agricultural Emissions Avoided	22	22
Total (Area + Operational - Agricultural)	389,017	383,949

Notes:
Emissions for 2015.
Natural gas emissions based on average natural gas use per land use type (Itron, 2006).
Electricity use based on average electricity use per land use type (Itron, 2006).
Natural gas and electricity emissions based on California Climate Action Registry Protocol (2007).
Operational vehicle trips based on URBEMIS2007 model and use building square footages and trip generation rates as reported in the project traffic report (Higgins Associates, 2008).
Operational vehicle truck only emissions use traffic report for trip generation (Higgins Associates, 2008) and Uni-Kool Partners estimates for trip lengths (Kovacich, pers. comm.).
Agricultural emissions based on emission inventory data (California Air Resources Board, 2003).

Figure 3. Comparison of Scenario 1 and 2 GHG Emissions (without reductions, metric tons CO_2e/year)



Operational GHG Footprint – With GHG Reductions

This section focuses on operational measures that can reduce GHG emissions. As noted in the previous discussion, the majority of the project's GHG emissions are associated with truck trips, especially line-haul trips. The project applicant would have no direct control over this largest source of emissions.

The project applicant has the most control over the project's water use, refrigerant use, and area source emissions, which consist of natural gas combustion and electricity use. This section focuses on ways to reduce emissions from these categories.

Relationship to Salinas General Plan

The City of Salinas' Final Supplement for the Salinas General Plan Final Program EIR (Salinas, 2007) addresses global climate change. The document recommends that nine mitigation measures "be applied to development projects throughout the City of Salinas where feasible to reduce the cumulatively significant incremental contribution to global climate change." Appendix A discusses the applicability of the Salinas General Plan to the Ag-Industrial Center.

GHG Reduction Measures Included in the Ag-Industrial Center Specific Plan

For most land use development projects, energy efficiency improvements have the potential to substantially reduce GHG emissions. For the proposed project, improvements in refrigerant use also have the potential to reduce GHG emissions. The measures shown in Table 4 are taken from the Salinas Ag-Industrial Center Specific Plan's Green Building Plan, and have been applied to the representative buildout Scenarios shown in Table 1.

Table 4. Ag-Industrial Center Specific Plan GHG Reduction Measures

Measure	Quantification Method
1) Individual developers within the Plan Area will be required to perform fundamental commissioning of the building energy systems for the office employee/visitor areas of the building.	This measure is designed to verify that the building's energy related systems are installed, calibrated, and perform according to the owner's project requirements, basis of design, and construction documents. As such, this measure itself would not result in GHG emission reductions, but would ensure that the building meets its estimated emission target. Consequently, GHG emission reductions were not quantified for this measure.
2) All heating, ventilation, air conditioning, and refrigeration (HVAC&R) units within the Specific Plan Area will use zero CFC-based refrigerants. This excludes small HVAC&R units such as refrigerators, small water coolers, and other cooling equipment that	GHG emission reductions were quantified for this measure. The analysis assumes that without this measure, there would be 5 major users of CFC's using a total of 70,000 pounds

Measure	Quantification Method
contains less than 0.5 pounds of refrigerant	CFC's per year with a leakage rate of 24.5%. With this measure in place, the analysis assumes that 3 major users would use non-GWP refrigerants and that 2 users would use HFC refrigerants. By prohibiting CFCs, and by encouraging non-GWP refrigerants, such as ammonia, the project would reduce the amount of GHG gases that could potentially be emitted during operation.
3) Install light emitting diodes (LEDs) and fluorescent lighting for indoor lighting in all employee/visitor areas, where feasible in other building areas and for outdoor lighting.	GHG emission reductions were estimated by assuming 90% of office/visitor space would be illuminated by fluorescent lighting and 10% by LED's. LED's are assumed to result in a 50% reduction in energy demand compared to fluorescent lighting (TheDailyGreen.com, 2007). The analysis also assumes that 5% of the "remainder" areas will use LEDs and that 10% of all outdoor lighting will use LEDs.
4) Natural lighting shall be used, where feasible, to reduce indoor lighting requirements.	GHG emission reductions were not quantified for this measure. To estimate potential energy savings associated with natural lighting, detailed energy estimates would need to be conducted for individual buildings that are in the design stage. Such estimates are not possible at a Specific Plan level of analysis.
5) The office employee/visitor areas of buildings within the Plan Area will achieve optimized energy performance by complying with the prescriptive measures of the ASHRAE Advanced Energy Design Guide for Small Office Buildings (2004).	A total building area of 1,874,794 square feet is assumed to be employee/visitor office space for Scenario 1, and 1,020,594 square feet for Scenario 2. For this area, the analysis assumes a 30% reduction in energy use (electricity and natural gas) based on AHRAE's guidance (2004).
6) The installation of photovoltaic panels, wind turbines, solar water heaters, fuel cells, and other renewable energy sources are allowed on roofs and in other areas	At this time it is not known which, if any, land uses will install renewable energy sources. Potential applicants

Measure	Quantification Method
of the sites.	would need to evaluate the financial feasibility of renewable resources before installing them. Appendices C and D of this report describe the financial feasibility of using solar power and wind power for the Center. These analyses show that neither solar nor wind power are viable options for meeting the Center's estimated energy requirements. Consequently, GHG emission reductions were not quantified for this measure.
7) Food processing and related facilities shall utilize Industrial Best Practices as discussed in "California's Food Processing Industry Energy Efficiency Initiative: Adoption of Industrial Best Practices", California Energy Commission publication CEC 400-2008-006 (California Energy Commission, 2008a). This document encourages adoption of Industrial Best Practices to advance energy efficiency in the food processing industry. The California League of Food Processors works with investor and publicly owned utilities to hold training workshops and support the delivery of energy system assessments to their customers.	Industrial Best Practices include energy efficiency training workshops, and energy system assessments of motors, pumps, and fans; and steam, process heating, and compressed air systems. Best Practices require reviewing and updating food processing facilities on a regular basis to ensure that they are up-to-date with regard to the latest developments in energy efficiency. GHG emission reductions were not quantified for this measure due to the difficulty in estimating how much energy savings would result from these Best Practices.
8) Planting within the Landscape Buffer Areas to provide shade for public sidewalks	The GHG emissions sequestered by tree plantings were quantified for this analysis.
9) Planting within the employee/visitor parking lots to shade portions of the paved areas. Tree planting can be used to remove or sequester CO_2 from the atmosphere. The project developer(s) will plant a minimum of 400 trees on site. These 400 trees will be placed within the enhanced streetscape described in the Specific Plan.	The GHG emissions sequestered by tree plantings were quantified for this analysis using a methodology developed by the U.S. Department of Energy (2006).
10) Light colored, solar reflecting roofing materials and/or coatings have a reflectance of 0.3 or higher shall be used for the individual, flat-roofed industrial buildings with roof area of 5,000 square feet or more.	Cool roofs are estimated to reduce emissions by 2.6 Btu per square foot per year (Levinson, et. al. 2005). This reduction is included in the GHG reduction estimates.
11) Water conservation measures to reduce water usage in all restrooms and break rooms by a minimum of 30%	Reduced water use reduces electrical energy demand associated with water

Measure	Quantification Method
through the use of water conserving fixtures.	pumping, water treatment, and wastewater treatment. GHG emission reductions were quantified for this measure using water use estimates included in the Water Supply Assessment for the Center (Yarne, J., 2009).
12) Measures to encourage alternative commuter transportation to work, such as Class 2 bicycle lanes, two new Monterey-Salinas Transit bus shelters and bus stops, and preferential parking.	These measures would reduce the number of automobile work commute trips. GHG emission reductions were quantified for this measure using the URBEMIS2007 model (see Appendix B).
13) Transportation emission reductions associated with the California Air Resources Board's proposed AB32 Truck Efficiency Rule, enacted in December 2008. This rule would require that all long haul trucks be installed with SmartWay approved technologies capable of reducing GHG emissions by 8 to 11 percent. The rule would require that all long haul trucks doing business in California comply by 2014. This analysis assumes a 10% reduction in GHG because all long haul trucks operating in California would be required to comply with this proposed rule (U.S. Environmental Protection Agency, 2008b; California Air Resources Board, 2008b). (Note: This is a proposed statewide rule and would not be an enforcement responsibility of either the City of Salinas or the Ag-Industrial Center).	This measure, though not part of the Ag-Industrial Center Specific Plan, would reduce emissions from long-haul trucks and is included in the GHG reduction calculations. A 10% reduction in long haul truck emissions is assumed.
14) Transportation emission reductions associated with the California Air Resources Board's Low Carbon Fuels Standard (LCFS), enacted in April, 2009. The LCFS will reduce carbon emissions from all motor vehicles by 10% by 2020. The analysis assumes a 2.5% reduction from all vehicles by 2015, the assumed buildout year for the Industrial Center.	This measure, though not part of the Ag-Industrial Center Specific Plan, would reduce emissions from all vehicles – employee trips, field trucks, and line-haul trucks - and is included in the emission calculations. A 2.5% reduction in vehicle emissions is assumed for 2015, based on the ramp-in provisions of the LCFS.
15) The project's location on the southern outskirts of Salinas would result in the consolidation of agricultural processing facilities from locations throughout the Salinas area. The Center would be located closer to the primary agricultural producing areas of the Salinas Valley. Consequently, by reducing travel distance, the	Based on truck travel distances stated in the traffic analysis, the average one-way truck travel distance for field trucks and line haul trucks was assumed to be reduced by 4 miles. This was applied to the average truck travel distance,

Measure	Quantification Method
Center would reduce field truck and line haul truck vehicle miles traveled.	resulting in a reduction of 11.4 percent in one way trip travel distance for field truck trips and a 2.9 percent reduction for line haul truck trips.

Table 5 shows reduced emissions for Scenarios 1 and 2, which are based on the measures discussed above in Table 4.

Table 5. Salinas Center Scenario 1 and 2 Operational Greenhouse Gas Emissions (GHG reduction measures applied)

	Scenario 1	Scenario 2
	Metric Tons CO_2e/year	Metric Tons CO_2e/year
Emission Category	Totals	Totals
Water Use	2	2
Refrigerant Use	11,547	11,547
Area - Natural Gas	1,901	1,618
Area – Electricity	14,026	11,235
Operational (Vehicles) - Employee Trips	34,011	34,011
Operational (Vehicles) - Field Truck Trips	20,123	20,123
Operational (Vehicles) - Line Haul Trips	199,101	199,101
Agricultural Emissions Avoided	22	22
Total (Area + Operational - Agricultural)	280,690	277,615
Carbon Sequestration from Trees	11	11
Total (Area + Operational -Ag) – Sequestration	280,678	277,604
Percent Reduction	28%	28%

Notes:

Water use in this table assumes 30% reduction in kitchen and restroom water use only.

Refrigerant estimates in Table 3 assume all 5 major users would use CFCs. Refrigerant use in this table assumes that 2 of 5 major users use HFC refrigerants and 3 of 5 use refrigerants having no global warming potential.

Natural gas and electricity emissions adjusted to account for "Cool Roofs" and compliance with ASHRAE Advanced Energy Design Guide for Small Office Buildings.

Electricity use also assumes a reduction in GHGs for the use of LED lighting indoors and outdoors.

Operational vehicle trips based on URBEMIS2007 model and use building square footages and trip generation rates as reported in the project traffic report (Higgins Associates, 2008).

Operational vehicle truck only emissions use traffic report for trip generation (Higgins Associates, 2008) and Uni-Kool Partners estimates for trip lengths (Kovacich, pers. comm.).

Operational emissions in this table assume 80.2% of VMT is line-haul and that a 10% reduction is achieved for line-haul based on ARB's truck efficiency rule.

Operational emissions in this table also assume that all vehicular emissions reduced by 2.5% by 2015 based on ARB's Low Carbon Fuels Standard.

Employee trip emissions in this table assume a reduction as calculated by URBEMIS2007 associated with measures to encourage alternative commuter transportation to work, including Class 2 bicycle lanes, two new Monterey-Salinas Transit bus shelters and bus stops, and preferential parking.

Detailed emission estimates are included in Appendix B.

Carbon sequestration based on U.S. Department of Energy, Energy Information Administration Urban Forestry Carbon Sequestration Worksheet

Figure 4 shows a bar graph that compares both scenarios with and without GHG reductions. Scenario 1 would have slightly higher electricity and natural gas use compared to Scenario 2. Under both scenarios, the largest percentage of emission reductions results from reduced use of refrigerants with a high global warming potential. Proposed reduction measures will reduce GHG emissions by 28 percent for Scenarios 1 and Scenario 2, as compared to the measurements without reductions.

Figure 4. Comparison of Scenario 1 and 2 GHG Emissions with and without Reductions (metric tons CO_2e/year)

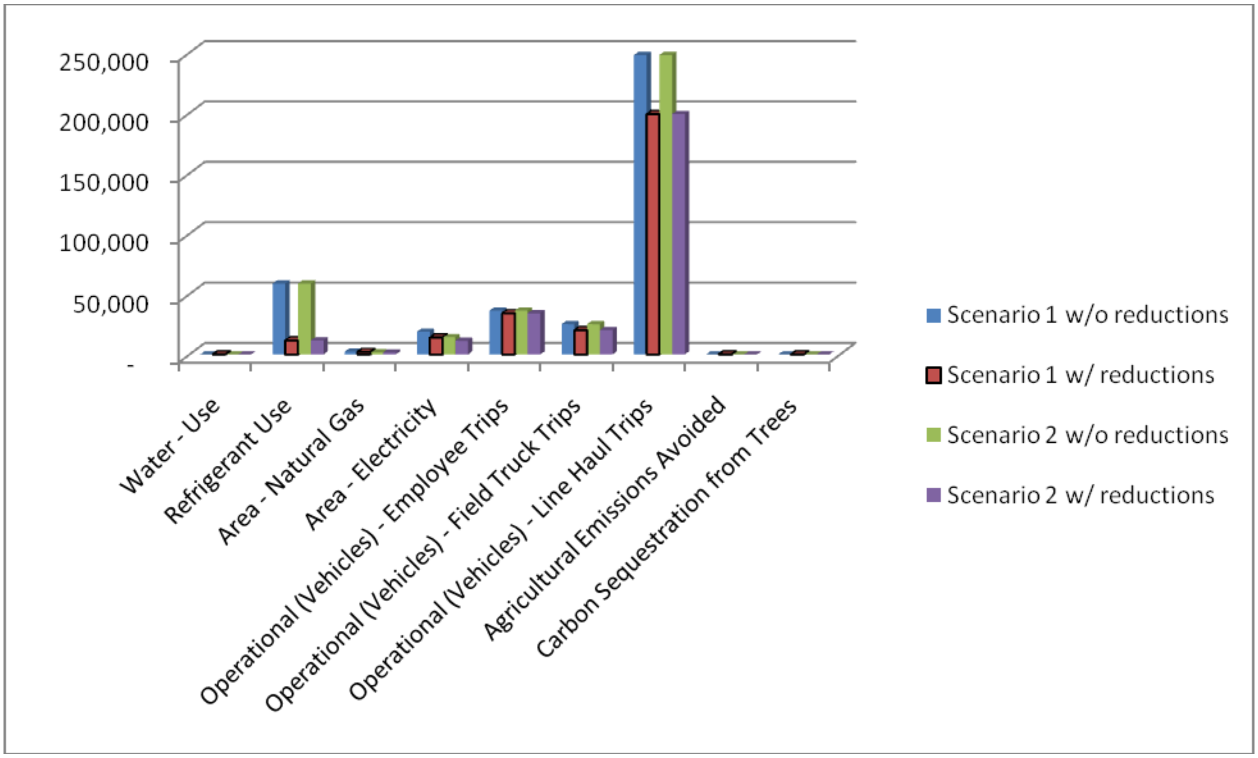


Table 6 contains the same information as Tables 3 and 5 except that line field truck and haul truck emissions have been removed. Field and line haul trucks represent almost 80 percent of the Center's total emissions. Measures included in the Ag-Industrial Center Specific Plan, combined with the Center's location in the southern portion of Salinas, would result in an overall GHG emission reduction ranging from 47 percent for Scenario 1 and 47.4 percent for Scenario 2, when field and line haul trucks are omitted from the total.

Note that the reductions are calculated using two representative buildout scenarios. The reductions shown in this analysis are intended to demonstrate the potential savings that can be achieved at ag-industrial facilities. The Salinas Ag-Industrial Center Specific Plan's Land Use chapter identifies allowable uses within the Plan Area while providing flexibility in the mix and intensity of those uses. All project applicants within the Center will be subject to the Specific Plan's Green Building Plan, and GHG reductions will vary based on the actual uses operating at the site. Consequently, reductions calculated for Scenarios 1 and 2 in this analysis cannot be used as a threshold, or for comparative measure.

Table 6. Salinas Ag Industrial Center Scenario 1 and 2 With and Without Reductions, Without Field and Line Haul Trucks (CO2e metric tons/year)

	Scenario 1			Scenario 2		
	Without GHG Reductions	With GHG Reductions	% Reduction	Without GHG Reductions	With GHG Reductions	% Reduction
Water Use	2	2	2.7%	2	2	2.7%
Refrigerant Use	58,671	11,547	80.3%	58,671	11,547	80.3%
Area - Natural Gas	2,349	1,901	19.1%	1,849	1,618	12.5%
Area - Electricity	18,798	14,026	25.4%	14,229	11,235	21.0%
Operational (Vehicles) - Employee Trips	36,213	34,011	6.1%	36,213	34,011	6.1%
Agricultural Emissions Avoided	22	22		22	22	0.0%
Total (Area + Operational - Agricultural)	116,011	61,465	47.0%	110,943	58,390	47.4%
Carbon Sequestration from Trees	-	11	0.0%	11	11	0.0%
Total (Area + Operational) - Sequestration	116,011	61,454	47.0%	110,954	58,379	47.4%
Notes: Emissions identical to Table 5 except that field truck and line-haul truck emissions have been removed.						

Global climate change represents a worldwide concern. No single project generates GHG emissions in sufficient amounts to cause climate change. Instead, climate change is attributable to the cumulative emissions of millions of sources throughout the world.

Table 7 compares the Center's GHG emissions (shown in Tables 2, 3, 5, and 6) to emissions for California, the United States, and worldwide. When fully built out and operating, the Center would generate approximately 0.05 percent of total California GHG emissions, and a substantially lower percentage of national and worldwide emissions.

Table 7. Comparison of the Center's Greenhouse Gas Emissions to State, National, and Worldwide Estimates

Project or Area	**Metric Tons/Year CO_2e**
Construction Cumulative (2010-2014)	6,445
Operational without GHG reductions (2015)	383,949 – 389,017
Operational with GHG reductions (2015)	277,604 – 280,678
Operational w/o GHG reductions and w/o field and line haul trucks (2015)	110,954 – 116,011
Operational w/ GHG reductions and w/o field and line haul trucks (2015)	58,379 – 61,454
California (2004)	523,900,000
United States (2006)	6,326,491,790
Worldwide (2006)	36,000,000,000

Notes:
Emissions for California from California Air Resources Board's Draft California Greenhouse Gas Inventory (California Air Resources Board, 2007).
U.S emissions based on Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2006 (U.S. EPA, 2008a)
Worldwide emissions based on World Resources Institute (2008).

The Center's Green Building Plan contains an extensive set of GHG reduction strategies. They represent a "state of the art" Plan that is the first known attempt to incorporate a comprehensive set of GHG reducing energy efficiency standards into an agricultural industrial planning area anywhere in the United States.

The Plan ensures that development within the Center will meet strict energy efficiency and refrigerant standards that minimize GHG emissions. The Green Building Plan, by requiring a wide-ranging set of GHG reducing strategies, places the Center solidly in the forefront as a state and national leader for agricultural industrial developments.

Uni-Kool wants to assist the City of Salinas in meeting its GHG reduction goals. Consequently, Uni-Kool will work closely with its clients to ensure that they comply with the Green Building Plan described in the Salinas Ag-Industrial Specific Plan. By doing so, the Ag-Industrial Center's GHG emission footprint will be reduced to the maximum extent possible.

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Appendix A. Applicability of the Salinas General Plan Final Program EIR to the Salinas Ag-Industrial Center

This appendix lists each of the nine greenhouse gas mitigation measures included in the Salinas General Plan Supplemental Environmental Impact Report (SEIR) and discusses the applicability of each measure to the Salinas Ag-Industrial Center Specific Plan.

Measure 1. Within 36 months, the City shall establish a global climate change action plan that includes a baseline inventory of all GHG emissions associated with all residences, businesses, industries, agriculture, municipal operations, and other sources within the City limits, establishment of a GHG emissions reduction target; development of enforceable, feasible emissions reduction measures to meet the established target; and performance monitoring of the GHG emissions reduction measures shall occur every 3 years to ensure the emission reductions are being achieved.

Applicability of Measure 1 to Project:

Measure 1 describes the City of Salinas' climate change action plan goals and is not applicable to the Salinas Ag-Industrial Center.

Measure 2. Prioritized parking within new commercial and retail areas shall be given to electric vehicles, hybrid vehicles, and alternative fuel vehicles.

Applicability of Measure 2 to Project:

Measure 2 applies to the entire project area, including agricultural-industrial land uses. Specific Plan Section 7.5.1.3 establishes, for sites with 10 or more required visitor/employee parking spaces, a 10% minimum requirement for preferred use by carpool, vanpool and alternative fuel vehicles and requires provision of an alternative fueling system, such as an electric vehicle charging area, for at least one employee visitor vehicle. The GHG emission reductions associated with this measure were included in the analysis, as described in Table 4, measure 12.

Measure 3. The City shall require that new or major rehabilitation (additions of 25,000 square feet of office/retail commercial or 100,000 square feet of industrial floor area) or residential projects of 6 units or more comply with at least one of the following:

- **Participate in the CEC's New Solar Homes Partnership (this program provides rebates to developers of 6 units or more who offer solar power in 50 percent of new units), or a similar program with solar power requirements equal to or greater than those of the CEC's New Solar Homes Partnership as demonstrated to the City by the project applicant.**
- **Design and construct 50 percent of the square footage of the building(s) to be capable of being certified under either the Leadership in Energy and Environmental Design (LEED) or equivalent building rating system: LEED for New Construction; LEED for Existing Buildings, LEED for Homes, LEED for Core and Shell, or any Application**

Guides of these rating systems. However, no formal LEED certification shall be required, and the City Manager or his/her designee shall make the determination that the potential for LEED certification has been achieved. All credits used to demonstrate capability to meet one of the above certifications must directly or indirectly result in a reduction in GHG emissions.

<u>**Applicability of Measure 3 to Project**</u>:
Measure 3 requires that fifty percent of the Project's building square footage be required to meet LEED building rating systems. The Specific Plan anticipates that the majority of the Center's uses will be processing and/or cooling facilities which include large areas for operations and a small proportion of office space. This configuration will make it impossible to achieve the applicable LEED certification.

The Specific Plan's Green Building Plan (GBP) identifies measures to reduce GHGs within the Ag-Industrial Center. The GBP is tailored to the uses within the Plan Area, and requires that users optimize energy performance within office employee/visitor areas of buildings. The GHG analysis assumed an emission reduction credit of 30% for the office/visitor square footage portion of total Center square footage. For Scenario 1, this includes 44% of total building square footage, while for Scenario 2, this includes 24% of total building square footage. Please refer to Table 4, measure 5.

Measure 4. The City shall require that new or major rehabilitation (additions of 25,000 square feet of office/retail commercial or 100,000 square feet of industrial floor area) of commercial, office, or industrial development greater than or equal to 25,000 square feet in size must incorporate renewable energy generation (on- or off-site) to provide 15 percent or more of the project's energy needs.

<u>**Applicability of Measure 4 to Project**</u>:
The Specific Plan allows renewable energy generation projects within the Center and permits photovoltaic panels, wind turbines, solar water heaters, fuel cells, and other renewable energy sources to be installed on roofs of individual projects or in other areas of sites outside of the required yards. None of these applications are required within the Center, primarily because of the cost of these systems. Appendix C evaluates the feasibility of using solar power to supply 15% of the Center's anticipated energy demand Appendix D evaluates the feasibility of using wind power to supply 15% of the Center's energy demand. Appendices C and D demonstrate that neither solar nor wind power can be used to cost-effectively meet 15% of the Center's large expected energy demand.

Measure 5. The City shall require that new development in excess of 10 acres in size be capable of meeting the certification requirements of the LEED for Neighborhood Development Rating System Pilot Version (February 2007) ("LEED ND"). However, no formal certification shall be required, and the City Manager or his/her designee shall make the determination that the potential for certification has been achieved. All credits used to demonstrate capability to meet the LEED ND certification must directly or indirectly result in a reduction in GHG emissions.

<u>Applicability of Measure 5 to Project:</u>
Measure 5 is not applicable to the project. LEED ND, though not designed to be exclusively applied to residential, is primarily for residential and mixed use developments that include residential and commercial-retail.

Measure 6. The City shall require that the design or purchase of any new street lights and water and wastewater pumps and treatment systems achieve a 10 percent reduction beyond an estimated baseline energy use for this infrastructure. All new traffic lights installed within Salinas shall use LED technology.

<u>Applicability of Measure 6 to Project:</u>
Measure 6 is the City of Salinas' responsibility and not directly applicable to the Project. The Specific Plan proposes formation of a Landscape and Lighting Maintenance District which will implement this Measure as it installs and maintains street lighting within the District (Plan Area). Existing City policy requires the use of LED technology for new traffic lights.

In addition, the Green Building Plan requires that LEDs and/or fluorescent lighting be installed in all employee/visitor areas, whenever practicable in other building areas, and for outdoor lighting, when feasible. The GHG emission reductions associated with this measure were included in the analysis, as described in Table 4, measure 3.

Measure 7. The City shall require all new development or major rehabilitation (additions of 25,000 square feet of office/retail commercial or 100,000 square feet of industrial floor area) projects to recycle and/or salvage at least 50 percent of nonhazardous construction and demolition debris. To implement this requirement, a construction waste management plan identifying materials to be diverted from disposal and whether the materials will be stored on-site or commingled shall be developed and implemented by the applicant for said development or rehabilitation. Excavated soil and land-clearing debris do not contribute to this credit. Calculation can be done by weight or volume but must be consistent throughout.

<u>Applicability of Measure 7 to Project:</u>
Measure 7 is applicable to the Plan Area and has the potential to reduce GHG emissions during construction. The Specific Plan includes measures designed to ensure that at least 50% of non-hazardous construction waste is recycled, when feasible. Although this measure would potentially reduce vehicle trips and associated GHG emissions, the exact amount of GHG emissions reduced cannot be calculated because of the difficulty in estimating how many vehicle trips would be avoided.

Measure 8. The City shall require all new development and major rehabilitation (additions of 25,000 square feet of office/retail commercial or 100,000 square feet of industrial floor area) projects to incorporate any combination of the following strategies to reduce heat gain for 50 percent of the non-roof impervious site landscape (including roads, sidewalks, courtyards, parking lots, and driveways):

- **Shaded (Within 5 years of occupancy)**
- **Paving materials with a Solar Reflective Index (SRI) of at least 29**
- **Open grid pavement system**
- **Parking spaces under cover (defined as underground, under deck, under roof, or under building.) Any roof used to shade or cover parking must have an SRI of at least 29.**

Applicability of Measure 8 to Project: Although all buildings within the Center will be installed with cool roofs, the Center would not include significant amounts of shading. Specific Plan policies will result in some shading of non-roof impervious surfaces but the extent of shading will be minimal relative to the expected total amount of impervious area. The Specific Plan does not provide for open grid pavement systems or parking spaces under cover, nor does it require paving materials with an SRI of at least 29 for 50% of non-roof impervious vehicular travel, parking, or loading areas. Using paving materials with an SRI of at least 29, such as concrete, would triple the costs required to pave the parking areas. This represents an unaffordable cost increase because of the large parking areas that will be needed to accommodate field trucks and line haul trucks. Appendix E documents the added costs of using concrete instead of asphalt for the Center.

Measure 9. The City shall require all new development and major rehabilitation (additions of 25,000 square feet of office/retail commercial or 100,000 square feet of industrial floor area) projects incorporate "green building" points in construction plans prior to issuing a permit to build. Such points may be achieved through checklists identified by New Home Construction Green Building Guidelines available at www.builditgreen.org, or through a similar list that distinguishes specific measures targeting efficiencies in energy, resource use, or other measures that would also directly or indirectly result in GHG emission reductions. Specific efficiencies that would reduce GHG emissions shall be implemented where feasible for all project areas including site design, landscaping, foundation, structural frame and building envelope, exterior finishing, plumbing, appliance use, insulation, heating, venting and air conditioning, building performance, use of renewable energy, finishes, and flooring.

Applicability of Measure 9 to Project: The BuilditGreen web site referenced in this measure applies only to residential construction and thus provides no guidance for the uses proposed in the Plan Area. Section 7.5 of the Specific Plan requires that the commercial and industrial projects within the Plan Area incorporate energy efficient design and allows renewable energy generation facilities that are appropriate to Plan Area land uses. These measures are described in Table 4 of this analysis (see measures 3, 4, 5, 6, 7, 10, 11, and 12). Emission reductions are shown in Table 5.

Appendix B. Construction and Operational GHG Emission Estimates

Construction Emissions

Construction Emissions Estimation Methodology

Construction emission estimates are summarized in the table below. These emissions were based on the URBEMIS2007 model, version 9.2.4. The detailed modeling assumptions and emission results are summarized in the URBEMIS output shown below.

Year	Metric Tons (CO_2e)	Annual Construction Activities
2010	1,168	Demolition, Mass Grading, Fine Grading, Road Asphalt Paving, Trenching (and Wet and Dry Utilities)
2011	1,316	Building Construction, Road/Parking Lot Paving
2012	1,320	Building Construction, Road/Parking Lot Paving
2013	1,320	Building Construction, Road/Parking Lot Paving
2014	1,320	Building Construction, Road/Parking Lot Paving
Total	6,445	

Notes: Estimates based on URBEMIS2007 model. Assumes default construction equipment list by phase as generated by URBEMIS2007.
Emission estimates assume the following phasing:
Demolition for 1 week beginning January 2010;
Mass Grading for 2.5 months beginning in mid January 2010;
Fine Grading for 1 month in April 2010;
Trenching and Utilities Installation for 1 month in June 2010;
Building for 4.5 years from July 2010 through December 2014;
Asphalt Paving for 1 month in May 2010, 2011, 2012, 2013, and 2014;
A total of 125 acres assumed to be paved, with an average of 25 acres paved per year. The majority of paving in 2010 expected to be roads, while majority of paving in subsequent years expected to be parking lots.

Construction Emission URBEMIS Results

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Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Documents and Settings\Tim Rimpo\Application Data\Urbemis\Version9a\Projects\Uni-Kool Revised Construction Only.urb924

Project Name: Salinas Ag-Industrial Revised Construction GHG

Project Location: Monterey County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES		Metric
	CO2	CO2
2010 TOTALS (tons/year unmitigated)	1,287.54	1,168.37
2011 TOTALS (tons/year unmitigated)	1,450.50	1,316.24
2012 TOTALS (tons/year unmitigated)	1,454.81	1,320.16
2013 TOTALS (tons/year unmitigated)	1,454.83	1,320.17
2014 TOTALS (tons/year unmitigated)	1,454.84	1,320.18

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	CO2	
2010		1,287.54
Demolition 01/04/2010-01/09/2010		12.13
Fugitive Dust	0.00	
Demo Off Road Diesel	10.33	
Demo On Road Diesel	1.47	
Demo Worker Trips	0.33	
Mass Grading 01/11/2010-03/26/2010		250.43
Mass Grading Dust	0.00	
Mass Grading Off Road Diesel	243.18	
Mass Grading On Road Diesel	0.00	
Mass Grading Worker Trips	7.25	
Fine Grading 03/29/2010-04/30/2010		113.83
Fine Grading Dust	0.00	
Fine Grading Off Road Diesel	110.54	
Fine Grading On Road Diesel	0.00	
Fine Grading Worker Trips	3.30	
Asphalt 05/03/2010-05/28/2010		331.79
Paving Off-Gas	0.00	

	Paving Off Road Diesel	12.72	
	Paving On Road Diesel	317.75	
	Paving Worker Trips	1.32	
	Trenching 06/01/2010-06/30/2010		20.02
	Trenching Off Road Diesel	18.86	
	Trenching Worker Trips	1.16	
	Building 07/05/2010-12/31/2014		559.31
	Building Off Road Diesel	146.85	
	Building Vendor Trips	399.91	
	Building Worker Trips	12.55	
	Coating 09/07/2010-12/05/2014		0.02
	Architectural Coating	0.00	
	Coating Worker Trips	0.02	
2011			1,450.50
	Building 07/05/2010-12/31/2014		1,118.64
	Building Off Road Diesel	293.71	
	Building Vendor Trips	799.85	
	Building Worker Trips	25.08	
	Coating 09/07/2010-12/05/2014		0.07
	Architectural Coating	0.00	
	Coating Worker Trips	0.07	
	Asphalt 05/02/2011-05/27/2011		331.79
	Paving Off-Gas	0.00	
	Paving Off Road Diesel	12.72	
	Paving On Road Diesel	317.75	
	Paving Worker Trips	1.32	
2012			1,454.81
	Building 07/05/2010-12/31/2014		1,122.95
	Building Off Road Diesel	294.84	
	Building Vendor Trips	802.96	
	Building Worker Trips	25.16	
	Coating 09/07/2010-12/05/2014		0.07
	Architectural Coating	0.00	
	Coating Worker Trips	0.07	
	Asphalt 05/07/2012-06/01/2012		331.79
	Paving Off-Gas	0.00	
	Paving Off Road Diesel	12.72	
	Paving On Road Diesel	317.75	
	Paving Worker Trips	1.32	
2013			1,454.83
	Building 07/05/2010-12/31/2014		1,122.97
	Building Off Road Diesel	294.84	
	Building Vendor Trips	802.99	
	Building Worker Trips	25.15	
	Coating 09/07/2010-12/05/2014		0.07
	Architectural Coating	0.00	
	Coating Worker Trips	0.07	

	Asphalt 05/06/2013-05/31/2013		331.79
	Paving Off-Gas	0.00	
	Paving Off Road Diesel	12.72	
	Paving On Road Diesel	317.75	
	Paving Worker Trips	1.32	
2014			1,454.84
	Building 07/05/2010-12/31/2014		1,122.99
	Building Off Road Diesel	294.84	
	Building Vendor Trips	803.01	
	Building Worker Trips	25.14	
	Coating 09/07/2010-12/05/2014		0.06
	Architectural Coating	0.00	
	Coating Worker Trips	0.06	
	Asphalt 05/05/2014-05/30/2014		331.79
	Paving Off-Gas	0.00	
	Paving Off Road Diesel	12.72	
	Paving On Road Diesel	317.75	
	Paving Worker Trips	1.32	

Phase Assumptions

Phase: Demolition 1/4/2010 - 1/9/2010 - Type Your Description Here
Building Volume Total (cubic feet): 50000
Building Volume Daily (cubic feet): 10000
On Road Truck Travel (VMT): 138.89
Off-Road Equipment:
3 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day
2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

Phase: Fine Grading 3/29/2010 - 4/30/2010 - Type Your Description Here
Total Acres Disturbed: 257
Maximum Daily Acreage Disturbed: 64.25
Fugitive Dust Level of Detail: Default
20 lbs per acre-day
On Road Truck Travel (VMT): 0
Off-Road Equipment:
1 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day
1 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day
1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day
3 Scrapers (313 hp) operating at a 0.72 load factor for 8 hours per day
3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day
1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Mass Grading 1/11/2010 - 3/26/2010 - Default Fine Site Grading Description
Total Acres Disturbed: 257
Maximum Daily Acreage Disturbed: 64.25
Fugitive Dust Level of Detail: Default
20 lbs per acre-day

On Road Truck Travel (VMT): 0
Off-Road Equipment:
1 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day
1 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day
1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day
3 Scrapers (313 hp) operating at a 0.72 load factor for 8 hours per day
3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day
1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Trenching 6/1/2010 - 6/30/2010 - Includes Wet and Dry Utilities
Off-Road Equipment:
2 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day
1 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 0 hours per day

Phase: Paving 5/3/2010 - 5/28/2010 - Paving Road Network
Acres to be Paved: 25
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Paving 5/2/2011 - 5/27/2011 - Type Your Description Here
Acres to be Paved: 25
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Paving 5/7/2012 - 6/1/2012 - Type Your Description Here
Acres to be Paved: 25
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Paving 5/6/2013 - 5/31/2013 - Type Your Description Here
Acres to be Paved: 25
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Paving 5/5/2014 - 5/30/2014 - Type Your Description Here
Acres to be Paved: 25
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 7/5/2010 - 12/31/2014 - Default Building Construction Description

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day

3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 9/7/2010 - 12/5/2014 - Default Architectural Coating Description

Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 100

Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Operational Emissions – Vehicles

The URBEMIS2007 model was used to estimate CO_2 emissions associated with all vehicle trips. The trip generation rates input into URBEMIS were based the rates included in the project traffic report (Higgins and Associates, 2008).

The average one way distance for each of these truck trips was estimated by determining the percentage of trips originating from zones around the proposed project. Table B-1 shows those distances, the percentage originating from each distance, and the average one-way truck trip distance for line haul trucks, while Table B-2 shows distances for field trucks. Table B-3 shows the weighted average distances for line-haul and field trucks. This weighted average trip distance was input into URBEMIS as the average truck trip length.

Table B-1. Average One-Way Truck Travel Distances for Line Haul Trucks

Trip Distance - Line Haul	One Way Miles	Maximum Daily One Way Miles	% of Trips	Trip Distance Weighted One-Way
Salinas – LA	312	312	0.35	109.2
Salinas - San Fran	100	100	0.5	50
Salinas - St. Louis	2050	480	0.15	72
			1	231.2

Table B-2 Average One-Way Truck Travel Distances for Field Trucks

Trip Distance - Field Trucks	One Way Miles	% of Trips	Average One-Way
0-10	5	0.25	1.25
10-50	30	0.5	15
50-100	75	0.25	18.75
		1	35

Table B-3. Weighted Average Truck Trip Travel Distance

Field Trip Distance Weighted Average (40%)	14.0
Line Haul Distance Weighted Average (60%)	138.7
Sum of Weighted Average	152.7

Table B-4 shows the total vehicle miles traveled for truck trips. These values are used to calculate methane and nitrous oxide emissions associated with diesel fuel use. Total VMT/year assumes 365 days per year, although actual number of days per year is expected to be lower.

Table B-4. Truck Trip Travel Distance

Daily Trips Line Haul	Daily Trips Field Trucks	VMT/day Field Trucks	VMT/Day Line Haul	Total VMT/Day	Total VMT/Year
3503	2336	81,745	809,877	891,722	325,478,709

Table B-5 summarizes greenhouse gas emissions in metric tons per year. CO_2 emissions are based on URBEMIS modeling results in tons per year, converted to metric tons per year. CH_4 emissions assume 0.06 grams methane per mile traveled while N_2O emissions assume 0.05 grams nitrous oxide per mile traveled. CH_4 is converted to CO_2 equivalence by multiplying CH_4 metric tons per year by 21, while N_2O is converted to CO_2 equivalence by multiplying N_2O metric tons per year by 310 (California Climate Action Registry, 2009).

Table B-5. Transportation Greenhouse Gas Emissions (metric tons/year)

	CO_2	CH_4	N2O
Emission Rates	from EMFAC2007	0.06 grams/mile	0.05 grams/mile
metric tpy	303,045	22.11	18.42
CO_2e unmitigated	309,220		

Total CO2e emissions were then divided into emissions by the three vehicle classes based on VMT as follows:

Emissions Itemized by Trip Type	Daily VMT	CO2e Emissions (Unmit)	% of Total
Employee Trips	118,284	36,213	11.71%
Field Trucks	81,745	25,027	8.09%
Line Haul	809,977	247,980	80.20%
	1,010,006	309,220	100.00%

Table B-6 shows the first step in the vehicle emissions mitigation. First, mitigated VMT for trucks were estimated using the reduction in average trip length of 4 miles per trip.

Table B-6. Mitigated VMT assumes 4 mile reduction for field truck trips and line haul truck trips.

Daily Trips Line Haul	Daily Trips Field Trucks	Total Trips/day Line+Field	VMT/day Field Trucks	VMT/Day Line Haul	Total VMT/Day	Total VMT/Year	Average VMT/trip into URBEMIS
3,503	2,336	5,839	81,745	809,977	891,722	325,478,709	
		Mitigated	72,403	795,964	868,367	316,953,860	148.72

The average truck trip length was reduced from 153 to 149 miles (Kovacich, pers. comm.). URBEMIS was then rerun using 149 miles as the average truck trip length. The revised URBEMIS run also included mitigation to account for employee trip reductions associated with enhanced transit services, bike lanes, and sidewalks. The mitigated

URBEMIS results of 276,779 metric tons per year (shown in Table B-7 and in URBEMIS modeling printout shown below) were then split into emissions for employee trips, field trucks, and line haul trucks, and those emissions were reduced further to account for low carbon fuels (2.5% reduction applied to all vehicles) and ARB's truck efficiency rule (10% reduction applied to line haul trucks only)

Table B-7. Mitigated Transportation Emissions After Accounting for Employee Trip Reductions, Low Carbon Fuels, and ARB's Truck Efficiency Fleet Rule

	Mitigated CO_2 Emissions from URBEMIS (metric tpy)	CH_4 (metric tpy)	N20 (metric tpy)	CO_2e (metric tpy)	% Reduction	Emission Reduction Assumptions
Employee Trips	33,331.69	2.4	2.0	34,010.9	7.96	Employee Trip Emissions Reduced 2.5% for Low Carbon Fuels
Field Truck Trips	19,721.22	1.4	1.2	20,123.1	21.20	Field Truck Trip Emissions Reduced 2.5% for Low Carbon Fuels
Line Haul Trips	195,125.57	14.2	11.9	199,101.4	21.31	Line Haul Truck Trip Emissions Reduced 10% for ARB Truck Efficiency Rule and 2.5% for Clean Fuels
Totals	276,778.57	18.1	15.1	253,235.3	10.49	

Operational Emissions – Unmitigated URBEMIS Modeling Results w/TDM Mitigation Only

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Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Documents and Settings\Tim Rimpo\Application Data\Urbemis\Version9a\Projects\Uni-Kool Operational Only.urb924

Project Name: Salinas Ag-Industrial Transportation GHG

Project Location: Monterey County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	CO2
TOTALS (tons/year, unmitigated)	333,955.66
TOTALS (tons/year, mitigated)	310,942.97
Percent Reduction	6.89

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	CO2
TOTALS (tons/year, unmitigated)	333,955.66

Both Area and Operational Mitigation must be turned on to get a combined mitigated total.

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	CO_2
Industrial park	333,955.66
TOTALS (tons/year, unmitigated)	333,955.66

Operational Mitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Mitigated

Source	CO_2
Industrial park	310,942.97
TOTALS (tons/year, mitigated)	310,942.97

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2015 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Industrial park		63.11	acres	257.00	16,219.27	1,010,006.39
					16,219.27	1,010,006.39

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	64.0	0.2	99.6	0.2
Light Truck < 3750 lbs	0.0	0.6	95.6	3.8
Light Truck 3751-5750 lbs	0.0	0.5	99.5	0.0
Med Truck 5751-8500 lbs	0.0	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.0	0.0	73.3	26.7
Lite-Heavy Truck 10,001-14,000 lbs	0.0	0.0	55.6	44.4
Med-Heavy Truck 14,001-33,000 lbs	14.4	0.0	23.1	76.9
Heavy-Heavy Truck 33,001-60,000 lbs	21.6	0.0	0.0	100.0
Other Bus	0.0	0.0	50.0	50.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	0.0	51.4	48.6	0.0
School Bus	0.0	0.0	0.0	100.0
Motor Home	0.0	0.0	88.9	11.1

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.8	8.3	7.1	11.8	152.0	152.0
Rural Trip Length (miles)	11.8	8.3	7.1	11.8	4.4	4.4
Trip speeds (mph)	30.0	30.0	30.0	30.0	30.0	30.0
% of Trips - Residential	32.9	18.0	49.1			

% of Trips - Commercial (by land

use)			
Industrial park	64.0	18.0	18.0

Operational Emissions –Mitigated URBEMIS Modeling Results with adjusted trip lengths and TDMs

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Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Documents and Settings\Tim Rimpo\Application Data\Urbemis\Version9a\Projects\Uni-Kool Operational Only with adjusted trip lengths and tdms.urb924

Project Name: Salinas Ag-Industrial Transportation GHG

Project Location: Monterey County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

OPERATIONAL (VEHICLE) EMISSION ESTIMATES		Metric
	CO2	CO2
TOTALS (tons/year, unmitigated)	327,593.21	297,272
TOTALS (tons/year, mitigated)	305,009.98	276,779
Percent Reduction	6.89	

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES	
	CO2
TOTALS (tons/year, unmitigated)	327,593.21

Both Area and Operational Mitigation must be turned on to get a combined mitigated total.

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	CO_2
Industrial park	327,593.21
TOTALS (tons/year, unmitigated)	327,593.21

Operational Mitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Mitigated

Source	CO_2
Industrial park	305,009.98
TOTALS (tons/year, mitigated)	305,009.98

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2015 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Industrial park		63.11	acres	257.00	16,219.27	990,737.88
					16,219.27	990,737.88

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	64.0	0.2	99.6	0.2
Light Truck < 3750 lbs	0.0	0.6	95.6	3.8
Light Truck 3751-5750	0.0	0.5	99.5	0.0

lbs				
Med Truck 5751-8500 lbs	0.0	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.0	0.0	73.3	26.7
Lite-Heavy Truck 10,001-14,000 lbs	0.0	0.0	55.6	44.4
Med-Heavy Truck 14,001-33,000 lbs	14.4	0.0	23.1	76.9
Heavy-Heavy Truck 33,001-60,000 lbs	21.6	0.0	0.0	100.0
Other Bus	0.0	0.0	50.0	50.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	0.0	51.4	48.6	0.0
School Bus	0.0	0.0	0.0	100.0
Motor Home	0.0	0.0	88.9	11.1

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.8	8.3	7.1	11.8	148.7	148.7
Rural Trip Length (miles)	11.8	8.3	7.1	11.8	4.4	4.4
Trip speeds (mph)	30.0	30.0	30.0	30.0	30.0	30.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Industrial park				64.0	18.0	18.0

Area Source Emissions

Area source emissions include natural gas and electricity use. Both of these energy sources generate GHG emissions. Table B-8 shows electricity and natural gas use assumptions as compiled by Itron, Inc. (2006) for the California Energy Commission.

Table B-8. Electricity Use and Natural Gas Use Assumptions

	Unmitigated Electric kWh/ft^2	Unmitigated Natural Gas kBtu/ ft^2	Cool Roof Mit Electric kwh/ ft^2	Cool Roof Mit Natural Gas kBtu/ ft^2	Electric Outdoor lighting kWh/ ft^2	Electric Indoor lighting kWh/ ft^2
Warehouses	4.26	4.40	3.96	4.89	0.57	2.4
Refrigerated Warehouses	10.15	3.90	9.85	4.39	0.13	2.2
All Office	21.35	20.52	21.05	21.01	0.76	3.3
Retail	12.82	3.00	12.52	3.49	0.66	5.8
Miscellaneous	9.81	29.65	9.51	30.14	1.12	3
Average All Commercial	13.64	29.50	13.34	29.99	0.78	3.7
Source: Itron, 2006 PG&E Climate Zone 4						

Natural Gas

Table B-9 shows the methodology used to estimate GHG emissions for Scenario 1's natural gas use. The first step involves estimating total annual energy use for each of the land use categories. To do that, the average energy use per year was estimated by taking the total energy use per square foot per year (Table B-8) and multiplying by the square footage of each land use. The second column in Table B-9 shows the energy use category (from Table B-8) that was used to estimate annual energy use. Emission factors for natural gas use were based on a report published by the California Climate Action Registry (2009). Those emission factors include 53.05 kilograms CO_2 per million Btu of natural gas consumed, 0.0059 kilogram of methane per million Btu of gas, and 0.0001 kilogram of nitrous oxide per million Btu of gas consumed. Methane emissions were converted to CO_2 equivalence by multiplying by 21, and nitrous oxide emissions were converted to CO_2e by multiplying by 320. Table B-10 shows Scenario 2's natural gas use and GHG estimates.

Table B-9 Scenario 1 Natural Gas Energy Use, Unmitigated

NATURAL GAS									
	Scenario 1								
Total Building (sf)	Office/Visitor Space (sf)	Remainder (sf)	CEC Energy Use Category	Land Use Type	Energy Use mmBtu/yr	CO2 Emissions metric tons/year	Ch4 Emissions metric tons/year	N2O Emissions metric tons/year	CO2e metric tons/yr
1,319,868	237,576	1,082,292	Warehouse	Manufacturing (Ag Processing)	9,637.14	510.32	0.06	0.00	511.91
711,834	142,367	569,467	Refrigerated Warehouses	Manufacturing (Coolers)	5,142.29	272.30	0.03	0.00	273.15
889,793	177,959	711,834	Warehouse	Manufacturing (Ag Manufacturing)	6,783.79	359.23	0.04	0.00	360.35
1,067,751	1,067,751	-	Warehouse	R&D Center (Ag Support)	21,910.25	1,160.23	0.13	0.00	1,163.84
249,142	249,142	-	Retail	Specialty Retail	747.43	39.58	0.00	0.00	40
4,238,388	1,874,795	2,363,593			44,220.90	2,341.66	0.26	0.00	2,348.96

Table B-10. Scenario 2 Natural Gas Energy Use, Unmitigated

NATURAL GAS

Scenario 2

Total Building (sf)	Office/Visitor Space (sf)	Remainder (sf)	CEC Energy Use Category	Land Use Type	Annual Energy Use (mmBtu/yr)	CO2 Emissions (metric tons/year)	Ch4 Emissions (metric tons/yr)	N2O Emissions (metric tons/yr)	CO2e (metric tons/yr)
1,319,868	237,576	1,082,292	Warehouse	Manufacturing (Ag Processing)	9,637.14	510.32	0.06	0.00	511.91
711,834	142,367	569,467	Refrigerated Warehouses	Manufacturing (Coolers)	5,142.29	272.30	0.03	0.00	273.15
889,793	177,959	711,834	Warehouse	Manufacturing (Ag Manufacturing)	6,783.79	359.23	0.04	0.00	360.35
1,067,751	213,550	854,201	Warehouse	R&D Center (Ag Support)	8,140.53	431.07	0.05	0.00	432.41
249,142	249,142	-	Retail	Specialty Retail	5,112.39	270.72	0.03	0.00	272
4,238,388	1,020,594	3,217,794			34,816.15	1,843.64	0.21	0.00	1,849.39

Tables B-11 and B-12 show mitigated natural gas emissions for Scenarios 1 and 2, respectively. Mitigated assume that from 1,020, 594 (Scenario 2) to 1,874,795 square feet of office space will comply with ASHRAE Advanced Energy Design for Small Buildings (2004), which will achieve an energy reduction of 30% for that office space. Since this square footage represents from 24 to 44 percent of total square footage, and emissions will be reduced by 30%, the net emission reduction will range from 7% to 13% of total building energy use. Also, electricity emissions associated with cool roofs also include an emission reduction. That reduction assumes savings of 2.6 Btu/square foot per year (Levinson, et. al. 2005).

Table B-11 Scenario 1 - Natural Gas Use, Mitigated

NATURAL GAS	Scenario 1 - Mitigated					Office Vistor	Remainder	Total				
				Office/Visitor	Remainders	Annual Energy Use	Annual Energy Use	Energy Use	CO2 Emissions	Ch4 Emissions	N2O Emissions	CO2e
			Renewables	1	1	mmBtu/yr	mmBtu/yr	mmBtu/yr	metric tons/year	metric tons/year	metric tons/year	metric tons/yr
Total (sf)	Office/Visitor Space (sf)	Remainder (sf)	Energy Efficiency	0.7	1							
1,319,868	237,576	1,082,292	Warehouse	Manufacturing (Ag Processing)		3,494.03	5,292.41	8,786.44	465.27	0.05	0.00	466.72
711,834	142,367	569,467	Refrigerated Warehouses	Manufacturing (Coolers)		2,093.79	2,499.96	4,593.75	243.26	0.03	0.00	244.01
889,793	177,959	711,834	Warehouse	Manufacturing (Ag Manufacturing)		2,617.24	3,480.87	6,098.11	322.92	0.04	0.00	323.92
1,067,751	1,067,751	-	Warehouse	R&D Center (Ag Support)		15,703.41	-	15,703.41	831.55	0.09	0.00	834.15
249,142	249,142	-	Retail	Specialty Retail		608.65	-	608.65	32.23	0.00	0.00	32
4,238,388	1,874,795	2,363,593				24,517.13	11,273.24	35,790.37	1,895.23	0.21	0.00	1,901.14

Table B-12 Scenario 2 - Natural Gas Use, Mitigated

NATURAL GAS				Office/Visitor	Remainders	Office Vistor	Remainder	Total				
			Renewables	1	1	Annual Energy Use	Annual Energy Use	Energy Use	CO2 Emissions	Ch4 Emissions	N2O Emissions	CO2e
square feet			Energy Efficiency	0.7	1	mmBtu/yr	mmBtu/yr	mmBtu/yr	metric tons/year	metric tons/year	metric tons/year	metric tons/yr
	Office/Visitor Space	Remainder										
1,319,868	237,576	1,082,292	Warehouse	Manufacturing (Ag Processing)		3,494.03	5,292.41	8,786.44	465.27	0.05	0.00	466.72
711,834	142,367	569,467	Refrigerated Warehouses	Manufacturing (Coolers) Manufacturing (Ag Manufacturing)		2,093.79	2,499.96	4,593.75	243.26	0.03	0.00	244.01
889,793	177,959	711,834	Warehouse	Manufacturing (Ag Manufacturing)		2,617.24	3,480.87	6,098.11	322.92	0.04	0.00	323.92
1,067,751	213,550	854,201	Warehouse	R&D Center (Ag Support)		3,140.68	4,177.04	7,317.72	387.50	0.04	0.00	388.71
249,142	249,142	-	Retail	Specialty Retail		3,664.13	-	3,664.13	194.03	0.02	0.00	195
4,238,388	1,020,594	3,217,794				15,009.88	15,450.28	30,460.16	1,612.98	0.18	0.00	1,618.00

Electricity

Tables B-13 and B-14 show the methodology used to estimate GHG emissions from electricity use for Scenarios 1 and 2, respectively. The first step involves estimating total annual electricity use for each of the land use categories. To do that, the average electricity use per year was estimated by multiplying the total electricity use per square foot per year (Table B-8) and multiplying by the square footage of each land use. The second column in Table B-13 shows the electricity use category (from Table B-8) that was used to estimate annual electricity use. Emission factors for electricity use were based on a report published by the California Climate Action Registry (2009). Those emission factors include 805.4 pounds CO_2 per megawatt hour of electricity consumed, 0.0067 pounds of methane per megawatt-hour of electricity consumed, and 0.0037 pounds of nitrous oxide per megawatt-hour of electricity consumed. Methane emissions were converted to CO_2 equivalence by multiplying by 21, and nitrous oxide emissions were converted to CO_2e by multiplying by 320.

Table B-13. Scenario 1 Electricity Use Emissions, Unmitigated

Unmitigated	Scenario 1								
ELECTRICITY									
					Annual Energy Use	CO2 Emissions	Ch4 Emissions	N2O Emissions	CO2e
Total Building	Office/Visitor Space	Remainder			(mwh)	metric tons/year	metric tons/year	metric tons/year	metric tons/yr
1,319,868	237,576	1,082,292	Warehouse	Major Ag Processing	9,682.81	3,541.00	0.03	0.02	3,546.50
711,834	142,367	569,467	Refrigerated Warehouses	Minor Ag Processing (coolers)	8,817.35	3,224.50	0.03	0.01	3,229.51
889,793	177,959	711,834	Warehouse	Manufacturing (Ag Manufacturing)	6,831.84	2,498.40	0.02	0.01	2,502.28
1,067,751	1,067,751	-	Warehouse	R&D Center (Ag Support)	22,796.48	8,336.67	0.07	0.04	8,349.62
249,142	249,142	-	Retail	Retail	3,194.00	1,168.05	0.01	0.01	1,170
4,238,388	1,874,795	2,363,593			51,322.48	18,768.63	0.16	0.09	18,797.78

Table B-14. Scenario 2 Electricity Use Emissions, Unmitigated

Unmitigated	Scenario 2										
ELECTRICITY											
						Annual Energy Use	CO2 Emissions	Ch4 Emissions	N2O Emissions	CO2e
Total Building	Office/Visitor Space	Remainder				(mwh)	metric tons/year	metric tons/year	metric tons/year	metric tons/yr
1,319,868	237,576	1,082,292	Warehouse	Major Ag Processing		9,682.81	3,541.00	0.03	0.02	3,546.50
711,834	142,367	569,467	Refrigerated Warehouses	Minor Ag Processing (coolers)		8,817.35	3,224.50	0.03	0.01	3,229.51
889,793	177,959	711,834	Warehouse	Manufacturing (Ag Manufacturing)		6,831.84	2,498.40	0.02	0.01	2,502.28
1,067,751	213,550	854,201	Warehouse	R&D Center (Ag Support)		8,198.19	2,998.08	0.02	0.01	3,002.73
249,142	249,142	-	Retail	Retail		5,319.18	1,945.22	0.02	0.01	1,948
4,238,388	1,020,594	3,217,794				38,849.37	14,207.21	0.12	0.07	14,229.27

Table B-15 and B-16 show mitigated electricity emissions for Scenarios 1 and 2, respectively. Mitigated emissions assume that from 1,020, 594 (Scenario 2) to 1,874,795 (Scenario 1) square feet of office space will comply with ASHRAE Advanced Energy Design for Small Buildings (2004), which will achieve an energy reduction of 30% for that office space. Since this square footage represents from 24 to 44 percent of total square footage, and emissions will be reduced by 30%, the net emission reduction will range from 7% to 13% of total building energy use. Also, electricity emissions associated with cool roofs also include an emission reduction. That reduction assumes savings of 2.6 Btu/square foot per year (Levinson, et. al. 2005). Finally, the mitigated electricity use and GHG emission reductions associated with lighting were estimated. The lighting portion of the calculations assumes: 90% of office/visitor space within the Center will be illuminated by fluorescents, 10% of office/visitor space within the Center will be illuminated by LED's, 50% of the office/visitor space within the Major Ag Processing/Ag Manufacturing, and Ag Support uses will implement motion-sensing devices, 10% of all outdoor lighting will be LEDs, and 5% of remainder areas of all uses will include LEDs. The use of fluorescent lighting or its energy use equivalent is considered to be the unmitigated condition because the latest revisions to Title 24, California's energy code, are slated to take effect in August 2009. The Title 24 revisions will require the use of fluorescent lights or their energy equivalent (California Energy Commission, 2008b). The analysis assumes that 10% of the office/visitor space and 10% of outdoor lighting will see a 50% reduction in lighting energy use due to the use of LEDs (TheDailyGreen.com, 2007). This analysis also assumes that 5% of the "remainder areas" will see a 50% reduction in lighting energy use due to the use of LEDs (TheDailyGreen.com, 2007). Although the use of motion sensing devices will reduce electrical energy demand, insufficient data were available to estimate the electricity reduction associated with this use.

Table B-15. Scenario 1 Electricity Use Emissions, Mitigated

Lighting	Office/Visitor	Remainders
Indoor	0.05	0.025
Outdoor	0.05	N/A

Office/Visitor assumes 10% of office/visitor use LEDs and that LED's reduce consumption by 50%.
Outdoor assumes 10@ will be LEDs and LEDs reduce consumption by 50%

	Office/Visitor	Remainders
Renewables	1	1
Energy Efficiency	0.7	1

ELECTRICITY					Office Visitor Annual Energy Use	Remainder Annual Energy Use	Total Energy Use	CO2 Emissions	CH4 Emissions	N2O Emissions	CO2e
square feet	Office/Visitor Space	Remainder			(mwh)	(mwh)	(mwh)	metric tons/year	metric tons/year	metric tons/year	metric tons/yr
1,319,868	237,576	1,082,292	Warehouse	Manufacturing (Ag Processing)	3,423.87	4,220.94	7,644.80	2,795.71	0.02	0.01	2,800.05
711,834	142,367	569,467	Refrigerated Warehouses	Manufacturing (Coolers)	2,069.66	5,575.65	7,645.31	2,795.89	0.02	0.01	2,800.23
889,793	177,959	711,834	Warehouse	Manufacturing (Ag Manufacturing)	2,567.50	2,776.15	5,343.66	1,954.18	0.02	0.01	1,957.21
1,067,751	1,067,751	-	Warehouse	R&D Center (Ag Support)	15,526.70	-	15,526.70	5,678.11	0.05	0.03	5,686.93
249,142	249,142	-	Retail	Specialty Retail	2,134.15	-	2,134.15	780.46	0.01	0.00	782
4,238,388	1,874,795	2,363,593			25,721.88	12,572.74	38,294.62	14,004.34	0.12	0.06	14,026.09

Table B-16. Scenario 2 Electricity Use Emissions, Mitigated

Lighting	Office/Visitor	Remainders
Indoor	0.05	0.025
Outdoor	0.05	N/A

	Scenario 2 - Mitigated			Office/Visitor	Remainders	Office Vistor	Remainder	Total			
ELECTRICITY			Renewables	1	1		Remainder	Energy Use			
			Energy Efficiency	0.7	1	Annual Energy Use	Annual Energy Use	(mwh)	CO2 Emissions	Ch4 Emissions	N2O Emission
square feet	Office/Visitor Space	Remainder				(mwh)	(mwh)		metric tons/year	metric tons/year	metric tons/yea
1,319,868	237,576	1,082,292	Warehouse	Manufacturing (Ag Processing)		3,434.56	4,220.94	7,655.50	2,799.61	0.02	0.01
711,834	142,367	569,467	Refrigerated Warehouses	Manufacturing (Coolers)		2,077.49	5,575.65	7,653.14	2,798.75	0.02	0.01
889,793	177,959	711,834	Warehouse	Manufacturing (Ag Manufacturing)		2,575.51	2,776.15	5,351.66	1,957.10	0.02	0.01
1,067,751	213,550	854,201	Warehouse	R&D Center (Ag Support)		3,090.60	3,331.38	6,421.99	2,348.52	0.02	0.01
249,142	249,142	-	Retail	Specialty Retail		3,590.63	-	3,590.63	1,313.10	0.01	0.01
4,238,388	1,020,594	3,217,794				14,768.80	15,904.13	30,672.92	11,217.09	0.09	0.05

Agricultural Emissions Avoided

Assumptions:

257.3	acres				
4.7	passes/acre/year	total hours	CO_2e (#/hr)	Metric CO_2e tons/year	
2	pass/acre/year tillers	51.46	239.43	5.59	
2	pass/acre/year sprayers	51.46	155.36	3.63	
6	passes/acre/year ag tractors	154.38	178.04	12.47	
10	acres/hour			21.69	<-Total
25.73	hours/pass				
120.931	total hours required to plant and harvest				

Season	AvgDays	Equipment	MaxHP	Population	hr/day/pop Activity	tpd CO_2 Exhaust	pounds/hr CO_2	tpd CH_4 Exhaust	pounds/hr CH_4	pounds/hr CO_2e
Annual	Mon-Sun	Agricultural Tractors	250	4.65E+02	6.06E+02	5.39E+01	178.04	4.08E-03	6.73E-06	178.04
Annual	Mon-Sun	Sprayers	250	4.49E+00	1.11E+00	8.62E-02	155.36	5.11E-06	4.60E-06	155.36
Annual	Mon-Sun	Tillers	250	2.55E-02	1.20E-02	1.44E-03	239.43	9.05E-08	7.51E-06	239.43

Notes:

Pounds per hour estimates from OFFROAD2007.

Assumptions based on ARB emission inventory (California Air Resources Board, 2003)

Farming also includes electricity used to pump water. These electricity emissions are included in the water use estimates.

Carbon Sequestration from Tree Planting

URBAN FORESTRY CARBON SEQUESTRATION WORKSHEET

10-Sep-08

Reporting Entity: Ag-Industrial Center

Select Units:

(•) Metric To ( ) Short Tons ( ) Kilograms ( ) Pounds

Data Year: 2010

Sequestration Summary:

Gas	Type	Unit of Measure	2010	2011	2012	2013	2014
Carbon	Total Storage	metric tons	0.30	0.69	1.16	1.71	2.35
Carbon	Annual Increase	metric tons	0.30	0.39	0.47	0.55	0.64
Carbon dioxide	Total Storage	metric tons	1.10	2.54	4.25	6.27	8.62
Carbon dioxide	Annual Increase	metric tons	1.10	1.43	1.71	2.02	2.35

Gas	Type	Unit of Measure	2015	2016	2017	2018	2019
Carbon	Total Storage	metric tons	3.08	3.90	4.81	5.81	6.90
Carbon	Annual Increase	metric tons	0.73	0.82	0.91	1.00	1.09
Carbon dioxide	Total Storage	metric tons	11.29	14.30	17.65	21.30	25.30
Carbon dioxide	Annual Increase	metric tons	2.67	3.02	3.35	3.65	4.00

1

Gas	Type	Unit of Measure	2020	2021	2022	2023	2024
Carbon	Total Storage	metric tons	8.07	9.33	10.68	12.11	13.62
Carbon	Annual Increase	metric tons	1.17	1.26	1.35	1.43	1.51
Carbon dioxide	Total Storage	metric tons	29.59	34.21	39.15	44.39	49.93
Carbon dioxide	Annual Increase	metric tons	4.29	4.62	4.95	5.24	5.54

U.S. DEPARTMENT OF ENERGY

ENERGY INFORMATION ADMINISTRATION

Notes and Instructions for the

URBAN FORESTRY

CARBON SEQUESTRATION WORKBOOK

Version 8.0 February 9, 2006

BEGIN DATA ENTRY

1) This workbook is intended to assist in the calculations of carbon sequestration by individual ("open grown") trees planted at a "standard" age, defined as typical, nursery-raised trees, sold in a 15-gallon container or balled and burlapped. If you wish to calculate sequestration for trees planted at a non-standard age, please refer to the detailed instructions that accompany the paper version of this worksheet. The paper version is available on the Program's CD-ROM, on the Internet at **http://www.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/sequester2001.pdf** or by contacting the Program's Communications Center at **1-800-803-5182** or **infoghg@eia.doe.gov**.

If you wish to calculate sequestration from forestry activities such as afforestation or reforestation where trees are planted over large, contiguous areas, please refer to the Guidelines which are available on the Program's home page at **http://www.eia.doe.gov/oiaf/1605/frntvrgg.html** or contact the Program's Communications Center for assistance.

2) This workbook estimates sequestration for the most common U.S. tree species, divided into the following 6 categories: fast, medium or slow growth hardwoods; fast, medium or slow growth conifers.

3) To use this workbook, enter the numbers of each type of tree planted in each year on the "Data Entry" sheet.

4) Sequestration is automatically calculated, and appears on the "Sequestration" sheet.

5) Report the sequestration quantities calculated (in short tons, pounds, or metric tons) for the data year(s) you are reporting, as follows:

a) for Form EIB-1605EZ, enter the "Annual Increase of CO2" figure into Column K, "Quantity"; or

b) for Form EIB-1605 (the Long Form), transfer the data to the appropriate year's column in Part III of Section 8.

6) You can also view the annual sequestration details on the sheets labeled with the given year.

7) If you have any questions or comments, please call **1-800-803-5182** or send an email to **infoghg@eia.doe.gov**.

URBAN FORESTRY CARBON SEQUESTRATION WORKSHEET

10-Sep-08

Enter Entity Name: Ag-Industrial Center

PRINT

Enter Data Year: 2010

Enter Number of Trees Planted:

Year	Number of Trees Planted						
	Hardwoods			Conifers			
	Fast	Medium	Slow	Fast	Medium	Slow	
2010		400					
2011							
2012							
2013							
2014							
2015							
2016							
2017							
2018							

Refrigerant Emissions

CFC Assumptions

Assumes that a typical 25 acre processing/cooling operation
will have
(3) 4,000-pound refrigeration tanks
(2) 1,000-pound refrigeration tanks

Ag-Industrial Center will have 5 such operations

Consequently, the Ag-Industrial Center will have 70,000 pounds of refrigerants for the 5 operations.

CFCs phased out by 2030 based on Montreal Protocol.

CFCs banned for Specific Plan area by Measure 2, Table 4.
Therefore, the unmitigated scenario assumes all 5 operations could potentially use CFCs.
The mitigated scenario assumes no use of CFCs, that 2 of the 5 operations would use HFCs, and 3 would use ammonia or other non-GWP refrigerants.

Refrigerant Calculations	Refrigerant Used with Global Warming Potential (pounds)	Leakage Rate	Leakage pounds/yr	CFCs/ HFC's Average GWP	Metric tons CO2e	Source:
1) Unmitigated: Assume as worst case that all 5 use CFCs	70000	24.50%	17150	7540	58,671	California Air Resources Board. 2009. [Page 26]
2) Mitigated Project: Assumes 3 of 5 (60%) operations use non refrigerants, such as NH3, that will have no or extremely low GWP and that 2 of 5 (40%) use HFCs in lieu of CFCs	28000	24.50%	6860	3710	11,547	(U.S. Green Building Council, 2007) [Page 220]
				Net	47,124	

Notes: Leakage rates assume average of Centralized (large) and cold storage (large) from page 26 of ARB, 2009.
Assumes that for Unmitigated that all five use CFCs.
Assumes that for Mitigated that 2 of five use HFCs and 3 of 5 use NH3 or other low GWP
Average of CFC and HFC GWP's listed on page 220 of US Green Building Council, 2007.

Water Use

(30% water use reduction)

	Existing - Farming	Proposed Use	Discharge - Industrial	Discharge - Sanitary	Mitigated Proposed Use	Mitigated Discharge
Acre-Feet/Year	1,386.00	3,152.00	2,409.00	271.00	3,070.70	2,598.70
gallons/acre-ft	325,851.40	325,851.40	325,851.40	325,851.40	325,851.40	325,851.40
Million gallons/year	451.63	1,027.08	784.98	88.31	1,000.59	846.79

Water use estimates based on (Yarne, J. 2009).

MW/year						
Water supply	0.96	2.17			2.12	
Water treatment	0.05	0.11			0.11	
Water Distribution	0.57	1.31			1.27	
Wastewater Treatment	-		1.50	0.17	-	1.62
	1.58	3.59	1.50	0.17	3.50	1.62

CO2	0.58	1.31	0.55	0.06	1.28	0.59
CH4	0.00	0.00	0.00	0.00	0.00	0.00
N20	0.00	0.00	0.00	0.00	0.00	0.00
CO2e	0.58	1.31	0.55	0.06	1.28	0.59

Existing	0.58
Total Proposed	1.92
Total Proposed w/Mit	1.87

Greenhouse Gas Emission Factors	CO_2	CH_4	N_2O
Electricity	804.54	0.0067	0.0037
Units	#/mwh	#/mwh	#/mwh

(Source: California Climate Action Registry, 2009)

Table ES-1 from Navigant, 2006.

'able ES-1. Recommended revised water-energy proxies

	Indoor Uses		Outdoor Uses	
	Northern California kWh/MG	Southern California kWh/MG	Northern California kWh/MG	Southern California kWh/MG
Water Supply and Conveyance	2,117	9,727	2,117	9,727
Water Treatment	111	111	111	111
Water Distribution	1,272	1,272	1,272	1,272
Wastewater Treatment	1,911	1,911	0	0
Regional Total	5,411	13,022	3,500	11,111

Appendix C - SALINAS AG-INDUSTRIAL CENTER

Onsite Solar Power Production Analysis

July 7, 2009

This document is an evaluation of the applicability and feasibility of utilizing onsite solar power to supply 15% of the *Center's* anticipated energy demand.

Anticipated Energy Demand: Based on the energy demand estimates in Appendix B of the "Salinas Ag-Industrial Center Greenhouse Gas Analysis" by Rimpo and Associates (Rimpo Report), dated June 5, 2009, the *Center's* total anticipated energy demands, with the *Center* Green Building Plan (*GBP*) measures in place, range from approximately 40,000,000 kilowatt hours per year (kW hrs per year) to 50,000,000 kW hrs per year.

Summary of Calculation Results: Tables 1 and 2 of the "Onsite Solar Power Production Analysis Calculations", page 2 of this document, show the anticipated energy demands for the project and the resulting possible costs and area required for installation. The scenarios listed are those included in the Rimpo Report. As can be seen in Table 2, supplying fifteen percent (15%) of the project's total estimated energy demand with an on-site facility, with the *Center* GBP in place results in the following anticipated range of requirements:

Production required for 15% of total demand........ 6,000,000 to 7,300,000 kWh /year

Required installation area ....7 to 25 acres

Installation Costs ....$61,000,000 to over $150,000,000

Installation Costs equivalent over lifetime................................... $0.41 to $1.04 /kWh

The industries locating within the Specific Plan area will experience grid energy rates of approximately $0.10 per kWh. PV production costs are from 4 times to over 10 times these grid energy rates. With energy costs being one of the single, largest operating expenses for these industries, it is impossible for an industry to absorb an increase of 400% or more in one of its most major operating expenses. Such a magnitude of increase in operating costs will render locating within the *Center* infeasible for most major ag-industrial uses.

Technological Factors: Many facilities within the *Center* will be intensive energy users due to their processes such as rapid cooling of warm, raw produce from the field, the continued refrigeration of that produce, and in some cases the transformation of the produce into packaged goods. The utilization of a solar technology at this level of magnitude is not proven for these types of facilities. The very large energy demands that will be experienced by users within the *Center* are a key operating component in their success, and one of their highest single operating costs. Capacity, reliability and availability are not assured, and the failure of any one of these key elements would be catastrophic for a business dealing with perishable commodities within the *Center.*

Conclusions: The Specific Plan allows the installation of photovoltaic panels, solar water heaters, fuel cells, and other renewable energy sources on roofs and within other areas on the individual user sites within the *Center.* However, the magnitude of the anticipated energy demands combined with the high costs of installing and maintaining renewable energy facilities renders mandatory renewable energy generation infeasible for the success of the uses locating within the *Plan Area.* Power costs are one of the single, highest operating costs for these industries. If/when the purchase and installation costs of onsite solar facilities reduce in the future to the point at which they can become a viable source of power for these industries, the installation of the facilities will be allowed within the *Center.* However, the implementation of mandatory renewable energy generation within the *Center* would greatly limit the type of facility that could or would locate within the *Center,* and would jeopardize success of the *Center* for the City.

Pages 4 & 5 of this document list the technical sources utilized in this analysis, along with the major assumptions involved in the calculations.

SALINAS AG-INDUSTRIAL CENTER

Onsite Solar Power Production Analysis Calculations (JUNE 29, 2009)

TABLE 1. TOTAL ENERGY DEMAND FOR THE CENTER

Item	Natural Gas*			Electricity*		Total Energy Demand		Total Energy Demand	
	Total (Btu/yr)	Total Equiv. (kWh/yr) 1 kWh = 3412 Btu	15% of Total (kWh/yr)	Total (kWh/yr)	15% of Total (kWh/yr)	Total (kWh/yr)	15% of Total (kWh/yr)	Total (GWh/yr)	15% of Total (GWh/yr)
Scenario 1, w/o GBP:									
Natural Gas	44,220,900,000	12,959,180	1,943,877						
Electricity				51,322,480	7,698,372				
Total Power Consumption:						64,281,660	9,642,249	64.282	9.642
Scenario 1, w/GBP:									
Natural Gas	35,790,370,000	10,203,066	1,530,460						
Electricity				38,294,620	5,744,193				
Total Power Consumption:						48,497,686	7,274,653	48.498	7.275
Scenario 2, w/o GBP:									
Natural Gas	34,816,150,000	10,488,567	1,573,285						
Electricity				38,849,370	5,827,406				
Total Power Consumption:						49,337,937	7,400,691	49.338	7.401
Scenario 2, w/GBP:									
Natural Gas	30,460,160,000	8,926,519	1,338,978						
Electricity				30,672,920	4,600,938				
Total Power Consumption:						39,599,439	5,939,916	39.599	5.940

* Energy demand estimates are from Appendix B of the "Salinas Ag-Industrial Center Greenhouse Gas Analysis" by Rimpo and Associates, dated June 5, 2009.

TABLE 2

RESULTING COST AND AREA REQUIREMENTS

Scenario	GWH/Yr	Approx. Area Required (ac.)		Approx. Purchase Costs (mil. $$)	
		Low	High	Low	High
Scenario 1, w/o GBP	9.642	11.3	32.4	99.4	200.1
Scenario 1, w/ GBP	7.275	8.5	24.4	75.0	151.0
Scenario 2, w/o GBP	7.401	8.7	24.8	76.3	153.6
Scenario 2, w/ GBP	5.940	7.0	19.9	61.2	123.3

Conversion Facto

1 mBtu =	1,000,000
1 Btu =	1,055
1 kWh =	3,600,000
1 kWh =	3,412
1 GWh =	1,000,000
1 sq. m =	10.764
1 acre	43,560

Assumptions for Calculation of Ranges of Possible System Costs:

Item	*Low*	*High*	*Units/Source*
1. PV cost Installed	10.66	14.66	$ / Peak W Est. install costs: $4.56 / PW panels only (solarbuzz.com July 2009). Must add costs for: power inverter + wiring + hardware + labor. Published: $8.1/PW - per LBNL Report, California total average installation costs
2. Contingency 30%	13.86	19.06	Standard contingency percentage for this conceptual stage
3. Peak Sun Hours	5.35	4.40	Solar irradiance equivelant to the amount of solar radiation received by a surface exactly perpendicular to the sun, for one hour at sea level. Peak Sun Hours are interchangeable with kWh/m^2/day.
4. Ideal Annual Production	1.95	1.61	kWh / Peak W [CEC Guide p. 9 Table 2]
5. Production Tolerance Factor	0.98	0.95	Manufacture's specs allow +/- 5%
6. Temp. Reduct. Factor	0.89	0.89	[CEC Guide p. 8]
7. Dirt & Dust Reduct. Factor	0.93	0.93	[CEC Guide p. 8]
8. Mismatch & Wire Loss	0.95	0.95	[CEC Guide p. 8]
9. DC to AC Loss Factor	0.94	0.90	[CEC Guide p. 8-9]
10. Age Degradation Factor	0.95	0.85	Manufacturer Specs allow -20% in 20-25 year
11. Orientation Reduct. Factor	1.00	1.00	Assume panels are tilted and oriented optimally, therefore no reduction for this factor
12. Total Reduction Factor	0.69	0.57	Product of preceding reduction factors
13. Actual Annual Production	1.34	0.92	kWh / Peak W
14. Purchase Cost	10.31	20.75	$ / kWh/yr
15. Purchase Cost	10.31	20.75	mil. $ / GWh/yr
16. System Lifespan	25	20	years Panel manufacturer's warranty lifespan (DC-AC converter unit lifespans are much less)
17. Average PV Pwr Cost	0.41	1.04	$ / kWh Does not account for the cost of the time value of money

Assumptions for Calculation of Ranges of System Area Requirements:

Item	*Low*	*High*	*Unit/Source*
18. Panel Power Density	10	5.0	Peak W / Sq. Ft., [CEC Guide P. 6]
19. Access/Build Space	20%	50%	[CEC Guide P. 6]
20. Net Pwr Density	8.3	3.3	Peak W / Sq. Ft.
21. Pwr Production Density	19.5	8.0	kWh / Sq.Ft. yr
22. Area Range	1.17	2.86	acres per gWh / yr

Salinas Ag-Industrial Center
On-site Solar Power Production Analysis
Production Cost and Area Calculation Backup

This list of sources and assumptions accompanies the Salinas Ag-Industrial Center Onsite Solar Energy Production Analysis, Tables 1 and 2.

Sources:

- "Guide to Photovoltaic (PV) System Design and Installation" published by the California Energy Commission (CEC Guide), dated June 14, 2001.
- "Tracking the Sun: The Installed Cost of Photovoltaics in the U.S. from 1998 -2007" published by the Environmental Energy Technologies Division of Lawrence Berkeley Nation Laboratory (LBNL Report), dated February 27, 2009.
- http://www.solarexpert.com/grid-tie/system-performance-factors.html
- http://www.homepower.com/article/?file=HP118_pg12_AskTheExperts_1

Technical Assumptions:

Energy Production

Peak Sun Hours -- See Page 4 of 4
Ideal Annual Production Results comparable with:------------------ Table 2 of the CEC Guide, page 9
“Dirt and dust" reduction factor approximated at 0.93 ------------------------------- CEC Guide, page 8
Temperature reduction factor of 0.89 -- CEC Guide, page 8
Wiring losses and panel mismatch combined reduction factor of 0.95------------ CEC Guide, page 8
DC to AC conversion efficiencies: 0.90 to 0.94, -----------------------------------CEC Guide, pages 8 & 9
Manufacturer warranties at between 20 and 25 years ------------------------ www.homepower .com
Production Tolerance of +/- 5%-- Manufacturer specifications
Panel Degradation after 20-25 years of -20%. ------------------------------ Manufacturer specifications

Installation Density (Area Requirements)

Installation density: 5 to 10 peak watts per square foot ------------------------------ CEC Guide, page 6
Access/build space required: 20% to 50%-- CEC Guide, page 6

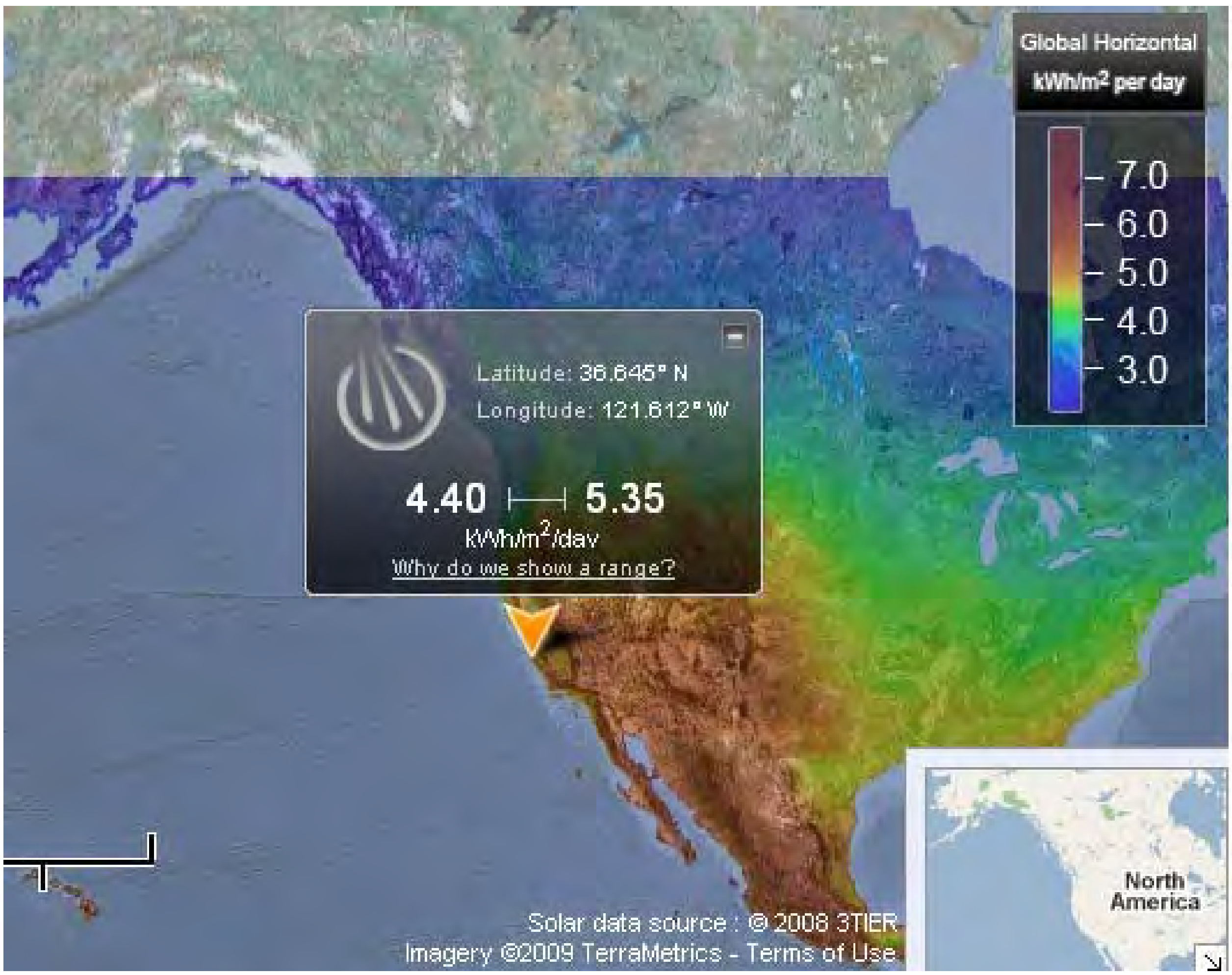
Other

A reduction factor for panel azimuth orientation and vertical tilt is shown in the list of assumptions, however it is set to 1.0 (no reduction), assuming that the panels are oriented and tilted optimally.

The access/build space high end range of 50% is reflective of the fact that installation would be on a property-by-property basis, and thus would not be the optimal spacing of a Solar Farm layout. Additionally, roof top installations will not be able to achieve optimal layout due to other large equipment on the roof and other access needs.

Peak Sun Hours: A commonly used term is "**peak sun hours**" and is defined as the equivalent number of hours per day, with solar irradiance equaling 1,000 W/m^2, which gives the same energy received from sunrise to sundown. This term is interchangeable with kWh / m^2 /day. One sun hour is equivalent to the amount of solar radiation received by a surface exactly perpendicular to the sun, for one hour, at sea level. One peak sun hour equals kWh / m^2 /day.

PEAK SUN HOURS



(Source: www.3tier.com)

Appendix D. SALINAS AG-INDUSTRIAL CENTER

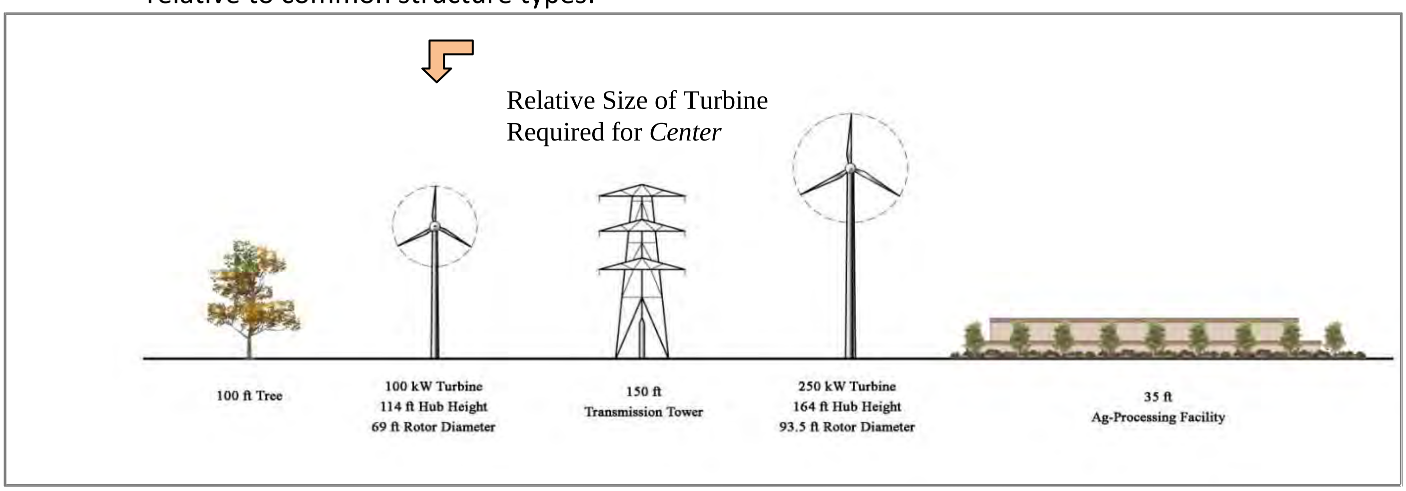
Onsite Wind Power Production Analysis Calculations

This document is an evaluation of the applicability and feasibility of utilizing on-site wind power generation to supply 15% of the *Center's* anticipated energy demand.

Anticipated Energy Demand: Based on the energy demand estimates in Appendix B of the "Salinas Ag-Industrial Center Greenhouse Gas Analysis" by Rimpo and Associates (Rimpo Report), dated June 2009, the *Center's* total anticipated energy demands, with the *Center* Green Building Plan (*GBP*) measures in place, range from approximately 40,000,000 kilowatt hours per year (kW hrs per year) to 50,000,000 kW hrs per year. Please see Table 1 on page 3.

Technological Factors: While installation and maintenance costs are a concern, the technological and social issues involved in on-site wind generation are the key limiting factors. Wind power generation is not feasible for the *Center,* based on the following:

- The wind conditions in Salinas are not favorable for dependable wind energy generation, especially of the magnitude required for the *Center ("poor" in the valley areas, per www.energyatlas.org).* *Center* tenants will likely be intensive energy users. The very large energy demands that will be experienced by users within the *Center* are a key operating component in their success, and one of their highest single operating costs. Capacity, reliability and availability are not assured, and the failure of any one of these key elements would be catastrophic for a business dealing with perishable commodities within the *Center.*
- Due to the large energy requirements of the *Center*, supplying just 15% of the energy would require at least 49 and up to over 120 industrial-scale wind turbines when wind conditions are consistent and favorable. These turbines are typically 120' in height or greater, and the diameter of the rotors is approximately 70' or greater. The following exhibit shows the size relative to common structure types:



- Multiple turbines of this size interfere with each other, and reduce the power generation potential for the site. A wind turbine will always cast a wind shade in the downwind direction. This phenomenon, known as the Wake Effect, creates a long trail of wind which is turbulent and slowed down, when compared to the wind arriving in front of the turbine.

- Many adverse environmental impacts are associated with installing such a facility in an urban area, such as visual, noise, vibration, airport proximity and endangering condors (HT Harvey Nov., 2007) and other birds.
- The number and concentration of wind generation facilities required to serve the *Center* is not suited for urban areas. The (minimum) forty-nine 100 kW turbines described above, when grouped together, would require at least 100 acres to accommodate the recommended turbine spacing. This concentration of turbines is generally found in wind farms on mountain ridges, etc.

TABLE 1. TOTAL ENERGY DEMAND FOR THE CENTER

Item	Natural Gas*			Electricity*		Total Energy Demand		Total Energy Demand	
	Total (Btu/yr)	Total Equiv. (kWh/yr) 1 kWh = 3412 Btu	15% of Total (kWh/yr)	Total (kWh/yr)	15% of Total (kWh/yr)	Total (kWh/yr)	15% of Total (kWh/yr)	Total (GWh/yr)	15% of Total (GWh/yr)
Scenario 1, w/o GBP:									
Natural Gas	44,220,900,000	12,959,180	1,943,877						
Electricity				51,322,480	7,698,372				
Total Power Consumption:						64,281,660	9,642,249	64.282	9.642
Scenario 1, w/GBP:									
Natural Gas	35,790,370,000	10,203,066	1,530,460						
Electricity				38,294,620	5,744,193				
Total Power Consumption:						48,497,686	7,274,653	48.498	7.275
Scenario 2, w/o GBP:									
Natural Gas	34,816,150,000	10,488,567	1,573,285						
Electricity				38,849,370	5,827,406				
Total Power Consumption:						49,337,937	7,400,691	49.338	7.401
Scenario 2, w/GBP:									
Natural Gas	30,460,160,000	8,926,519	1,338,978						
Electricity				30,672,920	4,600,938				
Total Power Consumption:						39,599,439	5,939,916	39.599	5.940

* Energy demand estimates are from Appendix B of the "Salinas Ag-Industrial Center Greenhouse Gas Analysis" by Rimpo and Associates, dated June 5, 2009

TABLE 2

RESULTING COST AND AREA REQUIREMENTS

Scenario	GWH/Yr	Approx. Number of 100 kW Wind Turbines		Approx. Purchase Costs (mil. $$)	
		Low	High	Low	High
Scenario 1, w/o GBP	9.642	80	171	23,902,715	51,168,362
Scenario 1, w/ GBP	7.275	60	129	18,033,547	38,604,279
Scenario 2, w/o GBP	7.401	61	131	18,345,989	39,273,120
Scenario 2, w/ GBP	5.940	49	105	14,724,792	31,521,252

Conversion Factors:

1 mBtu =	1,000,000	Btu
1 Btu =	1,055	joules
1 kWh =	3,600,000	joules
1 kWh =	3,412	Btu
1 GWh =	1,000,000	kWh
1 sq. m =	10.764	sq. ft
1 acre	43,560	sq. ft

Assumptions for Calculation of Ranges of Possible System Costs:

Item	*Low*	*High*	*Units/Source*
1. Turbine Cost	$300,000	$300,000	$/100 kW turbine
2. Average Wind Speed (V)	12.5	9.8	mph, over a 24-hour period
3. Rotor Diameter (D)	69	69	Feet
4. Annual Energy Output (AEO), gross	123,488	59,508	AEO = 0.01328 D^2 V^3 (kWh/year)
5. Wind Park Effect	0.98	0.95	Efficiency resulting from mulitple turbines
6. Annual Energy Output (AEO), net	121,019	56,532	AEO = 0.01328 D^2 V^3 (kWh/year)

Sources:

"Small Wind Electric Systems: A U.S. User's Guide" published by the U.S. Department of Energy http://www.nrel.gov/docs/fy07osti/42005.pdf

http://www.windpoweringamerica.gov/

http://www.energy.ca.gov/maps/wind.html

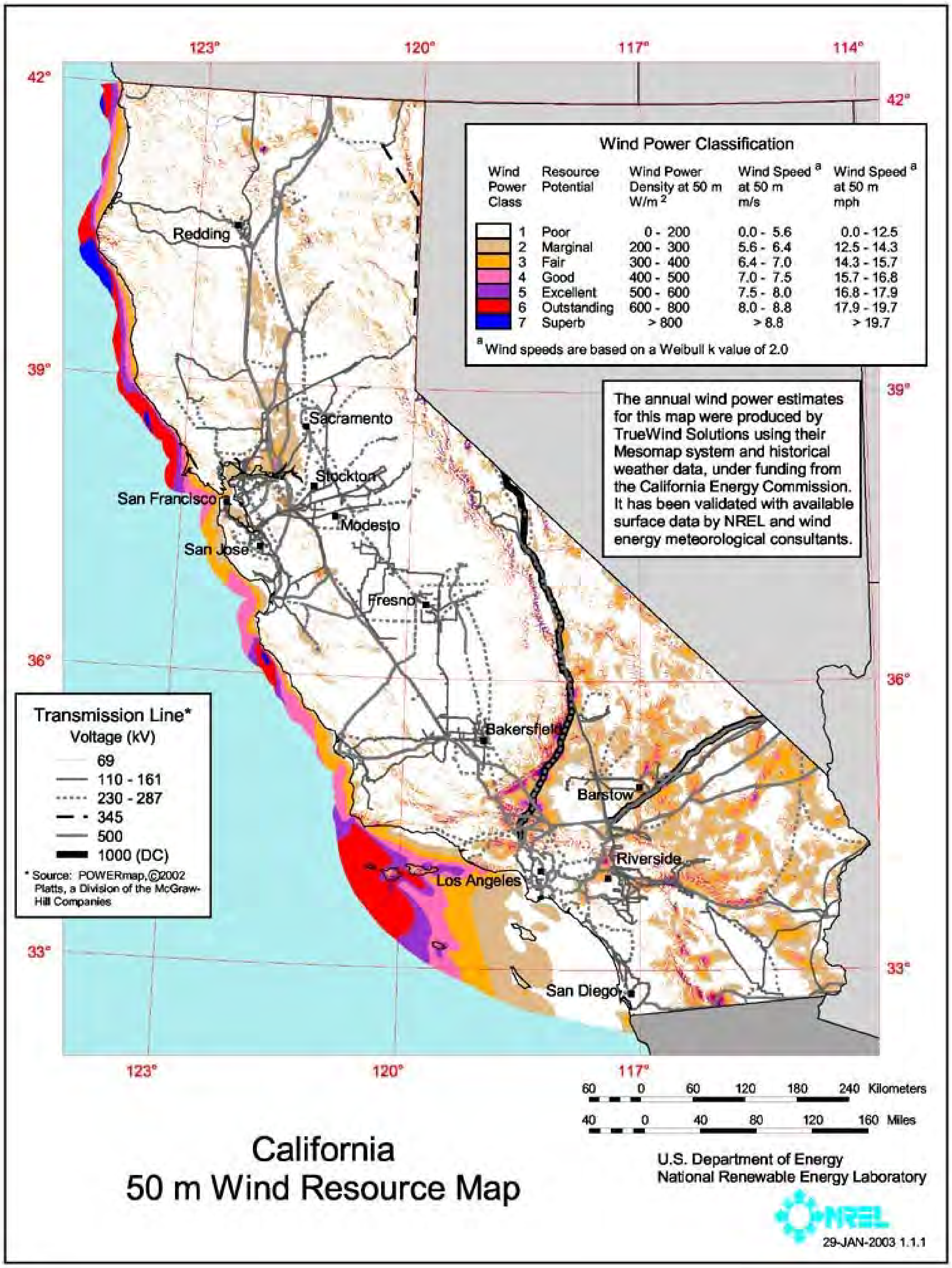
http://www.utilitywarehouse.com/info1/windturb

ineESI-545-100kw.htm

http://www.energyatlas.org

http://www.windpower.org/EN/tour/wres/wake.htm

PRESENCE AND MOVEMENTS OF CALIFORNIA CONDORS NEAR PROPOSED WIND TURBINES - FINAL REPORT PREPAREED FOR HT HARVEY AND ASSOCIATES Prepared by Nellie Thorngate of the Ventana Wildlife Society, November 15, 2007



Source: http://www.windpoweringamerica.gov/images/windmaps/ca_50m_800.jpg

Appendix E. SALINAS AG-INDUSTRIAL CENTER
Onsite Use of High S.R.I. Paving Material Analysis

This document is an evaluation of the applicability and feasibility of utilizing concrete or like paving materials with a high reflectance index (S.R.I) in place of asphalt for the *Center's* onsite pavement surfaces.

Anticipated Pavement Area: The facilities planned for the Center will require large amounts of pavement surface in the form of loading docks, staging areas, and parking lots. The "Preliminary Stormwater Control Plan" by Ruggeri-Jensen-Azar & Associates (RJA), dated June 2009, estimates that over 87% of the plan area could be covered by impervious surfaces. Based on the land use and floor area ratio assumptions in Chapter 3 of the "Draft Salinas Ag-Industrial Center Specific Plan" (Specific Plan) by RJA, dated June 2009, the Center's total anticipated onsite pavement area is between 88 and 108 acres.

Summary of Calculation Results: Tables 1 and 2 of the "Onsite Use of High S.R.I. Paving Material Analysis Calculations", page 2 of this document, show the anticipated pavement areas for the project and the resulting possible material costs. The scenarios listed are based on the probable and maximum land use distribution assumptions in the Specific Plan. As shown in Table 2, using concrete pavement in place of traditional asphalt pavement results in the following material cost increase:

Asphalt Pavement Costs..$7,000,000 to $9,000,000

Concrete Pavement Costs ....$17,000,000 to over $21,000,000

Increase in Cost ....$10,000,000 to over $12,000,000

Page 3 of this document lists the technical sources utilized in this analysis, along with the major assumptions involved in the calculations.

Conclusions: The Specific Plan allows the installation of concrete and other alternative forms of pavement with high S.R.I. values within the individual user sites of the *Center.* Light-colored paving materials with a published Solar Reflective Index (SRI) of at least 29 at the time of construction shall be used for on-site sidewalks, patios, and courtyards within the Plan Area. However, this requirement does not apply to paving surfaces that are subject to operational and truck traffic; the magnitude of the pavement surface necessary for the anticipated land uses in conjunction with the cost increase over traditional asphalt pavement (more than double), makes mandatory use of concrete pavement, or like materials, infeasible within the *Plan Area.* The implementation of mandatory use of high S.R.I. type pavement materials in the vehicular areas would result in a financial infeasibility for potential future users of the *Center,* and would likely limit the success of the *Center* for the City.

SALINAS AG-INDUSTRIAL CENTER
Onsite Use of High S.R.I Paving Material Analysis Calculations
June 23, 2009

TABLE 1
PAVEMENT SECTION COST CALCULATION

Item	Section Thickness (in.)*	Section Volume (cu. yd./sq. yd.)	Section Cost ($/sq. ft.)
Asphalt Section Cost Calculation:	(T.I. = 10)		
Asphalt Pavement	6	0.17	0.69
Aggregate Base	24	0.67	1.19
Total	30	0.83	1.87
Concrete Section Cost Calculation:			
Concrete Pavement	8	0.22	3.70
Aggregate Base	16	0.44	0.79
Total	24	0.67	4.49

* Asphalt pavement section based on "Preliminary Soil Engineering Investigation and Asphalt Pavement Design" report by Landset Engineers, Inc. dated April 2008

Conversion Factors:

1 yd. =	36	in.
1 sq. yd. =	9	sq. ft.
1 acre =	43,560	sq. ft.

TABLE 2
TOTAL PAVEMENT AREA AND CONSTRUCTION COST FOR THE CENTER

Item	Total Land Use Area (acre)*	Total Building Area (acre)	Total Pervious Area (acre)	Total Pavement (area)	Total Pavement (sq. ft.)	Asphalt Cost ($$)	Concrete Cost ($$)	Cost Difference ($$)
Scenario 1, Probable Land Use:								
Major Ag Processing	90	27.0	11.4	51.6	2,246,389			
Minor Ag Processing	145	72.5	18.4	54.1	2,355,943			
Total Area	235	99.50	29.8	105.7	4,602,332	8,608,065	20,682,084	12,074,019
Scenario 2, Max Major Ag Processing:								
Major Ag Processing	101	30.3	12.8	57.9	2,520,948			
Minor Ag Processing	134	67.0	17.0	50.0	2,177,216			
Total Area	235	97.30	29.8	107.9	4,698,164	8,787,306	21,112,736	12,325,430
Scenario 3, Max Minor Ag Processing:								
Major Ag Processing	-	-	-	-	-			
Minor Ag Processing	235	117.5	29.8	87.7	3,818,252			
Total Area	235	117.50	29.8	87.7	3,818,252	7,141,545	17,158,564	10,017,019

* Land use area assumptions for scenarios based on Table 3-2 of the "Draft Salinas Ag-Industrial Center Specific Plan" by RJA, dated June 2009.

Assumptions for Calculation of Ranges of Possible System Costs:

	Item	*Value*	*Units/Source*	
1.	Total Site Area	257	Acres	[Specfic Plan, Table 3-2]
2.	Street R/W Area	22	Acres	[Specfic Plan, Table 3-2]
3.	F.A.R Major Ag	0.3		[Specfic Plan, Table 3-3]
4.	F.A.R Minor Ag	0.5		[Specfic Plan, Table 3-3]
5.	% Pervious Area	12.7%	% of total area	[SWCP, Figure 5]
6.	Asphalt Pavement Cost	37	$/cu. yd.	[Granite Rock Construction]
7.	Concrete Pavement Cost	150	$/cu. yd.	[Caltrans]
8.	Aggregate Base Cost	16	$/cu. yd.	[Granite Rock Construction]

Salinas Ag-Industrial Center
Onsite Use of High S.R.I. Paving Material Analysis
Pavement Area and Cost Calculation Backup

This list of sources and assumptions accompanies the Salinas Ag-Industrial Center Onsite Use of High S.R.I. Paving Material Analysis Calculations, Tables 1 and 2.

Sources:

- "Draft Salinas Ag-Industrial Center Specific Plan" published by Ruggeri-Jensen-Azar & Associates (Specific Plan), dated June 2009.
- "Preliminary Stormwater Control Plan for the Salinas Ag-Industrial Center" published by Ruggeri-Jensen-Azar & Associates (SWCP), dated June 2009.
- "Preliminary Soil Engineering Investigation and Asphalt Pavement Design for Salinas Ag-Industrial Business Park" published by Landset Engineers, Inc. (Soils Report), dated April 2008.
- Construction Material Unit Costs provided by Granite Rock Construction on May 15, 2009.
- "2008 Contract Cost Data" published by the State of California Department of Transportation (Caltrans).

Technical Assumptions:

Land Use

Land Use Distributions -- Table 3-2 of the Specific Plan

Floor Area Ratios --- Table 3-3 of the Specific Plan

Percent pervious/landscaped area of 12.7% --Figure 5 of the SWCP

Pavement Assumptions

Asphalt pavement section of 6"/24" (T.I. = 10) -------------------------------------- Soils Report, page 17

*A Traffic Index (T.I.) of 10 was assumed based on the high truck traffic volume anticipated for the site. Equivalent concrete pavement section of 8"/16" assumed based on engineering experience.

Material Cost

Asphalt Cost of $37 per cubic yard placed -------------------------------------Granite Rock Construction

Concrete Cost of $150 per cubic yard placed ---Caltrans

Aggregate Base Cost of $16 per cubic yard placed----------------------------Granite Rock Construction

General Plan Climate Change Related Goals and Policies

Land Use Element

Issues, Goals and Policies

Policy LU-1.1: Achieve a balance of land uses to provide for a range of housing, jobs, libraries, and educational and recreational facilities that allow residents to live, work, shop, learn, and play in the community.

Policy LU-1.4: Create and preserve distinct, identifiable neighborhoods that have traditional neighborhood development (TND) characteristics. Specifically, development should:

- Connect in as many locations as possible to adjacent development, arterial streets, and thoroughfares;
- Provide a balanced mix of housing, workplaces, shopping, recreational opportunities, and institutional uses, including mixed-use structures (combined residential and non-residential uses), that help to reduce vehicular trips;
- Provide natural amenities that are fronted by thoroughfares or public spaces, and not privatized behind backyards;
- Commercial buildings should directly front on the sidewalk, with ample landscaping as a buffer between the building and sidewalk, and parking lots are to be located behind the buildings;

- Allow flexible parking requirements and arrangements within neighborhood activity centers to minimize the impact of the automobile and foster a pedestrian oriented streetscape;
- Provide second stories on commercial buildings to provide for other uses and encourage residential use;
- Allow small ancillary dwelling units in the rear yard for residential areas; and
- Decrease the front yard setbacks moving from the neighborhood edge to neighborhood center.

Policy LU-2.1: Minimize disruption of agriculture by maintaining a compact city form and directing urban expansion to the North and East, away from the most productive agricultural land.

Policy LU-2.3: Encourage clustering of development on sites within the Future Growth Area to minimize impacts on agricultural and open space resources.

Policy LU-2.4: Utilize well-designed in-fill development, and selectively increase density within Focused Growth Areas to maintain compact city form.

Policy LU-2.7: Encourage existing commercial and professional office developments to redevelop and reconfigure uses to incorporate new housing opportunities.

Policy LU-3.7: Revitalize the existing commercial and industrial areas within the City including: the Central City and Sunset Avenue Redevelopment Project Areas; the commercial areas along North and Sough Main Streets, West Market and Abbott Street.

Policy LU-6.3: Participate in and support regional programs and projects that target the improvement and conservation of the region's groundwater and surface water supply.

Policy LU-6.4: Actively promote water conservation by City residents, businesses and surrounding agricultural producers.

Land Use Plan

The following Land Use Plan provides for growth in the Future Growth Area outside the city limits, and within the Focused Growth Areas within the urbanized city limits. New growth outside the city will occur on land that is currently under agricultural production. Future Growth

Area is the area outside the city limits that is designated for urban uses on Figure LU-1. To minimize the amount of agricultural land lost to urban development and create a livable community, *New Urbanism* principles were used to design a land use plan that is compact and pedestrian-friendly, with a mixture of higher density uses surrounding activity centers/neighborhood focal points. Higher density residential uses surround retail, recreational, and governmental uses in the Future Growth Area[1], and all of these core activity centers are connected with pedestrian, bicycle, and transit routes to help reduce the number of vehicle trips generated by the new development.

The Focused Growth Areas (shown in Figure LU-2) are existing urbanized areas where additional growth and/or redevelopment and revitalization would be appropriate and provide benefits to the community. By selectively increasing density of development in a manner compatible with the surrounding neighborhoods, the pressure to develop agricultural lands is also reduced.

Balance of Land Uses

The variety of land uses within Salinas affects the important balance between the generation of public revenues and the provision of public services and facilities. Achieving and maintaining a balance of land uses can ensure fiscal stability and also create a desirable community in which people can work, shop, reside, and recreate. As discussed later in this element, implementation of the Land Use Plan will result in positive net revenue for Salinas.

Implementation of the Land Use Plan will also assist in creating a balance between jobs and housing units within the City. A balance between jobs and housing allows people to live and work within the same community, and often within the same neighborhood. This results in a reduction of traffic, thereby reducing the level of air pollution and improving the quality of life for the community.

Land Use Classification System

The Land Use Map also includes a Mixed Use land use category. This category is extremely important for achieving the Salinas of the future. The Mixed Use category is designated in areas where a vibrant combination of residential and non-residential uses is desired, either to create new *New Urbanism* activity centers in the Future Growth Area, or to help revitalize or redevelop

[1] Prior to approving development proposals within the Future Growth Area, developer will need to prepare Specific Plans.

the Focused Growth Areas. These mixed use areas will allow City residents to utilize community connections for walking, bicycling, or taking transit to work, school, shopping, medical, and recreation.

Land Use Designations

Other Land Use Designations

Mixed Use: The Mixed Use designation allows for development including a mixture of retail, office and residential uses in the same building, on the same parcel or in the same area. The intent of this designation is to create activity centers with pedestrian-oriented uses in certain portions of the City. The maximum intensity/density of development is 1.0 + 10 dwelling units per acre (for a total maximum allowable floor area ratio of 1.25) throughout the City and a maximum intensity/density of development of 4.0 + 80 dwelling units per acre (for a total maximum allowable floor area ratio of 6.0) for projects within the Central City. For retail or office development without residential, the maximum intensity of development is a 3.0 FAR. For residential without retail or office, the maximum allowable density is 60 units per acre in the Central City. An FAR of 8.0 may be allowed for receiving properties in the core of the downtown commercial area under a transfer of development rights (TDR) program that maybe adopted by the City.

Management of Future Growth

Over the last decade, Salinas and the Monterey region have grown at a significant rate. Factors affecting growth have changed during that time, with pressure for affordable housing now coming all the way from the Silicon Valley to the north. Understanding that growth will occur in the future, directing how and where growth will occur is important, as it will have a great impact on the quality of life and economic well-being of the community as a while. To prepare for population increases in the next 20 years, Salinas will direct growth within the Future Growth Area and Focused Growth Areas, as described below, to create a community that is compact and pedestrian and transit-oriented, avoids removing from production more valuable agricultural land than necessary, and is able to meet the public service and infrastructure needs of existing and future residents.

Reuse/Revitalization of Existing Areas

In addition to the Future Growth Area, growth in Salinas will occur in the Focused Growth Area. These areas are located within the urbanized City limits, as shown in Figure LU-2. These areas of existing development would benefit from redevelopment or revitalization, change of land uses, and/or the incorporation of mixed use residential uses. By encouraging future growth in these areas, conversion of agricultural lands will be reduced and the quality of life within the community improved.

Land Use Implementation Program

LU-7 **City-Centered Growth:** To encourage City-Centered Growth, give priority to redevelopment and infill projects that reduce development pressure on agricultural lands. Establish an incentive program to promote these projects, such as priority permit processing and density bonuses for such developments.

COMMUNITY DESIGN ELEMENT

Issues, Goals and Policies

Policy CD-3.1: Create and preserve distinct, identifiable neighborhoods that have traditional neighborhood development (TND) characteristics. Specifically, each neighborhood should have the following characteristics:

- An approximately 5-minute walk from perimeter to center;
- Housing densities should increase from perimeter to center (i.e., neighborhoods should be more densely populated at the center);
- The neighborhood center should be the location of retail space, office space, and upper story residential above commercial and office space;
- A civic or public space such as a plaza or park should be at the neighborhood center;
- Small parks should be distributed throughout the neighborhood;
- Schools should lie within the neighborhood and be easily accessible and within walking distance;
- When not adjacent to agricultural operations, which may require a variety of buffering techniques, the neighborhood edge should be bordered by either a natural corridor or the edge of an adjacent neighborhood across a pedestrian-friendly boulevard; and
- Front yard setbacks should decrease from neighborhood edge to neighborhood center.

Policy CD-3.3: Maintain a compact Central City core that minimizes distances between most residential units, offices, stores and restaurants.

Policy CD-3.4: Actively encourage mixed-use development in order to provide a greater spectrum of housing near businesses, alternative modes of transportation and other activity areas.

Policy CD-3.5: Promote high-density residential development and mixed-use (commercial, office, and residential together) in the Central City to the extent consistent with the area's architectural and historical character.

Policy CD-3.6: Provide and maintain a pedestrian-friendly atmosphere by encouraging "pedestrian zones" with increased landscaping, use of traffic-calming techniques on local streets, adequate separation from automobile traffic and the inclusion of amenities such as lighted crosswalks and increased lighting along sidewalks.

Policy CD-3.7: Provide sufficient, conveniently located public parking in the Central City to support a pedestrian business district.

Policy CD-3.8: Promote the use of alternative modes of transportation, including bus, rail, bicycling and walking.

Policy CD-3.9: Group neighborhood shopping centers, schools, civic and recreational uses, parks, and public transit opportunities together in new neighborhoods to create an activity center focal point for the neighborhoods they serve.

Community Design Implementation Program

CD-11: **Smart Growth Principals:** Using the Smart Growth Network's Getting to Smart Growth: 100 Policies for Implementation (ICMA, 2002) or other similar policy manual, to perform an "audit" of the City's Zoning and Subdivision Ordinances to identify potential impediments to the development of smart growth and traditional neighborhood development projects. Revise, adopt, and implement new standards and procedures as necessary to encourage smart growth and traditional neighborhood development in Salinas.

CD-12: **Mixed Uses:** Actively encourage the development and maintenance of mixed uses, particularly in the Mixed Use district, but also in the Arterial Frontage, Retail, Mixed Office/Residential, Commercial Office, and Downtown Commercial districts by maintaining a list of sites zoned for these uses and making the list available for developers. Establish developer incentives to encourage mixed use development in these districts.

CD-13: **Pedestrian-Friendly Improvements:** Consider, plan for, and fund sidewalk, pedestrian path, crosswalk, lighting and landscaping improvements within the Capital Improvement Plan.

CONSERVATION/OPEN SPACE ELEMENT

Issues, Goals and Policies

Policy COS-2: Encourage the conservation of water resources.

Policy COS-3: Identify, preserve and protect the significant agricultural resources within and surrounding Salinas, while minimizing conflicts between agricultural and urban uses.

Policy COS-3.1: Maintain a compact urban form, locating growth areas to minimize the loss of important agricultural resources while allowing for the reasonable expansion of the City to address projected population growth.

Policy COS-6: Improve air quality through proper planning for land use, transportation and energy use.

Policy COS-6.4: Support alternative modes of transportation, such as walking, biking and public transit, and develop bike- and pedestrian-friendly neighborhoods to reduce emissions associated with automobile use.

Policy COS-7.11: Develop and maintain an integrated system of open-space corridors and trails along utility easements, power-transmission-line rights-of-way, the reclamation ditch, stream banks, drainage-ways, slopes, and other natural features.

Goal COS-8: Encourage energy conservation.

Policy COS-8.1: Enforce State Title 24 building construction requirements.

Policy COS-8.2: Apply standards that promote energy conservation in new and existing development.

Policy COS-8.3: Work with energy suppliers and distributors to implement energy conservation programs and help inform the public of these programs.

Policy COS-8.4: Participate in programs that promote energy conservation.

Policy COS-8.5: Encourage land use arrangements and densities that facilitate the use of energy efficient public transit.

Policy COS-8.6: Encourage the creation and retention of neighborhood-level services (e.g., family medical offices, dry cleaners, grocery stores, drug stores) throughout the City in order to reduce energy consumption through automobile use.

CIRCULATION ELEMENT

Issues, Goals and Policies

Policy C-1.1: Create and preserve distinct, identifiable neighborhoods that have traditional neighborhood development (TND) characteristics and corresponding circulation systems. Specifically, the street network should have the following characteristics:

- Individual blocks should average less than 600 feet in length and less the 1,800 feet in perimeter;
- Streets should be organized in a comprehensive hierarchical network that manifests the structure of the neighborhood;
- Cul-de-sacs should be avoided unless natural conditions demand them;
- The street network should be interconnected; and
- Transit access, passenger safety, and transit facilities should be included in the street network design.

Policy C-1.9: Use traffic calming methods within residential areas where necessary to create a pedestrian-friendly circulation system.

Policy C-1.10: Encourage car-pooling, at government offices, business, schools, and other facilities, to reduce the number of vehicles using the roadway system.

Policy C-2.1: Urge a countywide approach to Transportation Demand Management (TDM) and Transportation Systems Management (TSM) as the best way to reduce peak-hour vehicle trips and congestion at major employment centers.

Policy C-2.6: Promote a regional jobs-housing balance to reduce vehicle miles traveled and congestion on the regional circulation system.

Policy C-2.7: Support continued maintenance and expanded use of the City's Intermodal Transportation Center.

Goal C-3: Promote an efficient public transportation network.

Policy C-3.1: Support Monterey-Salinas Transit initiatives to provide adequate and improved (i.e. more frequent availability and use of Intelligent Transportation System measures where appropriate) public transportation service.

Policy C-3.2: Design development and reuse/revitalization projects to be transit-oriented to promote the use of alternative modes of transit and support higher levels of transit service.

Policy C-3.3: Support the extension of commuter rail to Salinas to allow for alternatives to automobile use.

Policy C-3.4: Support public transportation that is "bike" friendly, such as buses with bicycle racks and reduced fares for bicycle riders and provision of bicycle racks at public transportation stations.

Goal C-4: Provide an extensive, safe public bicycle network that provides on-street as well as off-street facilities.

Policy C-4.1: Continue to develop a network of on- and off-street bicycle routes to encourage and facilitate the use of bicycles for commute, recreational, and other trips. Eliminate gaps and provide connections between existing bicycle routes.

Policy C-4.2: Increase availability of facilities, such as bike racks and well-maintained and well-lit bike lanes that promote bicycling.

Policy C-4.3: Encourage existing businesses and require new construction to provide on-premise facilities to aid bicycle commuters, such as on-site safe bicycle parking.

Policy C-4.4: Improve the biking environment by providing safe and attractive cut-throughs, bike lanes, and bike paths for both recreational and commuting purposes.

Policy C-4.5: Where possible, ensure that roadway improvements (i.e., widening and re-striping), as well as new overpasses and underpasses, allow for safe on-street bike lanes or adequate right-lane space for bicycles.

Policy C-4.6: Ensure that all pedestrian and bicycle route improvements meet the Americans with Disabilities Act (ADA) standards for accessibility, and Caltrans standards for design.

Policy C-4.7: Encourage parking lot designs that provide for safe and secure bicycle parking.

Goal C-5: Provide safe routes to school, work, shopping, and recreation for pedestrians.

Policy C-5.1: Increase availability of safe and well-maintained sidewalks in all areas of the City.

Policy C-5.2: Encourage all new bus stops and changes in existing bus stops to take pedestrian access into consideration.

Policy C-5.3: Ensure that all pedestrian route improvements meet with ADA standards for accessibility.

Policy C-5.4: Encourage parking lot designs that promote pedestrian access and safety.

Policy C-5.5: Improve the walking environment by providing safe and attractive sidewalks, cut-throughs, and walkways, for both recreational and commuting purposes.

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