# Appendix A: The Greenhouse Effect, Greenhouse Gases, and Climate Change Impacts

# GLOBAL CLIMATE CHANGE

Parts of the Earth's atmosphere act as an insulating blanket of just the right thickness, trapping sufficient solar energy to keep the global average temperature in a suitable range. The 'blanket' is a collection of atmospheric gases called 'greenhouse gases' (GHGs) based on the idea that the gases also 'trap' heat like the glass walls of a greenhouse. These gases, mainly water vapor, carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), ozone, and chlorofluorocarbons (CFCs) all act as effective global insulators, reflecting back to earth visible light and infrared radiation. Human activities such as producing electricity and driving vehicles have contributed to the elevated concentration of these gases in the atmosphere. This in turn, is causing the Earth's temperature to rise. A warmer Earth may lead to changes in rainfall patterns, much smaller polar ice caps, a rise in sea level, and a wide range of impacts on plants, wildlife, and humans.

Leading scientists around the world agree that Global Warming Potential is a reality and that human activities are disrupting the earth's climate by intensifying the greenhouse effect.

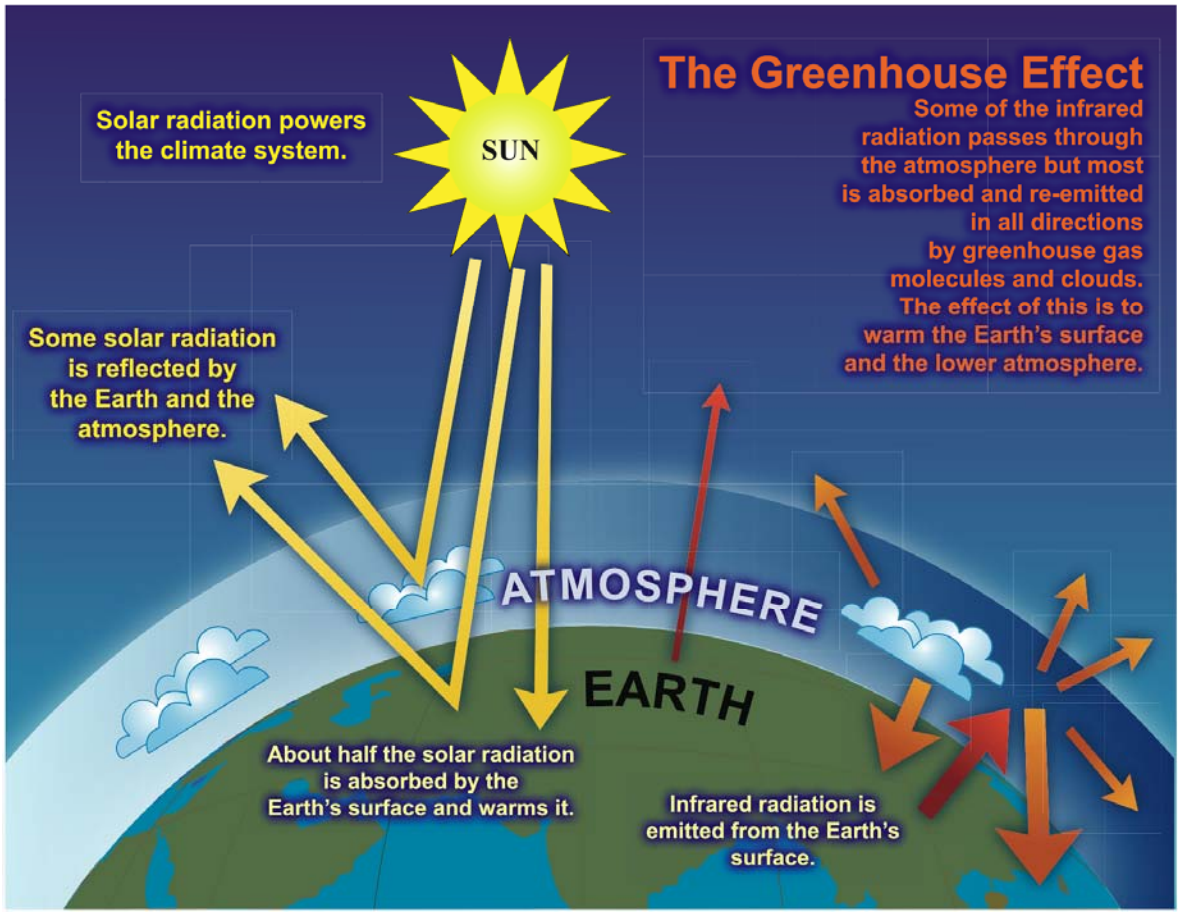
## 1. THE GREENHOUSE EFFECT

A balance of naturally occurring gases dispersed in the atmosphere determines the Earth's climate by trapping solar heat. This phenomenon is known as the greenhouse effect. As sunlight passes through our atmosphere, the incoming solar radiation is eradiated from the Earth's surface as heat energy. Greenhouse gases trap some of this reradiated energy, which warms the Earth. Figure A-1 illustrates the Greenhouse Gas Effect.

## 2. GLOBAL WARMING

The natural "greenhouse effect" allows the Earth to remain warm, and sustain life, and helps determine the existing climate. The increased consumption of fossil fuels (wood, coal, gasoline, etc.) has substantially increased atmospheric levels of greenhouse gases. As atmospheric concentrations of greenhouse gases rise, so do temperatures. Over time this rise in temperatures would result in climate change. Theories concerning climate change and global warming existed as early as the late 1800s. By the late 1900s the understanding of the Earth's atmosphere had advanced to the point where many climate scientists began to accept that the Earth's climate is changing. Today, many climate scientists agree that some warming has occurred over the past century and will continue through this century.

**Figure A.1 - The Greenhouse Gas Effect**




***Source: IPPC, 2008***

The United Nations Intergovernmental Panel on Climate Change predicts that changes in the Earth's climate will continue through the 21st century and that the rate of change may increase significantly in the future because of human activity. Many researchers studying California's climate believe that changes in the earth's climate have already affected California and will continue to do so in the future.

## 3. GREENHOUSE GASES

Changes in climate result from radiative forcings and feedbacks. Radiative forcing is the difference between the radiation energy entering the Earth's atmosphere and the radiation energy leaving the atmosphere. Greenhouse gases allow solar radiation to penetrate the Earth's atmosphere but slow the release of atmospheric heat. A feedback is an internal process that amplifies or dampens the climate's response to a specific forcing. For example; the heat trapped by the atmosphere may cause temperatures to rise or may alter wind and weather patterns. A gas or aerosol's global warming potential (GWP) is its ability to trap heat in the atmosphere. It is

the "cumulative radiative forcing effects of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas."[1]

Individual GHGs have varying global warming potential (GWP) and atmospheric lifetimes. The carbon dioxide equivalent ($CO_2e$) is a consistent methodology for comparing greenhouse gas emissions since it normalizes the various greenhouse gases to a consistent metric. The reference gas for GWPs is carbon dioxide, which has a GWP of one. By comparison, methane's GWP is 21, as $CH_4$ has a greater global warming effect than $CO_2$ on a molecule-to-molecule basis.[2] In order to combine the impacts of multiple greenhouse gases, the carbon dioxide equivalent metric is used. $CO_2e$ is the total amount of each individual greenhouse gas multiplied by that gas's GWP.

Atmospheric lifetimes vary from 1.5 (HFC-152a) to 50,000 years (tetrafluoromethane). One teragram (equal to one million metric tons) of carbon dioxide equivalent (Tg $CO_2$ Eq.) is the mass emissions of an individual GHG multiplied by its GWP. The atmospheric lifetime and GWP of selected greenhouse gases are also summarized in Table A.1.

**Table A.1 Global Warming Potentials and Atmospheric Lifetimes**

| Gas | Atmospheric Lifetime (years) | Global Warming Potential (100 year time horizon) |
|---|---|---|
| Carbon Dioxide | 50 - 200 | 1 |
| Methane | 12 ± 3 | 21 |
| Nitrous Oxide | 120 | 310 |
| HFC-23 | 264 | 11,700 |
| HFC-134a | 14.6 | 1,300 |
| HFC-152a | 1.5 | 140 |
| PFC: Tetrafluoromethane (CF4) | 50,000 | 6,500 |
| PFC: Hexafluoroethane (C2F6) | 10,000 | 9,200 |
| Sulfur Hexafluoride (SF6) | 3,200 | 23,900 |
| ***Source: U.S. Environmental Protection Agency, 2006.*** | | |

Of all greenhouse gases in the atmosphere, water vapor is the most abundant, important, and variable. It is not considered a pollutant; in the atmosphere it maintains a climate necessary for life. The main source of water vapor is evaporation from the oceans (approximately 85 percent).

[1] U.S. Environmental Protection Agency (EPA). 2006a. The U.S. Greenhouse Gas Emissions and Sinks: Fast Facts. Office of Atmospheric Programs.

[2] EPA, 2006. Non $CO_2$ Gases Economic Analysis and Inventory. Global Warming Potentials and Atmospheric Lifetimes. www.epa.gov/nonco2/econ-inv/table.html

Other sources include evaporation from other water bodies, sublimation (change from solid to gas) from ice and snow, and transpiration from plant leaves.

Ozone is also a greenhouse gas; however, unlike other GHGs, ozone in the troposphere is relatively short-lived and therefore is not global in nature. It is difficult to make an accurate determination of the contribution of ozone precursors (nitrogen oxides and volatile organic compounds) to global climate change (GCC).

Aerosols are suspensions of particulate matter in a gas emitted into the air through burning biomass (plant material) and fossil fuels. Aerosols can warm the atmosphere by absorbing and emitting heat and can cool the atmosphere by reflecting light. Cloud formation can also be affected by aerosols. Sulfate aerosols are emitted when fuel containing sulfur is burned. Black carbon (or soot) is emitted during bio mass burning and incomplete combustion of fossil fuels. Particulate matter regulation has been lowering aerosol concentrations in the United States; however, global concentrations are likely increasing.

**Carbon Dioxide**

The natural production and absorption of carbon dioxide ($CO_2$) is achieved through the terrestrial biosphere and the ocean. However, humankind has contributed to the alteration of the natural carbon cycle by burning coal, oil, natural gas, and wood. Since the industrial revolution began in the mid 1700s, each of these human-caused activities has increased in scale and distribution. Carbon dioxide was the first GHG demonstrated to be increasing in atmospheric concentration with the first conclusive measurements being made in the last half of the 20th century. Prior to the industrial revolution, concentrations were fairly stable at 280 ppm. Today, they are around 370 ppm, an increase of well over 30 percent[3]. Left unchecked, the concentration of carbon dioxide in the atmosphere is projected to increase to a minimum of 540 ppm by 2100 as a direct result of anthropogenic sources. This will result in an average global temperature rise of at least two degrees Celsius (3.6 $^{O}$F)[4].

Carbon dioxide emissions are directly generated primarily in the form of vehicle exhaust and in the consumption of natural gas for heating. Carbon dioxide emissions are also generated from natural gas combustion and indirectly through the use of electricity. Other indirect sources of carbon dioxide include the use of potable water and generation of wastewater (potable water and wastewater treatment generates greenhouse gases), and the generation of solid waste.

[3] U.S. Environmental Protection Agency, Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks, Third Edition, September 2006.
[4] Intergovernmental Panel on Climate Change, Climate Change 2001: The Scientific Basis, Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate. http://www.ipcc.ch/pub/reports.htm. 2001.

**Methane**

Methane ($CH_4$) is an extremely effective absorber of radiation, though its atmospheric concentration is less than carbon dioxide and its lifetime in the atmosphere is brief (10-12 years), compared to some other GHGs (such as carbon dioxide, nitrous oxide, and CFCs). Methane has both natural and anthropogenic (human) sources. It is released as part of the biological processes in low oxygen environments, such as in swamplands or in rice production (at the roots of the plants). Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas and mining coal have added to the atmospheric concentration of methane[5].

**Nitrous Oxide**

Concentrations of nitrous oxide ($N_2O$) also began to rise at the beginning of the industrial revolution. Microbial processes in soil and water, including those reactions that occur in fertilizer containing nitrogen, produce nitrous oxide. The use of fertilizers has increased over the last century. Global concentration for nitrous oxide in 1998 was 314 ppb, and in addition to agricultural sources for the gas, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load[6].

**Chlorofluorocarbons**

Chlorofluorocarbons (CFCs) have no natural source, but were synthesized for use as refrigerants, aerosol propellants and cleaning solvents. Since their creation in 1928, concentrations of CFCs in the atmosphere have been rising. Due to the discovery that they are able to destroy stratospheric ozone, a global effort to halt their production was undertaken and was extremely successful, so much so that levels of the major CFCs in the atmosphere are now remaining static or declining. However, their long atmospheric lifetimes mean that some of the CFCs will remain in the atmosphere for over 100 years. Since they are also a GHG, along with such other long-lived synthesized gases as $CF_4$ (carbontatrafuoride) and $SF_6$ (sulfurhexafluoride), they are of concern. Another set of synthesized compounds called HFCs (hydrofluorcarbons) are also considered GHGs, though they are less stable in the atmosphere and therefore have a shorter lifetime and less of an impact[7]. CFCs, $CF_4$, $SF_6$ and HFCs have been banned and are no longer available on the market.

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[5] U.S. Environmental Protection Agency, Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks, Third Edition, September 2006.

[6] U.S. Environmental Protection Agency, Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks, Third Edition, September 2006.

[7] U.S. Environmental Protection Agency, Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks, Third Edition, September 2006.

## 4. HUMAN AND CULTURAL CAUSES OF CLIMATE CHANGE

Like all other animals, humans participate in the natural carbon cycle, but there are important differences between human and animal activities. By burning coal, oil, and natural gas, humans are adding carbon dioxide ($CO_2$) to the atmosphere much faster than the carbon in rocks is released through natural processes. Clearing and burning forests to create agricultural land converts organic carbon to carbon dioxide gas. The oceans and land plants are absorbing a portion, but not nearly all of the $CO_2$ added to the atmosphere by human activities. Human climate drivers include heat-trapping emissions from cars and power plants, aerosols from pollution, and soot particles.

## 5. IMPACTS FROM GREENHOUSE GAS EMISSIONS

### *Global Impacts*

While in some cases global climate change may temporarily improve certain aspects of a region, such as lengthening the growing season, it is estimated that the ecology of the natural world will not be able to adjust quickly enough to prevent widespread environmental degradation[8]. In California, it is likely that warmer temperatures will result in frequent and longer periods of drought. The majority of the scientific community has stated that beyond doubt, global climate change will be one of the most significant challenges the globe will face in the twenty-first century, and will impact almost every system we depend upon for survival.

Just as humans are affected by climate change, so too are plants and animals. Animals must breathe the same air and are subject to the same types of negative health effects as humans. Certain plants and trees may absorb air pollutants that can stunt their development or cause premature death.

There are also numerous impacts to the human economy including lost workdays due to illness, a desire on the part of business to locate in areas with a healthy environment, and increased expenses from medical costs. Pollutants may also lower visibility and cause damage to property. Certain air pollutants are responsible for discoloring painted surfaces, eating away at stones used in buildings, dissolving the mortar that holds bricks together, and cracking tires and other items made from rubber.

The United States has the highest per capita emissions of GHGs in the world, 22 tons of $CO_2$ per person per year (see figure 1-2). With only five percent of the world's population, the United

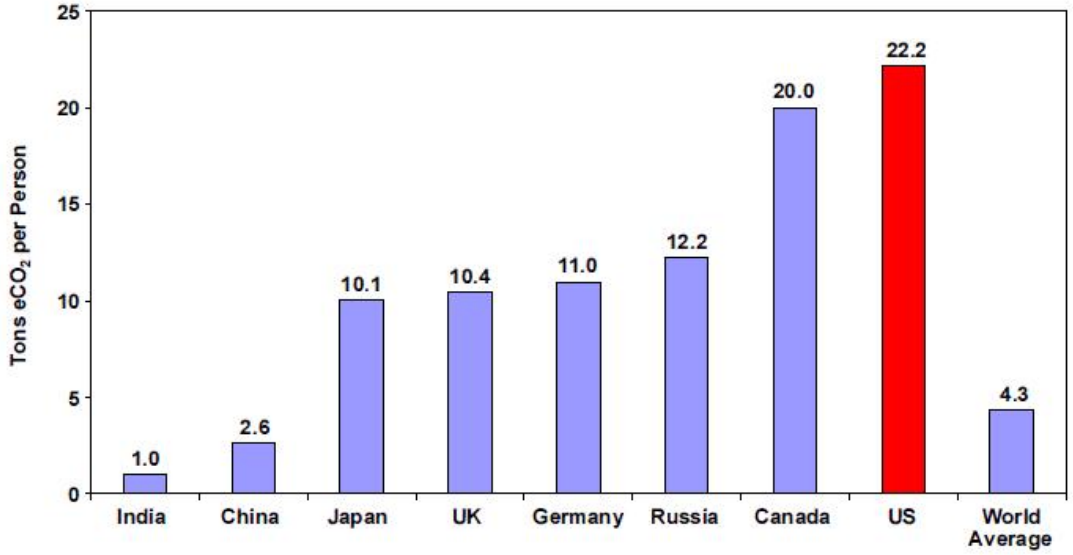
[8] Intergovernmental Panel on Climate Change, Climate Change 2001: The Scientific Basis, Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate. http://www.ipcc.ch/pub/reports.htm. 2001.

States is responsible for 24 percent of the world's $CO_2$ emissions. California, despite its strong environmental regulations, is the second largest greenhouse gas polluting state in the nation, and emits 2% of global human-generated emissions. Its largest contribution of $CO_2$ is from vehicle emissions.

According to the International Panel on Climate Change (IPCC), the following are current worldwide statistics for $CO_2$ concentrations[9]:

- The atmospheric concentration of carbon dioxide ($CO_2$) during the last two decades has increased at the rate of 0.4% every year.
- Current $CO_2$ concentrations are higher than they have been in the last 420,000 years, and according to some research, the last 20 million years.
- About three-quarters of the $CO_2$ emissions produced by human activity during the past 20 years are due to the burning of fossil fuels.

**Figure A-2 – Per Capita $CO_2$ Emissions from 2001**




***Source: Energy Information Administration, 2001.***

## Human Health

According to the Pew Center's report on Human Health and Climate Change, health threats may depend on surpassing a threshold level of a climate factor such as significant change in temperature, precipitation, or storm frequency. Once that threshold has passed, the incidence of disease may drastically increase.

[9] Intergovernmental Panel on Climate Change, Sixteen Years of Scientific Assessment in Support of the Climate Convention, http://www.ipcc.ch/about/anniversarybrochure.pdf. December 2004.

Environmental factors play a significant role in some diseases carried by insects. Warming could make tick-borne Lyme disease more prevalent. Mosquito-borne diseases such as West Nile virus, Dengue Fever, and Malaria could acquire new ranges and access to previously unexposed populations. For example, the temperature range at which the malaria-carrying mosquito lives is sensitive to a mere one-degree in temperature change; thus an overall increase in global temperatures will increase the land areas where it may spread disease. These temperature changes affect not only the mosquitoes, but also disturb and in some cases decrease the habitats of its natural predators.

**Ecosystems**

Scientists predict serious consequences of global warming. The rapid, unprecedented increase in temperatures accelerates the water cycle, which then increases the occurrence, variability, and severity of storms and drought. Such extreme climate events will potentially disrupt ecosystems and damage food and water supplies. In addition, increased temperatures cause thermo-expansion of the oceans and accelerate the melting of the icecaps, thereby raising the overall level of the oceans. The sea-level rise may have multiple outcomes, including significant environmental disturbances, coastline destruction, major population displacement and economic disruption.

While there is some degree of uncertainty, scientists are able to predict many of the challenges that climate change presents to ecosystems. Warmer temperatures may force some species to higher altitudes or more northern latitudes. This migration may be prevented by human developments that literally block the path as well as non-native species that can out-compete native plants and animals in new locations or make those areas uninhabitable. For example, there is evidence that certain butterflies, often a species that is used to indicate the health of an ecosystem, are moving further north, and are seldom seen in the southern reaches of their range. In addition, warmer temperatures have enabled the Jeffrey pine beetle to have more than one birth cycle per season, lengthening the amount of time this pest is able to damage trees. Furthermore, human impact other than greenhouse gas emissions will exacerbate challenges to ecosystems attempting to reestablish at higher elevations or new locations. According to the UCS report, “In many parts of California, fragmentation of the landscape by human developments, invasions by nonnative species, and air pollution may limit the reestablishment of native ecosystems.”[10]

[10] Union of Concerned Scientists and The Ecological Society of America, 1999 Confronting climate change in California.pdf, November 1999.

### *Impacts to California*

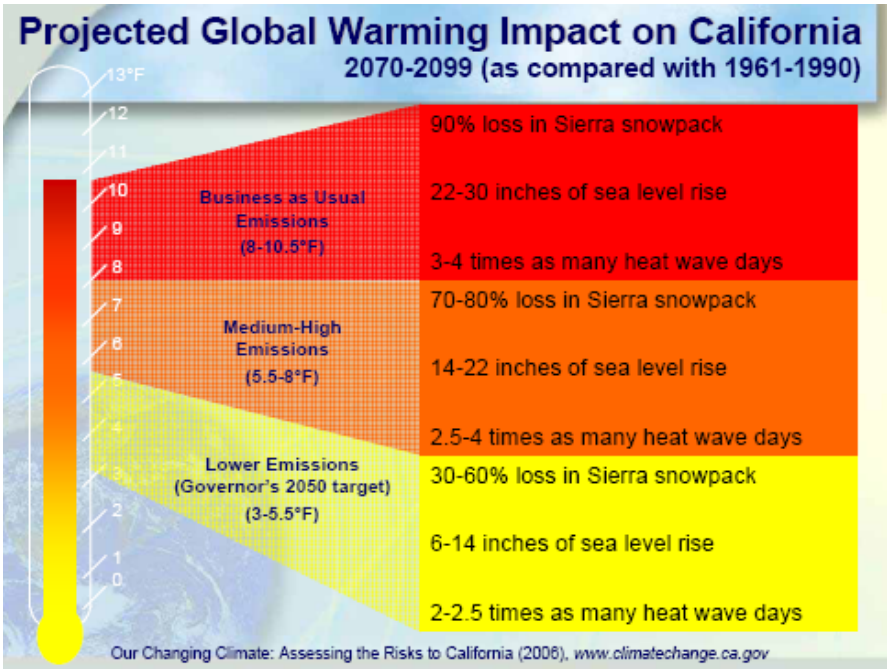
While it is a global problem, influenced by an array of interrelated factors, climate change is also a regional and local problem, with serious impacts foreseen for California, the Northern California Area, and Placer County.

The impacts of climate change will be variable and widespread. Global and local climate change will impact weather, sea-level rise, water resources, ecosystems, human health, economy, and infrastructure.

Projected future climate change may affect California in a variety of ways. Public health can suffer due to greater temperature extremes and more frequent extreme weather events, increases in transmission of infectious disease, and increases in air pollution. Agriculture is especially vulnerable to altered temperature and rainfall patterns, and new pest problems. Forest ecosystems would face increased fire hazards and would be more susceptible to pests and diseases. The Sierra snowpack that functions as the state's largest reservoir could shrink by one third by 2060, and to half its historic size by 2090. Runoff that fills reservoirs will start in midwinter, not spring, and rain falling on snow will trigger more flooding. The California coast is likely to face a rise in sea level that could threaten its shorelines. Sea level rise and storm surges could lead to flooding of low-lying property, loss of coastal wetlands, erosion of cliffs and beaches, saltwater contamination of drinking water, and damage to roads, causeways, and bridges. Figure A-3 illustrates potential impacts from global warming on California (2070-2099)[11].

[11] California Energy Commission, Our Changing Climate Assessing Risks to California: CEC-500-2006-077, 2006.

**Figure A- 3 – Projected Global Warming Impacts on California (2070-2099)**




Ultimately, in the next few decades, the impacts of climate change on weather in Sutter County, like the rest of California, will see warmer overall temperatures and an increase in precipitation events, with an increase of intensity and frequency of rainstorms.

**Climate and Weather**

There is a key difference between climate and weather. According to the National Science Foundation report on climate change in California, "Weather is the day-to-day phenomena we experience—sun, rain, fog, warm, cold, wind—that vary greatly. Climate is long term statistical patterns of weather…and is reflected in average temperatures, rainfall, and other weather events at a given location, and climate change is signaled by long-term changes in those averages"[12].

In 1999, the Union of Concerned Scientists and the Ecological Society of America published a report called *Confronting Climate Change in California*, which describes the predicted impacts of climate change in California. According to this report, California has had a 2 °F increase in temperature over the past 100 years, and annual precipitation has decreased by 10-25% in some regions The report also noted that most climate change models predict a temperature increase of 4° F in California in the next 20 to 40 years. These models also projected a decrease in the number of long dry spells, and an annual precipitation increase of 20-30% (with a range of 10-50%) in spring and fall, with somewhat larger increases in winter. One model reveals a large

[12] National Science Foundation, The Potential Consequences of Climate Variability and Change for California, The California Regional Assessment "*A Report of the California Regional Assessment Group*" For the U.S. Global Change Research Program, June 2002.

increase in precipitation over California, particularly in the form of rain, but with dry areas to the east of the Sierra. This regional model projects that winter precipitation over the coastal areas and the Sierra will increase by 25% or more, with an associated risk of increases in winter mud slides and flooding[13].

Much of the anticipated changes in climate will depend on the frequency and strength of the El Niño-Southern Oscillation phenomenon (ENSO). Most global climate change models indicate the possibility of more frequent ENSO events. El Niño historically happens every two to seven years off the west coast of South America, as a result of changes in ocean currents and prevailing winds over the Pacific Ocean. These changes bring warm water from the western oceans, displacing the nutrient-rich cold water that normally wells up on the western coasts of the Americas from deep in the ocean. These changes bring more frequent and extreme weather anomalies, including severe droughts and floods, hurricanes and winter storms. According to the National Science Foundation, "the invasion of warm water disrupts both the marine food chain and the economies of coastal communities that are based on fishing and related industries"[14] The effects of El Niño in California vary across the state, but in the past have included abnormally frequent winter rains and storms, and abnormally dry summers and associated wildfires The 1982-83 El Niño, the strongest event in recorded history, brought $8 billion in economic impacts and $100 million in California alone.

**Water Resources**

Climate change impacts will bring an additional burden to California's already over-taxed water supply system. According to the IPCC there will be an increase in the number of intense precipitation days and flood frequencies in basins driven by snowmelt, such as California's Central Valley.[15] For this type of basin, the accumulation of snow in winter is the essential "water tower" that stores water until the spring's warmer temperatures begins to melt the snow, forming the streams and rivers that supply the entire watershed with water for the duration of the summer.

Even under normal climatic conditions, 80% of California's annual rainfall occurs in the winter and is stored in the snowpacks of the various mountain ranges. The warmer temperatures associated with climate change will increase rainstorms and decrease snowstorms, shorten the overall snowfall season, and accelerate the rate of spring snowmelt, ultimately leading to more rapid,

[13] Union of Concerned Scientists and The Ecological Society of America, 1999 Confronting climate change in California.pdf, November 1999.

[14] National Science Foundation, The Potential Consequences of Climate Variability and Change for California, The California Regional Assessment "*A Report of the California Regional Assessment Group*" For the U.S. Global Change Research Program, June 2002.

[15] Intergovernmental Panel on Climate Change, Climate Change 2001: The Scientific Basis, Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate. http://www.ipcc.ch/pub/reports.htm. 2001.

earlier, and greater spring runoff. The anticipated early spring floods are likely to be followed by excessively dry summers.

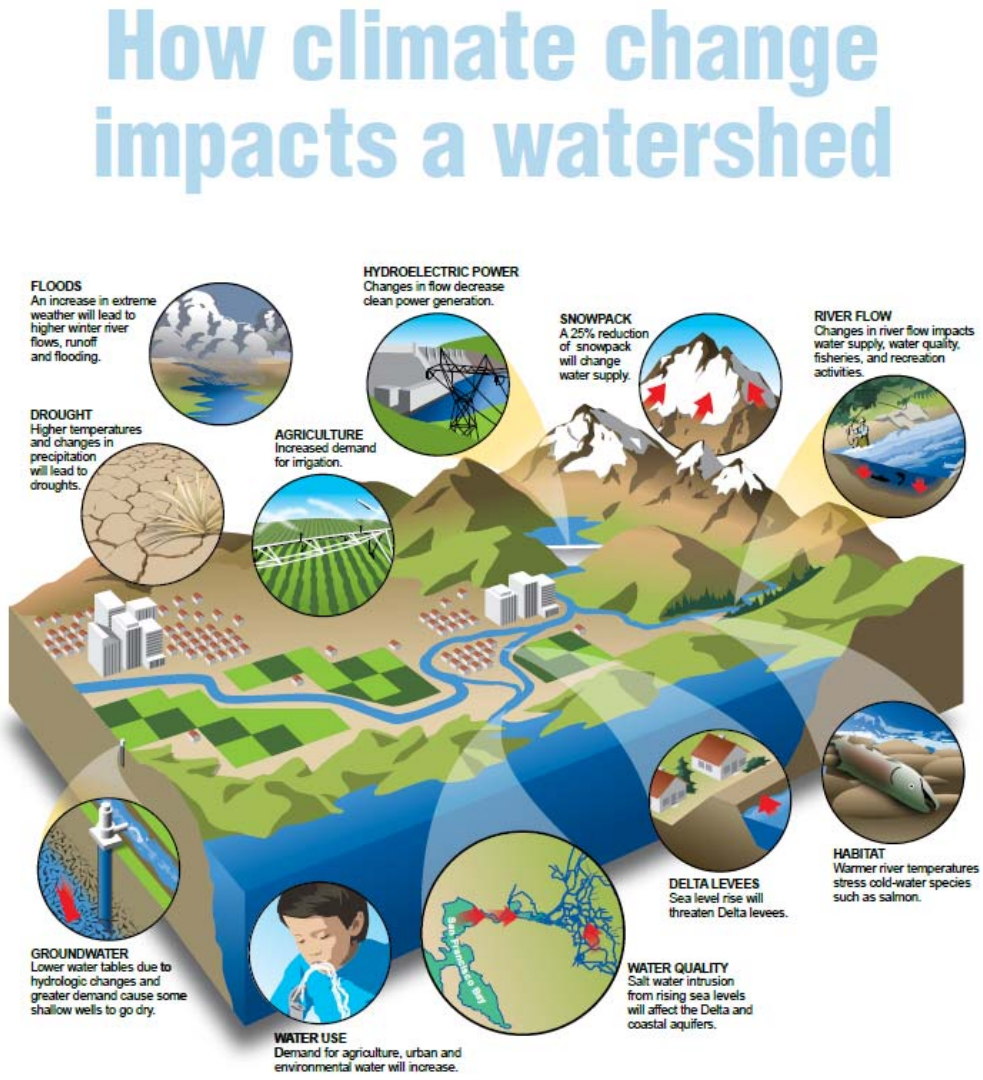
California's water supply is already under stress. According to the Union of Concerned Scientists and The Ecological Society of America, "Currently, every major water supply source in California is at its limit of sustainability, and options for increasing water imports are severely limited"[16]. A combination of natural and human activities is causing this depletion of California water supplies as well as water intrusion and chemical contamination. According to the Union of Concerned Scientists, 95% of the state's wetlands have already been destroyed.

In the past, California Water Resources on a statewide basis has allowed California to meet most of its agricultural and urban water management objectives and flood management objectives in most years. Generally, during a single dry year or two, surface and groundwater storage can maintain most water deliveries, but can result in critically low water reserves. Longer droughts can create numerous problems, including extreme fire danger, economic harm to urban and rural communities, loss of crops, and the potential for species collapse and degraded water quality in some regions. Water demand in California is already increasing because of population expansion. In addition, demand for water for irrigation rises with warmer temperatures. Summers with higher temperatures and even less rainfall and runoff than usual will exacerbate demands for water in California.

Climate change magnifies the problems that exist with an aging water infrastructure and growing population. While recent bond measures have provided a down payment for improving California's water and flood systems, climate change presents an ongoing risk that requires a long-term commitment of funding that is properly matched to anticipated expenditures, beneficiaries and responsible parties.

[16] The Union of Concerned Scientists and The Ecological Society of America, Confronting Climate Change in California Ecological Impacts on the Golden State, November 1999.

**Figure A-4 – How Climate Change Impacts a Watershed**




Source: California Department of Water Resources 2008

## Appendix B: Summary, Assumptions and General Formulas

**Sutter County**
**Green House Gas Emissions**
**Inventory Summary**

| | Reduced 2020 | BAU [1] 2020 | % increase from 2008 | 2008 | % increase from 1990 | 1990 |
|---|---|---|---|---|---|---|
| **Transportation[2]** | | | | | | |
| **Source:** | **MT of $CO_2e$** | **MT of $CO_2e$** | | **MT of CO2e** | | **MT of CO2e** |
| 1 On-Road Vehicles | 348,058 | 479,486 | 88.44% | 254,455 | 12.20% | 226,778 |
| 2 Airport Operations | 155 | 155 | 0.00% | 155 | 17.65% | 132 |
| **Total** | 348,213 | 479,641 | 88.38% | 254,610 | 12.21% | 226,910 |
| **Energy[3]** | | | | | | |
| **Sources:** | **MT of CO2e** | **MT of $CO_2e$** | | **MT of CO2e** | | **MT of CO2e** |
| 1 Electric | 46,600 | 83,234 | 59.49% | 52,186 | -6.51% | 55,823 |
| 2 Natural Gas | 131,623 | 150,392 | 41.29% | 106,441 | 18.03% | 90,179 |
| **Total** | 178,223 | 233,626 | 47.28% | 158,627 | 8.65% | 146,001 |
| **Solid Waste[4]** | | | | | | |
| **Source** | **MT of CO2e** | **MT of $CO_2e$** | | **MT of CO2e** | | **MT of CO2e** |
| 1 Solid Waste Disposal | 9,359 | 12,006 | 336.56% | 2,750 | -69.23% | 8,939 |
| 2 Green Waste Recycling | DNA | | | | | |
| 3 Materials Recycling | DNA | | | | | |
| **Total** | 9,359 | 12,006 | 336.56% | 2,750 | -69.23% | 8,939 |
| **Landscape Design[5]** | | | | | | |
| **Sources:** | **MT of CO2e** | **MT of $CO_2e$** | | **MT of CO2e** | | **MT of CO2e** |
| 1 Landscape Maintenance Emissions | 36 | 36 | 12.50% | 32 | 20.41% | 27 |
| 2 Carbon sink from $CO_2$ sequestration | DNA | | | | | |
| **Total** | 36 | 36 | 12.50% | 32 | 20.41% | 27 |
| **Agriculture[6]** | | | | | | |
| **Sources:** | **MT of CO2e** | **MT of $CO_2e$** | | **MT of CO2e** | | **MT of CO2e** |
| 1 Enteric Fermentation | 22,572 | 24,248 | 0.00% | 24,248 | -77.14% | 106,095 |
| 2 Manure Management | 27,515 | 29,780 | 0.00% | 29,780 | -77.36% | 131,555 |
| 3 Rice Cultivation | 142,346 | 177,933 | -1.73% | 181,067 | 36.44% | 132,703 |
| 4 Agricultural Residue Burning | 3,011 | 3,011 | -1.33% | 3,051 | -80.09% | 15,329 |
| 5 Crop Growth | 378,097 | 378,097 | -2.06% | 386,054 | -2.99% | 397,944 |
| 6 Animals and Runoff | 77,806 | 77,806 | -0.82% | 78,453 | -25.65% | 105,515 |
| 7 Fertilizer Use | 101,392 | 101,392 | -0.94% | 102,351 | 52.37% | 67,173 |
| **Total** | 752,739 | 792,267 | -1.58% | 805,005 | -15.82% | 956,315 |
| **Net Total Emissions** | | | | | | |
| **Category** | **MT of CO2e** | **MT of $CO_2e$** | | **MT of CO2e** | | **MT of CO2e** |
| Energy | 178,223 | 233,626 | 47.28% | 158,627 | 8.65% | 146,001 |
| Solid Waste | 9,359 | 12,006 | 336.56% | 2,750 | -69.23% | 8,939 |
| Landscape Design | 36 | 36 | 12.50% | 32 | 20.41% | 27 |
| Agriculture | 752,739 | 792,267 | -1.58% | 805,005 | -15.82% | 956,315 |
| Transportation | 348,213 | 479,641 | 88.38% | 254,610 | 12.20% | 226,910 |
| **Total** | **1,288,571** | **1,517,576** | *24.29%* | **1,221,024** | *-8.76%* | **1,338,192** |
| Does the County Meet the AB 32 Reduction Goals[7]? | **Yes** | | | | | |

[1] Business-As-Usual (BAU) refers to continued operations and development of the County without the inclusion of recently-adopted sustainability initiatives. The BAU scenario describes how emissions would be in year 2020, if the emissions inventory continued to grow strictly based upon the land use growth projections for the County and the naturally occurring events that might change the character of emissions.

[2] The relatively small increase in emissions between 1990 and 2008 (12.16%), and between 2008 and 2020 (30.48%) in transportation emissions is due to the increases in efficiency and decreases in emissions from onroad vehicles over the years between 1990 and now. These are incorporated into the emission factors provided by EMFAC for the years modeled. Therefore, although the amount of vehicle miles traveled increased between 1990 and 2008 and then again between 2008 and 2020, the increase in vehicle miles traveled is not directly proportional to the increase in emissions.

**Sutter County**
**Green House Gas Emissions**
**Inventory Summary**

[3] The reduction in emissions from electricity usage between 1990 and 2008 is due to the efficiencies and emission reductions that have been incorporated by PG&E over those 18 years. Electrical usage in 2008 was provided by PG&E at approximately 218 million kWhs. Electrical usage in 1990 was estimated at approximately 208 million kWhs (a 15% change). However, the PG&E specific emission factor for CO2 in 1990 was 620 lbs/MWh, where in 2008 it was 524 lbs/MWh. Therefore, the efficiencies and emission reductions provided by PG&E have resulted in a County wide decrease in emissions even with an increase in electricity use during this period.

[4] The generation of solid waste between 1990 and 2008 increased by approximately 15% due to County growth, however the incorporation of a methane capture system at the landfill has resulted in the decrease in emissions between this same period. The primary source of greenhouse gas emissions from a landfill is the generation of methane from the decomposition of solid waste. In 1990 there was no system in place to capture the methane and therefore the methane was released unchecked into the environment. In the 2008 baseline year, the Recology Ostrom Road Landfill was flaring the methane gas, thereby reducing the amount released into the environment. Further in 2009 The Recology Ostrom Road Landfill began a gas-energy conversion which further reduces the emissions of methane gas which results in even less emissions from waste generation. As the progression of technology increases, there is less methane released to the environment per ton of waste landfilled.

[5] Offroad landscape equipment emissions for the 2008 and 2020 emissions were determined from the URBEMIS model which takes into account the modeling year and projected emissions factors for future years with respect to landscape fuels and technology available. This is the reason for the smaller than expected increase in emissions during this period.

[6] Actual agricultural data was obtained for the County for 1990 and 2008, therefore the resulting decrease in emissions is due to the decrease in the amount of acreage cultivated and the number of animals raised between 1990 and 2008. Agriculture in 2020 was conservatively forecasted. It was assumed that the only reduction in agriculture was as a result of the growth of the Sutter Pointe Community anticipated by 2020. Total growth in 2030 is estimated at 7,527 acres within the Sutter Pointe Specific Plan Area. Approximately 1/3 of that (2,509 acres) is anticipated to be built out by 2020. Given that 70% of the existing Sutter Pointe Specific Plan area is cultivated with rice and the remaining 30% is fallow, it was anticipated that by 2020 there would be a total reduction in rice cultivation of 1,756 acres.

[7] AB 32 sets a statewide reduction goal of achieving greenhouse gas emissions equivalent to 1990 statewide levels by 2020.

**Sutter County**
**Modeling Assumptions for Greenhouse Gas Emissions**

***Assumptions***

[1] 2008 Electrical Data provided by PG&E for unincorporated Sutter County. Projections for 2030 by PBSJ (2010 GP Update EIR). 1990 historical data and 2020 projections were not available. Electrical usage was estimated for these years as follows:
- 1990 usage estimated as a 0.86% decrease per year for a total of a 15% reduction from existing year usage for all land uses.
- 2020 estimate based on % of total buildout to occur in 2020.

[2] Water is provided by Water Works District NO. 1. This water is supplied to the community of Robbins. There are approximately eighty eight residential connections and approximately five commercial/industrial connections. Other residents of unincorporated Sutter have private wells. Water usage is not metered therefore distribution between residential and commercial was determined based number of connections. Water consumption data was available for 2008 only. Projections for 2030 by PBSJ (2010 GP Update EIR). 1990 and 2020 usage were determined as follows:
- 1990 usage estimated as a 0.86% decrease per year for a total of a 15% reduction from existing year usage for all land uses.
- 2020 estimate based on % of total buildout to occur in 2020.

[3] Sutter County Solid Waste is conducted under a joint powers agreement with Yuba County and the cities of Live Oak, Marysville Wheatland, Yuba City and the City of Gridley in Butte County. Data received from State of California Calrecycle.gov and Recology Ostrom Road Landfill services the Yuba/Sutter JPA. Projections for 2030 by PBSJ (2010 GP Update EIR). Waste generation data only available for 2008. 1990 and 2020 data estimated as follows:
- 1990 generation estimated as a 0.86% decrease per year for a total of a 15% reduction from existing year usage for all land uses.
- 2020 estimate based on % of total buildout to occur in 2020.

[4] Assumes average one way distance of 27.7 miles from waste source to landfill.

[1] 2008 Natural Gas Data provided by PG&E for unincorporated Sutter County. Projections for 2030 by PBSJ (2010 GP Update EIR). 1990 historical data and 2020 projections were not available. Natural Gas usage was estimated for these years as follows:
- 1990 usage estimated as a 0.86% decrease per year for a total of a 15% reduction from existing year usage for all land uses.
- 2020 estimate based on % of total buildout to occur in 2020.

| | | | Growth | | | |
|---|---|---|---|---|---|---|
| **Land Use Data** | **2008** | **2020** | **from 2008** | **from 2020** | **2030** | **% total growth in 2020** |
| Residential Units | 9,768 | 15,181 | 13,415 | 8,002 | 23,183 | 40.35% |
| Total com/ind | 4,644,200 | 11,747,232 | 17,703,400 | 10,600,368 | 22,347,600 | 40.12% |

***County Data Sources***

[1] *Source:* *PG&E John Bohman, Green Communities and Innovator Pilots, received 02/16/2010*

*Note:* Average estimated per year reduction that will result in the 15% reduction from existing that is standard practice for backcasting from existing to 1990 levels.

[2] *Source:* Department of Water Usage *Sutter County Water Works #1*

[3] *Source:* *Source: State of California, CalRecycle, Disposal Reporting System (DRS),http://www.calrecycle.ca.gov/lgcentral/Reports/ReportViewer.aspx?OriginJurisdictionIDs=593&ReportYear=2008&ReportName=ReportEDRSJurisDisposalByFacility, accessed 03/10/2010*

[4] *Source:* Google Maps; http://maps.google.com/maps?f=d&source=s_d&saddr=Schlag+Rd+%26+Hughes+Rd,+Meridian,+Sutter,+California+95957&daddr=5900+Ostrom+Road,+Wheatland,+CA&hl=en&geocode=&mra=ls&sll=39.093175,-121.567565&sspn=0.398089,0.615921&ie=UTF8&z=11&layer=c&pw=2 ; accessed 4/16/2010

***Urbemis deviations from County data:***

Trip rates utilized for Urbemis modeling were provided from DKS, Sutter County Traffic Travel Demand Forecast Model Validation and Difference in VMT and ADT due to rounding error in the Urbemis model. Schools and parks have been incorporated into the commercial category in the traffic model. Sutter Airport has been incorporated into the industrial category.

***Mobile Source Emissions***

| | $CO_2$ | $CH_4$ | $N_2O$ | **Abbreviations** |
|---|---|---|---|---|
| *Onroad Emission Factors (g/mile)* | | | | |
| Non Cat passenger Car [5] | 480.735 | 0.1696 | 0.0197 | $EF_{MMV}$, $EF_{NMV}$ |
| Cat passenger Car [5] | 403.474 | 0.1355 | 0.0504 | $EF_{MMV}$, $EF_{NMV}$ |
| Diesel Passenger Car [5] | 373.824 | 0.0006 | 0.0012 | $EF_{MMV}$, $EF_{NMV}$ |
| Non cat light-duty truck [5] | 476.139 | 0.1908 | 0.0218 | $EF_{MMV}$, $EF_{NMV}$ |

**Sutter County**
**Modeling Assumptions for Greenhouse Gas Emissions**

| | | | | |
|---|---|---|---|---|
| Cat light duty truck [5] | 438.471 | 0.1516 | 0.0639 | $EF_{MMV}$, $EF_{NMV}$ |
| Diesel Light duty Truck [5] | 358.258 | 0.0011 | 0.0017 | $EF_{MMV}$, $EF_{NMV}$ |
| Non Cat light-duty truck 2 [5] | 476.685 | 0.1908 | 0.0218 | $EF_{MMV}$, $EF_{NMV}$ |
| Cat light duty truck 2 [5] | 431.99 | 0.1516 | 0.0639 | $EF_{MMV}$, $EF_{NMV}$ |
| Diesel Light duty truck 2 [5] | 369.35 | 0.0011 | 0.0017 | $EF_{MMV}$, $EF_{NMV}$ |
| Non Cat Medium duty Truck [5] | 605.047 | 0.4181 | 0.0473 | $EF_{MMV}$, $EF_{NMV}$ |
| Cat med duty truck [5] | 649.935 | 0.2356 | 0.1317 | $EF_{MMV}$, $EF_{NMV}$ |
| Diesel Med duty truck [5] | 362.668 | 0.0051 | 0.0048 | $EF_{MMV}$, $EF_{NMV}$ |
| Non Cat lite-heavy duty truck [5] | 567.895 | 0.4181 | 0.0473 | $EF_{MMV}$, $EF_{NMV}$ |
| Cat Light-heavy duty truck [5] | 567.895 | 0.2356 | 0.1317 | $EF_{MMV}$, $EF_{NMV}$ |
| Diesel Lite-heavy duty truck [5] | 642 | 0.0051 | 0.0048 | $EF_{MMV}$, $EF_{NMV}$ |
| Non Cat lite-heavy duty truck 2 [5] | 567.895 | 0.4181 | 0.0473 | $EF_{MMV}$, $EF_{NMV}$ |
| Cat Light-heavy duty truck 2 [5] | 567.895 | 0.2356 | 0.1317 | $EF_{MMV}$, $EF_{NMV}$ |
| Diesel Lite-heavy duty truck 2 [5] | 642 | 0.0051 | 0.0048 | $EF_{MMV}$, $EF_{NMV}$ |
| Non Cat med-heavy duty truck [5] | 567.895 | 0.4181 | 0.0473 | $EF_{MMV}$, $EF_{NMV}$ |
| Cat med-heavy duty truck [5] | 567.895 | 0.2356 | 0.1317 | $EF_{MMV}$, $EF_{NMV}$ |
| Diesel med-heavy duty truck [5] | 1505 | 0.0051 | 0.0048 | $EF_{MMV}$, $EF_{NMV}$ |
| Non cat Heavy Duty truck [5] | 567.895 | 0.4181 | 0.0473 | $EF_{MMV}$, $EF_{NMV}$ |
| Cat heavy duty truck [5] | 567.895 | 0.2356 | 0.1317 | $EF_{MMV}$, $EF_{NMV}$ |
| Diesel heavy duty truck [5] | 1924.234 | 0.0051 | 0.0048 | $EF_{MMV}$, $EF_{NMV}$ |
| Non Cat Other Bus [5] | 567.895 | 0.4181 | 0.0473 | $EF_{MMV}$, $EF_{NMV}$ |
| Cat other bus [5] | 567.895 | 0.2356 | 0.1317 | $EF_{MMV}$, $EF_{NMV}$ |
| Diesel Other Bus [5] | 1505 | 0.0051 | 0.0048 | $EF_{MMV}$, $EF_{NMV}$ |
| Non Cat Urban Bus [5] | 567.895 | 0.4181 | 0.0473 | $EF_{MMV}$, $EF_{NMV}$ |
| Cat Urban Bus [5] | 567.895 | 0.2356 | 0.1317 | $EF_{MMV}$, $EF_{NMV}$ |
| Diesel Urban Bus [5] | 3020.114 | 0.0051 | 0.0048 | $EF_{MMV}$, $EF_{NMV}$ |
| Non cat motorcycle [5] | 107.73 | 0.0672 | 0.0069 | $EF_{MMV}$, $EF_{NMV}$ |
| Cat motorcycle [5] | 0.0000 | 0.0672 | 0.0069 | $EF_{MMV}$, $EF_{NMV}$ |
| Diesel Motorcycle [5] | 0.0000 | 0 | 0 | |
| Non Cat School Bus [5] | 567.895 | 0.4181 | 0.0473 | $EF_{MMV}$, $EF_{NMV}$ |
| Cat School Bus [5] | 567.895 | 0.2356 | 0.1317 | $EF_{MMV}$, $EF_{NMV}$ |
| Diesel School Bus [5] | 1505 | 0.0051 | 0.0048 | $EF_{MMV}$, $EF_{NMV}$ |
| Non Cat Motor home [5] | 567.895 | 0.4181 | 0.0473 | $EF_{MMV}$, $EF_{NMV}$ |
| Cat Motor home [5] | 567.895 | 0.2356 | 0.1317 | $EF_{MMV}$, $EF_{NMV}$ |
| Diesel Motor home [5] | 1505 | 0.0051 | 0.0048 | $EF_{MMV}$, $EF_{NMV}$ |
| Aviation Gasoline (kg/g) [6] | 8.32 | - | - | $EF_{Caf}$ |
| Aviation Gasoline (gr/g) [7] | - | 7.04 | 0.11 | $EF_{Maf}$, $EF_{Naf}$ |

[5] *Source:* $CH_4$ & $N_2O$: EPA Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance: Direct Emissions from Mobile Combustion Sources; May 2008. EPA430-K-08-004 retrieved: http://www.epa.gov/climateleaders/documents/resources/mobilesource_guidance.pdf

*Source:* $CO_2$ emission Factors determined by EMFAC for 1990 emissions

*Note:* $CO_2$ emissions taken directly from URBEMIS, for 2008 and 2020, shown $CO_2$ emission factors are for 1990 only.

[6] *Source: California Climate Action Registry General Reporting Protocol, Version 3.1 January 2009 (Table C.3 )*

[7] *Source: California Climate Action Registry General Reporting Protocol, Version 3.1 January 2009 (Table C.6 )*

***Landscape and Wood Burning Hearth Emissions***

| | $CO_2$ | $CH_4$ | $N_2O$ | |
|---|---|---|---|---|
| gasoline emission factor (lbs/gallon) [8] | 19.4 | | | $EF_{Cgg}$ |
| gasoline emission factor (gr/gallon) [7] | | 0.50 | 0.22 | $EF_{MF}$, $EF_{NF}$ |
| MMBtu/short ton [9] | 15.38 | - | - | |
| Kg/MMBtu Residential [9] | 93.87 | 0.316 | 0.0042 | $EF_{Cwood}$, $EF_{Mwood}$, $EF_{Nwood}$ |
| Kg/MMBtu Commercial [9] | 93.87 | 0.316 | 0.0042 | |
| Kg/MMBtu Manufacturing [9] | 93.87 | 0.032 | 0.0042 | |

**Abbreviations**

**Sutter County**
**Modeling Assumptions for Greenhouse Gas Emissions**

[8] *Source: http://www.epa.gov/oms/climate/420f05001.htm*

[9] *Source: California Climate Action Registry General Reporting Protocol, Version 3.1 January 2009 (Table C7) For $CO_2$, (Table C8) for $CH_4$ and $N_2O$)*

***Natural Gas***

| | | $CO_2$ | $CH_4$ | $N_2O$ | Abbreviations |
|---|---|---|---|---|---|
| Residential (kg/MMBtu) | SFR [9] | 53.07 | 0.005 | 0.0001 | EFCng, EFMng, EFNng |
| | MFR [9] | 53.07 | 0.005 | 0.0001 | $EF_{Cng}$, $EF_{Mng}$, $EF_{Nng}$ |
| Commercial (kg/MMBtu) | Com [9] | 53.07 | 0.005 | 0.0001 | $EF_{Cng}$, $EF_{Mng}$, $EF_{Nng}$ |
| Industrial (kg/MMBtu) | Ind [9] | 53.07 | 0.001 | 0.0001 | $EF_{Cng}$, $EF_{Mng}$, $EF_{Nng}$ |

***Electricity***

| | | $CO_2$ | $CH_4$ | $N_2O$ | Abbreviations |
|---|---|---|---|---|---|
| | 1990 [10] | 620 | 0.0067 | 0.0037 | EFCele, EFMele, EFNele |
| 2008+ (lbs/MWh) | 2008 [10] | 524 | 0.0302 | 0.0081 | $EF_{Cele}$, $EF_{Mele}$, $EF_{Nele}$ |
| | 2020 [10] | 524 | 0.0302 | 0.0081 | $EF_{Cele}$, $EF_{Mele}$, $EF_{Nele}$ |

[10] *Source: California Climate Action Registry General Reporting Protocol, Version 3.1 January 2009 (Table C2,E2-E3)*

*Source: PG&E: GHG Data Requests, Fact Sheet GHG Data.pdf, Email from John Bohman January 11, 2010 ($CO_2$ emission rate 2003-2009)*

***Solid Waste***

| | $CO_2$ | $CH_4$ | $N_2O$ | Not Gas Dependent | Abbreviations |
|---|---|---|---|---|---|
| Residential (waste tons/cuyd) [11] | | | | 0.1125 | d |
| Non-commercial (waste tons/cuyd) [11] | | | | 0.225 | d |
| Truck capacity (cy/truck) [12] | | | | 33 | $C_T$ |
| Offroad emission factors (lbs/hr) [13] | Composite Values | | | | $EF_{CWD}$, $EF_{MWD}$, $EF_{NWD}$ |
| diesel offroad emission factor (gr/gallon) [14] | | 0.058 | 0.026 | | |
| diesel emission factor (lbs/gallon) [15] | 22.2 | | | | $EF_{Cdg}$ |
| (gr/mile) [14] | 3464.1638 | 0.0051 | 0.0048 | | $EF_{CWT}$, $EF_{MWT}$, $EF_{NWT}$ |
| (kg/gallon) [6] | 10.15 | | | | |
| miles/gallon [16] | 2.93 | | | | |
| Landfill w/o recovery [17] | | 0.52 | | | $EF_{MWF}$ |
| Landfill w/ Flaring [17] | | 0.13 | | | $EF_{MWF}$ |
| Landfill w/ electric gen [17] | | 0.07 | | | $EF_{MWF}$ |
| National Average [17] | | 0.27 | | | $EF_{MWF}$ |
| Landfill w/ Combination | | 0.09 | | | |
| % CH4 to generate electricity | | | | 66.67% | |
| % CH4 flared | | | | 33.33% | |

[11] *Source: EPA Standard Volume-to-Weight Conversion Factor obtained from http://www.epa.gov/osw/conserve/tools/recmeas/docs/guide_b.pdf, accessed January 18, 2010.*

[12] *Source: Heil Website (http://www.heil.com/products/python.asp) accessed 1/18/2010 & http://www.tigerdude.com/garbage/frontload/index.html accessed 1/18/2010.*

[13] *Source: SCAQMD OffroadEF07_25.xls (http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html)*

[14] *Source: California Climate Action Registry General Reporting Protocol, Version 3.1 January 2009 (Table C.4 )*

[15] *Source: http://www.epa.gov/oms/climate/420f05001.htm*

[16] *Source: Waste Management's LNG Truck Fleet: Final Results January 2001. (pg 14)*

[17] *Source: EPA Solid Waste Management and Greenhouse Gases; A life-cycle assessment of emissions and Sinks, 3rd edition, September 2006.*

*(GWP of CH4 is 21, therefore to convert MTCO2e of Methane to MTCH4 divide MTCO2e by 21)*

*(all our calculations are in short tons, converted to metric tons after combining)*

**Sutter County**
**Modeling Assumptions for Greenhouse Gas Emissions**

***Standard Conversion Rates:***

| | $CO_2$ | $CH_4$ | $N_2O$ | Not Gas Dependent | | Abbreviations |
|---|---|---|---|---|---|---|
| gr/lb [17] | | | | 453.59291 | | $C_2$ |
| lbs/short ton [17] | | | | 2000 | | |
| metric tons/short ton [17] | | | | 0.907185 | | |
| kg/ short ton [17] | | | | 907.18474 | | |
| kg/metric ton [17] | | | | 1000 | | $C_3$ |
| g/metric ton [17] | | | | 1,000,000 | | $C_6$ |
| lbs/metric ton [17] | | | | 2204.62 | | $C_1$ |
| therms per MMBTU [17] | | | | 0.10 | | |
| kWh/Mg (potable water) [18] | | | | 3,500 | | $C_4$ |
| kWh/MG (waste water) [18] | | | | 1,911 | | $C_5$ |
| Waste Water % of Potable [19] | | | | % indoor | % outdoor | |
| SFR | | | | 65 | 35 | $\%_{in}$, $\%_{out}$ |
| MFR | | | | 82 | 18 | $\%_{in}$, $\%_{out}$ |
| COM | | | | 71 | 29 | $\%_{in}$, $\%_{out}$ |
| IND | | | | 80 | 20 | $\%_{in}$, $\%_{out}$ |
| GWP | 1 | 21 | 310 | | | |
| Gallons/Acre foot [20] | | | | 325,851.43 | | |

[17] *Source: California Climate Action Registry General Reporting Protocol, Version 3.1 January 2009 (Appendix B)*

[18] *Source: California Energy Commission "Refining Estimates of Water-related Energy Uses in California", December 2006, CEC-500-2006-118*

[19] *Source: Integrated Water Resources Plan (IRP), MWD Report No. 1107, March 1996. (accessed from http://esce.ucr.edu/soilwater/summer2000.html)*

[20] *Source:* http://onlineconversion.com/volume.htm

| ***Average Square footage for dwelling units*** | | [21] | [21] | [21] | ***Schools*** [22] | | |
|---|---|---|---|---|---|---|---|
| ***Average Square Footage per student*** | ***Year*** | ***SFR*** | ***MFR*** | ***Retire*** | ***Elem*** | ***Middle*** | ***High*** |
| | 1990 | 2160 | 1000 | 1000 | 59 | 80 | 95 |
| | 2008 | 2508 | 1238 | 1238 | 73 | 80 | 95 |
| | 2020 | 2508 | 1238 | 1238 | 73 | 80 | 95 |

[21] *Source: US Census Bureau retrieved: http://www.census.gov/const/www/charindex.html#multiunit; 2/10/2010 (SFR and MFR*

[21] *Source: Retirement copied MFR until better data is available.*

[22] *Source: California Department of Education Complete Schools Report, May 23 2007. (elementary, junior high, high school)*

| | | [23] | [23] | [24] | [24] | [25] | [26] |
|---|---|---|---|---|---|---|---|
| ***Average Square Footage per student*** | ***Year*** | ***J. College*** | ***University*** | ***Hotel*** | ***Motel*** | ***Congregate*** | ***Hospital*** |
| ***Average square foot per bed (hotel/motel)*** | 1990 | 206 | 206 | 512.82 | 512.82 | 400 | 357.14 |
| ***Average square foot per bed (hospital)*** | 2008 | 238 | 238 | 512.82 | 512.82 | 400 | 357.14 |
| ***Average square foot per bed (congregate ca*** | 2020 | 238 | 238 | 512.82 | 512.82 | 400 | 357.14 |

[23] *Source: American School & University "Median square footage of building maintained per FTE student, Penton Media 2009. (College & University)*

[24] *Source: Energy Star Space Use Information - Hotel/Motel retrieved: https://www.energystar.gov/istar/pmpam/help/Hotel_Motel_Space_Use_Information.htm 2/11/2010*

[25] *Source: Congregate care based on 2 people per room (State Assisted Living Policy 1998 Section 1, http://aspe.hhs.gov/daltcp/reports/98state1.htm) and*

[26] *Source Energy Star Space Use Information - Hospitals Retrieved: https://www.energystar.gov/istar/pmpam/help/Hospital_(Acute_Care_and_Children_s)_Space_Use_Information.htm 2/11/2010*

Note: since accurate data for 2009 and beyond is not available at this time, it is assumed to remain the same for all future years. Data will be updated as available.

Note: When data was unavailable for individual years, the data for the closest prior year was used.

**Sutter County**
**Modeling Assumptions for Greenhouse Gas Emissions**

**Agricultural**

| | $CO_2$ | $CH_4$ | $N_2O$ | | | Abbreviations |
|---|---|---|---|---|---|---|
| Density of Methane ($kg/m^3$) [27] | | 0.678 | | | | $C_7$ |
| # of hectares/acre [27] | | | | 0.4046945 | | $C_{10}$ |
| Ratio $CH_4$-C [27] | | 0.005 | | | | $R_{CH4-C}$ |
| Conversion $CH_4$-C to Full Mol. Wt. [27] | | 1.33 | | | | $C_{11}$ |
| Emission factor for liquid systems (kg $N_2O$-N/kg N) [27] | | | 0.001 | | | $EF_{NML}$ |
| Emission factor for solid systems (kg $N_2O$-N/kg N) [27] | | | 0.02 | | | $EF_{NMS}$ |
| Ratio $N_2O$:$N_2$ [$C_{10}$] [27] | | | 1.57 | | | $C_9$ |
| Volitazition percent for all non-PRP ag soils [27] | | | 0.2 | | | $\%_{VI}$ |
| Volitazition percent for manure management [27] | | | 0 | | | $\%_{VM}$ |
| Rate $NH_3$-$NO_X$ [27] | | | 0.01 | | | $EF_{NH3-NOX}$ |
| Emission Factor for pastures, ranges, and paddocks [27] | | | 0.02 | | | $EF_{PRP}$ |
| Emission factor for ground application [27] | | | 0.0125 | | | $EF_{NV}$ |
| Cwt (hundred weight) | | | | 100 | lbs | |
| Volitazition of synthetic fertilizers [27] | | | 0.1 | | | $V_{FS}$ |
| Volitazition of organic fertilizers [27] | | | 0.2 | | | $V_{FO}$ |
| % leached from soils [27] | | | 0.3 | | | $\%_{Leach}$ |
| Leaching Factor (kg $N_2O$-N / kg N) [27] | | | 0.025 | | | $F_{leach}$ |
| Nitrogen Content of Non-manure Organics [27] | | | 0.041 | | | $N_{ORG}$ |
| Emission factor for soils (kg N2O-N/kgN) [27] | | | 0.01 | | | $EF_{NDE}$ |
| N2O Emissions from Volitazition [27] | | | 0.01 | | | $EF_{NIE}$ |
| N content of aboveground biomass for N-fixing crop production [27] | | | 0.03 | | | $C_8$ |
| Emission Factor for Temperate zone Histols (kg N2O-N / ha_yr) [27] | | | 8 | | | $EF_{NHT}$ |
| Emission Factor for Subtropic zone Histols (kg $N_2O$-N / ha_yr) [27] | | | 12 | | | $EF_{NHS}$ |
| $N_2O$-N Emissions Ratio [$R_{N20\_N}$] [27] | | | 0.007 | | | $R_{N2O-N}$ |
| % of target year applied [27] | | | 0.65 | | | $C_{12}$ |
| % of following year applied [27] | | | 0.35 | | | $C_{13}$ |
| Cotton (lbs/bale) [28] | | | | 480 | lbs | |
| average population growth per year [29] | | | | 0.40% | | |
| Reduction of acres of rice for 2020 [30] | | | | 1756 | | |

[27] *Source:* EPA State Inventory Tool for Agriculture, July 2008.

[28] *Source:* http://www.spectrumcommodities.com/pdf/convfactY2K.pdf

[29] *Source:* State of California, Department of Finance, California County Population Estimates and Components of Change by Year, July 1, 2000-2009. Sacramento, California, December 2009.

[30] *Note:* *In 2009 70% of the Sutter Pointe area is utilized as rice agriculture, the remaining 30% is fallow. 2020 build out of Sutter Pointe is estimated at 1/3 of 2030 buildout acreage (or 2,509 acres). Since 70% of existing is utilized for rice growth, 70% of the Sutter Pointe acreage from 2020 buildout is estimated to be reduced from existing acreage potential for rice.*

**Sutter County**
**Modeling Assumptions for Greenhouse Gas Emissions**

**Reduction Assumptions**

| | units | | *Square feet* total | total | | |
|---|---|---|---|---|---|---|
| | **2008** | **2020** | **2008** | **2020** | **Growth** | |
| Total | | | | | | |
| SF Residential | 5,163 | 5,804 | 12,948,804 | 14,556,432 | 641 | 1,607,628 |
| MF Residential | 4,605 | 9,377 | 5,700,990 | 11,608,726 | 4,772 | 5,907,736 |
| Industrial | | | 3,279,680 | 7,951,216 | | 4,671,536 |
| Commercial (including mixed use) | | | 1,364,520 | 3,796,016 | | 2,431,496 |
| Totals | 9,768 | 15,181 | 23,293,994 | 37,912,390 | 5,413 | 14,618,396 |
| Sutter Pointe | | | | | | |
| SF Residential | 0 | 0 | 0 | 0 | 0 | 0 |
| MF Residential | 20 | 2,610 | 24,760 | 3,231,180 | 2,590 | 3,206,420 |
| Industrial | | | 233,600 | 2,708,600 | | 2,475,000 |
| Commercial (including mixed use) | | | 45,600 | 1,067,933 | | 1,022,333 |
| Totals | 20 | 2,610 | 303,960 | 7,007,713 | 2,590 | 6,703,753 |
| Unincorporated Sutter County | | | | | | |
| SF Residential | 5,163 | 5,804 | 12,948,804 | 14,556,432 | 641 | 1,607,628 |
| MF Residential | 4,585 | 6,767 | 5,676,230 | 8,377,546 | 2,182 | 2,701,316 |
| Industrial | | | 3,046,080 | 5,242,616 | | 2,196,536 |
| Commercial (including mixed use) | | | 1,318,920 | 2,728,083 | | 1,409,163 |
| Totals | 9,748 | 12,571 | 22,990,034 | 30,904,677 | 2,823 | 7,914,643 |

* Residential is split from Commercial/Industrial with respect to utility usage.

| | 2020 |
|---|---|
| % growth in residential | 55.42% |
| % growth in commercial/industrial | 152.94% |
| %growth in commercial | 178.19% |
| % growth in industrial | 142.44% |
| % of development in 2020 that existed in 2008 | 61.44% |
| % of development in 2020 from Growth | 38.56% |
| % of 2020 growth from Sutter Pointe | 45.86% |
| % of 2020 total from Sutter Pointe | 18.48% |

| | | | |
|---|---|---|---|
| % total 2020 residential that is growth | 35.66% | % total 2020 commercial that is growth | 64.05% |
| % of total 2020 residential development from Sutter Pointe | 17.19% | % of total 2020 commercial from Sutter Pointe | 28.13% |
| % of growth from residential within Sutter Pointe | 47.85% | % of growth from com within Sutter Pointe | 42.05% |
| % total 2020 commercial & industrial that is growth | 60.47% | % total 2020 industrial that is growth | 58.75% |
| % of total 2020 industrial & commercial from Sutter Pointe | 32.15% | % of total 2020 industrial from Sutter Pointe | 34.07% |
| % of growth from com/ind within Sutter Pointe | 49.24% | % of growth from ind within Sutter Pointe | 52.98% |
| % total 2020 growth that is commercial & ind | 16.63% | | |

**Sutter County**
**Modeling Assumptions for Greenhouse Gas Emissions**

| | | |
|---|---|---|
| Conceptual Transit Plan | | |
| # of dwelling units for Phase 1 | | 7600 |
| # of dwelling uints by 2020 | | 2610 |
| % of Phase 1 completed by 2020 | [33] | 0.3434211 |
| | | |
| % of Construction/Demolition waste ir | [34] | 0.29 |

[33] Source HDR 2008. The Sutter Pointe Conceptual Transit Plan
[34] Source CIMWB 2009. California 2008 Statewide Characterization Study, August

# Carbon Dixoide Formula Sheet

**Sutter County**

**A. Direct Sources**

**A1-4. Mobile (Construction Equipment, Motor Vehicles, Landscape Equipment, and Wood Burning Hearth)**

Carbon dioxide emissions from construction, motor vehicles, landscape, and wood burning hearth emissions are provided from URBEMIS in short tons per year. Short tons are converted to metric tons by multiplying by 0.09071847.

***Emissions from airports:***

Emissions of carbon dioxide from airports (in particular airplanes) are calculated using the following equation:

$$\mathbf{E_{Caf} = (U_{Aaf} * EF_{Caf}) / C_3}$$

Where:

$E_{caf}$ = Annual emissions of $CO_2$ from airport fuel (MT/year).

$U_{aaf}$ = Annual usage of aviation fuel (gallons/year).

$EF_{Caf}$ = Emission factor for aviation fuel (kg/gallon)

$C_3$ = Conversion factor from kg to metric tons. (1,000 kg/MT)

**A5. Stationary Sources (Natural Gas)**

Emissions of carbon dioxide from natural gas usage are calculated using the following equation:

$$\mathbf{E_{Cng} = (U_{Ang} * EF_{Cng}) / C_3}$$

Where:

$E_{Cng}$ = Annual emissions of $CO_2$ from Natural Gas (MT/year).

$U_{Ang}$ = Annual usage of natural gas (MMBTU/year).

$EF_{Cng}$ = Emission factor for natural gas usage (kg/MMbtu)

$C_3$ = Conversion factor from kg to metric tons. (1,000 kg/MT)

**B. Indirect Sources**

**B1. Electricity**

Emissions of carbon dioxide from electricity usage are calculated using the following equation:

$$\mathbf{E_{Cele} = (U_{Ae} * EF_{Cele}) / C_1}$$

Where:

$E_{Cele}$ = Annual emissions of $CO_2$ from Electricity (MT/year).

$U_{Ae}$ = Annual usage of electricity (MWh/year).

$EF_{Cele}$ = Emission factor for electrical usage (lbs/MWh).

$C_1$ = Conversion factor from lbs to metric tons ( 1 MT = 2204.62 lbs).

**Sutter County**

**B2. Potable Water**

Emissions of Carbon Dioxide from potable water treatment and transportation for domestic uses are calculated using the following equation:

$$E_{Cpot} = (U_{epot} * EF_{Cele})/C_1$$

Where:

$E_{Cpot}$ = Annual Emissions of $CO_2$ from electricity used for potable water treatment and transportation (MT/year).

$U_{epot}$ = Annual electricity usage for potable water treatment and transportation (MWh/year).
= $U_{Apot} * C_4$

$U_{Apot}$ = Annual water usage (MG/yr)

$C_4$ = Conversion factor for determining kWhs used to treat water.

$EF_{Cele}$ = Emission factor for electrical usage (lbs/MWh).

$C_1$ = Conversion factor from lbs to metric tons ( 1 MT = 2204.62 lbs).

**B3. Solid Waste**

Emissions of carbon dioxide from solid waste is a summation of the emissions from solid waste transport, and the use of equipment at disposal sites. CO2 emissions from decomposition (treatment) are considered non-anthropogenic and are not included as part of the emissions inventory. In addition, $CO_2$ from landfilled waste is partially sequestered and therefore acts as a carbon sink.

$$E_{CTSW} = E_{CWT} + E_{CWD} - E_{CWF}$$

Where:

$E_{CTSW}$ = Annual Emissions of carbon dioxide from solid waste (MT/year).

$E_{CWT}$ = Annual emissions of $CO_2$ from solid waste transportation (MT/year).

$E_{CWD}$ = Annual emissions of $CO_2$ from solid waste disposal, (MT/year).

$E_{CWF}$ = Annual emissions of $CO_2$ from waste disposal (MT/year).

**B3a. Anthropogenic Carbon**

$E_{CWF}$ = Fugitive emissions of carbon dioxide are considered anthropogenic and are not included in this analysis.

**B3b. Exhaust Emissions (Hauling Trucks)**

Emissions of carbon dioxide from solid waste transportation are calculated using the following equations:

$$E_{CWT} = (((U_{SW} / d) / C_T) * M * EF_{CWT}) / C_6$$

Where:

$E_{CWT}$ = Annual emissions of $CO_2$ from solid waste transportation (MT/year).

$U_{SW}$ = Annual waste production for disposal and treatment (tons/year).

d = Average solid waste density, (tons/cubyc yard.)

$C_T$ = Average truck load capacity.

M = Average trip mileage (round trip from source to landfill).

$EF_{CWT}$ = Emission factor for hauling trucks.

$C_6$ = Conversion factor from gr to metric tons.

**Sutter County**

**B3c. Exhaust Emissions (Disposal Equipment)**

Emissions of carbon dioxide from disposal equipment are calculated using the following equation:

$$E_{CWD} = (EF_{CWD} * h * n) / C_1$$

Where:

$E_{CWD}$ = Annual emissions of carbon dioxide from solid waste disposal, MT/year.

$EF_{CWD}$ = Emission factor for disposal equipment, lbs/hr (SCAQMD off-Road Mobile Source Emission Factors, 2007).

h = Operating hours (% of day attributed to project waste generation - Total hours of operation of facility per day times the percentage of total annual waste attributable to Project generation).

n = Days per year. (Number of days per year the landfill is open to disposal).

$C_1$ = Conversion factor from lbs to metric tons ( 1 MT = 2204.62 lbs).

Note: Emissions from onsite equipment is only relevant if the project has control over landfill operations.

**B4. Wastewater**

Emissions of carbon dioxide from waste water treatment are calculated using the following equation:

$$E_{CWW} = (U_{eWW} * EF_{Cele})/C_1$$

Where:

$E_{CWW}$ = Annual Emissions of $CO_2$ from electricity used for potable water treatment and transportation (MT/year).

$U_{eWW}$ = Annual electricity usage for waste water treatment and transportation (MWh/year).
= $(U_{Apot} * \%_{in}) * C_5$

$U_{Apot}$ = Annual potable water used (MG/yr)

$\%_{in}$ = Percentage of potable water used indoors.

$C_5$ = Conversion factor for determining MWh used per MG of waste water treated.

$EF_{Cele}$ = $CO_2$ Emission factor for electrical usage (lbs/MWh).

$C_1$ = Conversion factor from lbs to metric tons ( 1 MT = 2204.62 lbs).

# Methane Formula Sheet

**Sutter County**

## A. Direct Sources

### A1. Mobile Source (Construction Equipment)

Emissions of methane from construction vehicles are calculated using the following equations:

$$E_{MCON} = ((U_{AG} * EF_{MHDV}) / C_6)$$

Where:

$E_{MCON}$ = Annual emissions of methane from construction vehicle exhaust (MT/year)

$U_{AG}$ = Annual gallons of gas used by construction vehicles

= $(E_{CCON} * C_1) / EF_{Cdg}$

$E_{CCON}$ = Annual emissions of $CO_2$ from Construction Vehicles (from URBEMIS).

$C_1$ = Conversion factor from lbs to metric tons (1 MT = 2204.62 lbs).

$EF_{Cdg}$ = Conversion of $CO_2$ from lbs to gallons for diesel.

$EF_{MHDV}$ = Emission factor for heavy duty vehicles, gr/gallon.

$C_6$ = Conversion factor from gr to MT.

### A2. Mobile Source (Motor Vehicles)

Emissions of methane from motor vehicles are calculated using the following equations:

$$E_{MMV} = ((M * EF_{MMV}) / C_6)$$

Where:

$E_{MMV}$ = Annual emissions of methane from motor vehicles, MT/year.

M = Annual mileage for motor vehicles, miles/year (from Urbemis2007 9.2.4 output).

$EF_{MMV}$ = Emission factor for motor vehicles, gr/mile by vehicle type

$C_6$ = Conversion factor from gr to MT.

***Emissions from aviation fuel***

Emissions of methane from aviation fuel usage are calculated in two steps.

$$E_{Maf} = (U_{Aaf} * EF_{Maf}) / C_6$$

Where:

$E_{maf}$ = Annual emissions of methane from aviation fuel use (MT/year).

$U_{aaf}$ = Gallons of fuel per year

$EF_{Maf}$ = Emission factor for methane for aviation fuel.

$C_6$ = Conversion factor from gr to MT.

### A3. Mobile Source (Landscape Equipment)

Emissions of methane from landscape equipment are calculated in two steps.

$$E_{Mls} = ((G_F * EF_{MF}) / C_6)$$

Where:

$E_{Mls}$ = Annual emissions of methane from landscape equipment (MT/year).

$G_F$ = Gallons of fuel per year

= $(E_{Cls} * C_1) / EF_{Cgg}$

$E_{Cls}$ = Annual emissions of $CO_2$ from landscaping (from URBEMIS).

$C_1$ = Conversion factor from lbs to metric tons (1 MT = 2204.62 lbs).

$EF_{Cgg}$ = Conversion of $CO_2$ from lbs to gallons.

$EF_{MF}$ = Emission factor for methane for motor gasoline.

$C_6$ = Conversion factor from gr to MT.

**A4. Wood Burning Hearth Emissions**

Emissions of methane from wood burning hearths are calculated as follows.

$$E_{Mwood} = ((M_{wood} * EF_{Mwood}) / C_3)$$

Where:

$E_{Mwood}$ = Annual emissions of methane from wood burning hearths (MT/year).

$M_{wood}$ = Heat content of the wood in MMBtu

= $E_{Cwood}$ * $HC_{Cwood}$

$E_{Cwood}$ = Emissions of tons of $CO_2$ estimated for wood burning hearths.

$HC_{Cwood}$ = MMBTUs per ton of $CO_2$ from burning wood.

$EF_{Mwood}$ = Emission factor for methane for wood burning;.

$C_3$ = Conversion factor from kg to MT.

**A5. Stationary Source (Cooling and Heating) - Natural Gas**

Emissions of methane from natural gas consumption are calculated using the following equation:

$$E_{Mng} = (U_{Ang} * EF_{Mng}) / C_3$$

Where:

$E_{Mng}$ = Annual emissions of methane from natural gas consumption (MT/year).

$U_{Ang}$ = Annual natural gas usage, MMBTUs/year.

$EF_{Mng}$ = Emission factor for natural gas usage.

$C_3$ = Conversion factor from kg to metric tons. (1,000 kg/MT)

**B. Indirect Sources**

**B1. Electricity**

Emissions of methane from electricity usage are calculated using the following equation:

$$E_{Mele} = (U_{Ae} * EF_{Mele}) / C_1$$

Where:

$E_{Mele}$ = Annual emissions of $CH_4$ from Electricity (MT/year).

$U_{Ae}$ = Annual usage of electricity (MWh/year).

$EF_{Mele}$ = Emission factor for electrical usage (lbs/MWh).

$C_1$ = Conversion factor from lbs to metric tons (1 MT = 2204.62 lbs).

**B2. Potable Water**

Emissions of methane from potable water treatment and transportation for domestic uses are calculated using the following equation:

$$E_{Mpot} = (U_{epot} * EF_{Mele}) / C_1$$

Where:

$E_{Mpot}$ = Annual Emissions of $CH_4$ from electricity used for potable water treatment and transportation (MT/year).

$U_{epot}$ = Annual electricity usage for potable water treatment and transportation (MWh/year).

= $U_{Apot}$ * $C_4$

$U_{Apot}$ = Annual usage of potable water (MG/yr)

$C_4$ = Conversion factor for determining kWhs used to treat water.

$EF_{Mele}$ = Emission factor for electrical usage (lbs/MWh).

$C_1$ = Conversion factor from lbs to metric tons (1 MT = 2204.62 lbs).

**B3. Solid Waste**

Emissions of methane from solid waste is a summation of the emissions from solid waste treatment, transport, and the use of equipment at disposal sites

$$\mathbf{E_{MTSW} = E_{MWF} + E_{MWT} + E_{MWD}}$$

Where:

$E_{MTSW}$ = Annual Emissions of $CH_4$ from solid waste (MT/year).

$E_{MWF}$ = Annual emissions of $CH_4$ from solid waste disposal and treatment (MT/year).

$E_{MWT}$ = Annual emissions of $CH_4$ from solid waste transportation (MT/year).

$E_{MWD}$ = Annual emissions of $CH_4$ from solid waste disposal, (MT/year).

**B3a. Fugitive Emissions**

Fugitive emissions of methane from solid waste disposal treatment are calculated using the following equation:

$$\mathbf{E_{MWF} = U_{SW} * EF_{MWF}}$$

Where:

$E_{MWF}$ = Annual emissions of $CO_2$ from solid waste disposal and treatment (MT/year).

$U_{SW}$ = Annual waste production for disposal and treatment (tons/year).

$EF_{MWF}$ = Emission factor for waste production.

**B3b. Exhaust Emissions (Hauling Trucks)**

Emissions of methane from solid waste transportation are calculated using the following equations:

$$\mathbf{E_{MWT} = ((((U_{SW} / d) / C_T) * M * EF_{MWT}) / C_6)}$$

Where:

$E_{MWT}$ = Annual emissions of $CH_4$ from solid waste transportation (tons/year).

$U_{SW}$ = Annual waste production for disposal and treatment (tons/year).

d = Average solid waste density (tons/cubic yard).

$C_T$ = Average truck load capacity.

M = Average trip mileage (round trip from source to landfill).

$EF_{MWT}$ = Emission factor for hauling trucks.

$C_6$ = Conversion factor from gr to MT;.

**B3c. Exhaust Emissions (Disposal Equipment)**

Emissions of methane from disposal equipment are calculated using the following equation:

$$\mathbf{E_{MWD} = (EF_{MWD} * h * n) / C_1}$$

Where:

$E_{MWD}$ = Annual emissions of methane from solid waste disposal, MT/year.

$EF_{MWD}$ = Emission factor for disposal equipment, lbs/hr (SCAQMD off-Road Mobile Source Emission Factors, 2007). (Equation needs to be repeated for each piece of equipment, then all emissions summed).

h = Operating hours (% of day attributed to project waste generation - Total hours of operation of facility per day times the percentage of total annual waste attributable to Project generation).
n = Days per year. (Number of days per year the landfill is open to disposal).
$C_1$ = Conversion factor from lbs to metric tons (1 MT = 2204.62 lbs).
Note: Emissions from onsite equipment is only relevant if the project has control over landfill operations.

**B4. Wastewater**

Emissions of methane from waste water treatment are calculated using the following equation:

$$\mathbf{E_{MWW} = (U_{eWW} * EF_{Mele}) / C_1}$$

Where:

$E_{MWW}$ = Annual emissions of methane from waste water treatment, MT/year.
$U_{eWW}$ = Annual electricity usage for transport and treatment of waste water
= $(U_{Apot} * \%_{in}) * C_5$
$U_{Apot}$ = Annual usage of potable water (MG/yr)
$\%_{in}$ = % of potable water used indoors.
$C_5$ = Conversion factor for determining MWh used per MG of waste water treated.
$EF_{Mele}$ = Emission factor for electrical usage (lbs/MWh).
$C_1$ = Conversion factor from lbs to metric tons (1 MT = 2204.62 lbs).

# Nitrous Oxide Formula Sheet

**Sutter County**

**A. Direct Sources**

**A1. Mobile Source (Construction Equipment)**

Emissions of nitrous oxide from construction vehicles are calculated using the following equations:

$$E_{NCON} = ((U_{AG} * EF_{NHDV}) / C_6)$$

Where:

$E_{NCON}$ = Annual emissions of nitrous oxide from construction vehicle exhaust (MT/year)

$U_{AG}$ = Annual gallons of gas used by construction vehicles

= $(E_{CCON} * C_1) / EF_{Cdg}$

$E_{CCON}$ = Annual emissions of $CO_2$ from Construction Vehicles (from URBEMIS).

$C_1$ = Conversion factor from lbs to metric tons (1 MT = 2204.62 lbs).

$EF_{Cdg}$ = Conversion of $CO_2$ from lbs to gallons.

$EF_{NHDV}$ = Emission factor for heavy duty vehicles, gr/gallon.

$C_6$ = Conversion factor from gr to MT.

**A2. Mobile Source (Motor Vehicles)**

Emissions of nitrous oxide from motor vehicles are calculated using the following equations:

$$E_{NMV} = ((M * EF_{NMV}) / C_6)$$

Where:

$E_{NMV}$ = Annual emissions of nitrous oxide from motor vehicles, MT/year.

M = Annual mileage for motor vehicles, miles/year (from Urbemis2007 9.2.4 output).

$EF_{NMV}$ = Emission factor for motor vehicles, gr/mile by vehicle type

$C_6$ = Conversion factor from gr to MT.

***Emissions from aviation fuel***

Emissions of nitrous oxide from aviation fuel usage are calculated in two steps.

$$E_{Naf} = (U_{Aaf} * EF_{Naf}) / C_6$$

Where:

$E_{naf}$ = Annual emissions of nitrous oxide from aviation fuel usage (tons/year).

$U_{aaf}$ = Gallons of fuel per year

$EF_{Naf}$ = Emission factor for nitrous oxide for aviation fuel usage.

$C_6$ = Conversion factor from gr to MT.

**A3. Mobile Source (Landscape Equipment)**

Emissions of nitrous oxide from landscape equipment are calculated in two steps.

$$E_{Nls} = ((G_F * EF_{NF}) / C_6)$$

Where:

$E_{Nls}$ = Annual emissions of nitrous oxide from landscape equipment (tons/year).

$G_F$ = Gallons of fuel per year

= $(E_{Cls} * C_1) / EF_{Cgg}$

$E_{cls}$ = Annual emissions of $CO_2$ from landscaping (from URBEMIS).

$C_1$ = Conversion factor from lbs to metric tons (1 MT = 2204.62 lbs).

**Sutter County**

$EF_{Cgg}$ = Conversion of $CO_2$ from lbs to gallons.
$EF_{NF}$ = Emission factor for nitrous oxide for motor gasoline.
$C_6$ = Conversion factor from gr to MT.

**A4. Wood Burning Hearth Emissions**
Emissions of nitrous oxide from wood burning hearths are calculated as follows.

$$\mathbf{E_{Nwood} = ((M_{wood} * EF_{Nwood}) / C_3)}$$

Where:

$E_{Mwood}$ = Annual emissions of nitrous oxide from wood burning hearths (MT/year).
$M_{wood}$ = Heat content of the wood in MMBtu
= $E_{Cwood}$ * $HC_{Cwood}$
$E_{Cwood}$ = Emissions of tons of $CO_2$ estimated for wood burning hearths.
$HC_{Cwood}$ = MMBTUs per ton of $CO_2$ from burning wood.
$EF_{Nwood}$ = Emission factor for nitrous oxide for wood burning.
$C_3$ = Conversion factor from kg to MT; 1,000 kg/MT

**A5. Stationary Source (Cooling and Heating)**
Emissions of nitrous oxide from natural gas consumption are calculated using the following equation:

$$\mathbf{E_{Nng} = (U_{Ang} * EF_{Nng}) / C_3}$$

Where:

$E_{Nng}$ = Annual emissions of nitrous oxide from natural gas consumption (MT/year).
$U_{Ang}$ = Annual natural gas usage, MMBTUs/year.
$EF_{Nng}$ = Emission factor for natural gas usage;
$C_3$ = Conversion factor from kg to metric tons. (1,000 kg/MT)

**B. Indirect Sources**
**B1. Electricity**
Emissions of nitrous oxide from electricity usage are calculated using the following equation:

$$\mathbf{E_{Nele} = (U_{Ae} * EF_{Nele}) / C_1}$$

Where:

$E_{Nele}$ = Annual emissions of $N_2O$ from Electricity (MT/year).
$U_{Ae}$ = Annual usage of electricity (MWh/year).
$EF_{Nele}$ = Emission factor for electrical usage (lbs/MWh).
$C_1$ = Conversion factor from lbs to metric tons (1 MT = 2204.62 lbs).

# Nitrous Oxide Formula Sheet

**Sutter County**

**B2. Potable Water**

Emissions of nitrous oxide from potable water treatment and transportation for domestic uses are calculated using the following equation:

$$E_{Npot} = (U_{epot} * EF_{Nele})/C_1$$

Where:

$E_{Npot}$ = Annual Emissions of $N_2O$ from electricity used for potable water treatment and transportation (MT/year).

$U_{epot}$ = Annual electricity usage for potable water treatment and transportation (MWh/year).
= $U_{Apot} * C_4$

$U_{Apot}$ = Annual usage of potable water (MG/yr)

$C_4$ = Conversion factor for determining kWhs used to treat water.

$EF_{Nele}$ = Emission factor for electrical usage (lbs/MWh).

$C_1$ = Conversion factor from lbs to metric tons (1 MT = 2204.62 lbs).

**B3. Solid Waste**

Emissions of nitrous oxide from solid waste is a summation of the emissions from solid waste transportation, and the use of equipment at disposal sites. There are no fugitive emissions from nitrous oxide with respect to solid waste, therefore emissions from treatment are not included in the emissions inventory.

$$E_{NTSW} = E_{NWT} + E_{NWD}$$

Where:

$E_{NTSW}$ = Annual Emissions of $CH_4$ from solid waste (MT/year).

$E_{NWT}$ = Annual emissions of $CH_4$ from solid waste transportation (MT/year).

$E_{NWD}$ = Annual emissions of $CH_4$ from solid waste disposal, (MT/year).

**B3b. Exhaust Emissions (Hauling Trucks)**

Emissions of nitrous oxide from solid waste transportation are calculated using the following equation:

$$E_{NWT} = ((((U_{SW} / d) / C_T) * M * EF_{NWT}) / C_6)$$

Where:

$E_{NWT}$ = Annual emissions of $N_2O$ from solid waste transportation (tons/year).

$U_{SW}$ = Annual waste production for disposal and treatment (tons/year).

d = Average solid waste density (tons/cubic yard).

$C_T$ = Average truck load capacity.

M = Average trip mileage (round trip from source to landfill).

$EF_{NWT}$ = Emission factor for hauling trucks.

$C_6$ = Conversion factor from gr to MT; 1,000,000 gr/MT.

**Sutter County**

**B3c. Exhaust Emissions (Disposal Equipment)**

Emissions of nitrous oxide from disposal equipment are calculated using the following equation:

$$E_{NWD} = (EF_{NWD} * h * n) / C_1$$

Where:

$E_{NWD}$ = Annual emissions of nitrous oxide from solid waste disposal, MT/year.

$EF_{NWD}$ = Emission factor for disposal equipment, lbs/hr (derived from SCAQMD off-Road Mobile Source Emission Factors, 2007). (Equation needs to be repeated for each piece of equipment, then all emissions summed).

h = Operating hours (% of day attributed to project waste generation - Total hours of operation of facility per day times the percentage of total annual waste attributable to Project generation).

n = Days per year. (Number of days per year the landfill is open to disposal).

$C_1$ = Conversion factor from lbs to metric tons (1 MT = 2204.62 lbs).

Note: Emissions from onsite equipment is only relevant if the project has control over landfill operations.

**B4. Wastewater**

Emissions of nitrous oxide from waste water treatment are calculated using the following equation:

$$E_{NWW} = (U_{eWW} * EF_{Nele}) / C_1$$

Where:

$E_{NWW}$ = Annual emissions of nitrous oxide from waste water treatment, MT/year.

$U_{eWW}$ = Annual electricity usage for transport and treatment of waste water

= $(U_{Apot} * \%_{in}) * C_5$

$U_{Apot}$ = Annual usage of potable water (MG/yr)

$\%_{in}$ = % of potable water used indoors.

$C_5$ = Conversion factor for determining MWh used per MG of waste water treated.

$EF_{Nele}$ = Emission factor for electrical usage (lbs/MWh).

$C_1$ = Conversion factor from lbs to metric tons (1 MT = 2204.62 lbs).

# Agricultural Formula Sheet

**Sutter County**

**CM1: Methane emissions from Enteric Fermentation**

$$E_{MEF} = (U_{Aani} * EF_{MEF}) / C_3$$

Where:

$E_{MEF}$ = Emissions of methane from Enteric Fermentation (MT/yr).

$U_{Aani}$ = Number of each type of animal (by type)

$EF_{MEF}$ = Emission Factor for enteric fermentation by year and animal type.

$C_3$ = Conversion factor from kg to metric tons. (1,000 kg/MT)

**CM2: Methane emissions from manure management**

$$E_{MMM} = ((U_{Aani}/1000) * TAM * VS * C_6 * B_O * MCF * C_7) / C_3$$

Where:

$E_{MMM}$ = Emissions of methane from manure management (MT/yr).

$U_{Aani}$ = Number of each type of animal (by type)

TAM = Typical animal mass by animal and year (kg/head)

VS = Volatile solids produced in kgVS/1000kg animal mass/day

$C_6$ = 365 days per year

$B_O$ = Maximum methane producing capacity by animal type

MCF = The extent to which methane producing capacity is realized for a given manure management system (weighted average for state by animal type).

$C_7$ = Density of methane 0.678 $kg/m^3$

$C_3$ = Conversion factor from kg to metric tons. (1,000 kg/MT)

**CM3: Methane emissions from rice cultivation**

$$E_{MRC} = (U_{AC} * C_{10} * EF_{PS}) / C_3$$

Where:

$E_{MRC}$ = Emissions of methane from rice cultivation.

$U_{AC}$ = Annual rice cultivation in acres

$C_{10}$ = Conversion of acres to hectares.

$EF_{PS}$ = Emission factor for primary season harvest;

$C_3$ = Conversion factor from kg to metric tons. (1,000 kg/MT)

**CM4: Methane emissions from agricultural residue burning**

$$E_{MARB} = (U_C * R_{RC} * F_{RB} * F_{DM} * BE * CE * CC) * R_{CH4-C} * C_{11})$$

Where:

$E_{MARB}$ = Emissions of methane from agricultural residue burning (MT/yr).

$U_C$ = Annual crop production in metric tons.

$R_{RC}$ = Residue to crop ratio by crop.

$F_{RB}$ = Fraction of residue burned by crop.

$F_{DM}$ = Fraction of residue from dry matter

BE = Burning efficiency per crop

CE = Combustion efficiency per crop
CC = Carbon content of crop
$R_{CH4-C}$ = Ratio of emissions $CH_4$-C
$C_{11}$ = Conversion from $CH_4$-C to full molecular weight of carbon.

**CN1: Nitrous Oxide from Manure Management:**

$$\mathbf{E_{NMM} = ((((N_T * \%_{AL}) + (N_T * \%_{SS}) + (N_T * \%_{DP})) * EF_{NML}) + (((N_T * \%_{SS}) + (N_T * \%_{DP}) + (N_T * \%_P) * EF_{NMD})) / C_3}$$

Where:

$E_{NMM}$ = Emissions of nitrous oxide from manure management (MT/yr).
$N_T$ = Total Nitrogen excreted in kgs
= $U_{Aani} * (TAM/1000) * K_N * C_6$
$U_{Aani}$ = Number of each type of animal (by type)
TAM = Typical animal mass by animal and year (kg/head) divided by 1000
$K_N$ = Nitrogen excreted in kg/ 1000 kg mass/day by animal type.
$C_6$ = 365 days per year
$\%_{AL}$ = % manure associated with anaerobic lagoons (Relevant to dairy cows, swine, and layers).
$\%_{LS}$ = % manure associated with liquid/slurry (relevant to diary cows, swine, and layers).
$\%_{DP}$ = % manure associated with deep pits (relevant to swine for liquid and dairy cows for solid systems), and for dry lots (relevant for feedlot beef).
$\%_{SS}$ = % manure associated with solid storage (relevant for dairy cows, swine, and layers), and managed solid systems (relevant for dairy heifers), and for sheep on and off feed).
$\%_P$ = % manure associated with pastures (relevant for beef not on feed), and poultry (relevant for layers without bedding, and broilers and turkey with litter).
$EF_{NML}$ = Emission factor for nitrous oxide from liquid systems
$EF_{NMS}$ = Emission factor for nitrous oxide from solid systems
$C_3$ = Conversion factor from kg to metric tons. (1,000 kg/MT)

**CN2: Nitrous Oxide emissions from animals and runoff:**

$$\mathbf{E_{NAAS} = E_{NIA} + E_{NDA} + E_{NL}}$$

Where:

$E_{NAAS}$ = Emissions of nitrous oxide from agricultural soils resulting from animal manure and runoff (MT/yr).

$\mathbf{E_{NIA}}$ = Emissions of nitrous oxide indirectly from animals (MT/yr).
= $((N_T * \%_{VI} * EF_{NH3-NOX}) / C_3) * C_9$
$N_T$ = Total Nitrogen excreted in kgs
$\%_{VI}$ = % indirect volitazation.
$EF_{NH3-NOX}$ = Rate of conversion from $NH_3$ to $NO_X$.
$C_3$ = Conversion factor from kg to metric tons. (1,000 kg/MT)
$C_9$ = Molecular weight ratio $N_2O$:$N_2$

$E_{NDA}$ = Emissions of nitrous oxide directly from animals (MT/yr).
= $((M_{PRP} + M_{AS}) * C_9) + (M_{PRP} * C_9)$
$M_{PRP}$ = Manure from Pasture, Range and Paddocks
= $(N_{UM} * EF_{PRP}) / C_3$
$M_{AS}$ = Manure applied to soils
= $((N_M + N_{DS}) * (1-\%_{VI}) * EF_{NV}) / C_3$
$N_{UM}$ = Unmanaged Nitrogen
= $U_{Aani} * (\text{sum all } \%_{UMS}) * TAM * K_N * C_6$
$U_{Aani}$ = Number of each type of animal (by type)
TAM = Typical animal mass by animal and year (kg/head) divided by 1000
$K_N$ = Nitrogen excreted in kg/ 1000 kg mass/day by animal type.
$C_6$ = 365 days per year
$\%_{UMS}$ = % of manure from each unmanaged system for each animal type and year.
Dairy Cows: pasture; dairy heifers: pasture, range and paddock; not on feed beef: pasture; swine: pasture; turkey: range; sheep (based on type of feed); goats: pasture; and horses: pasture.
$EF_{PRP}$ = Emission factor for pastures, ranges and paddocks.
$N_M$ = Managed Nitrogen
= $U_{Aani} * (\text{sum all } \%_{MS}) * TAM * K_N * C_6$
$\%_{MS}$ = % of manure from each managed system for each animal type and year.
Dairy Cows: anaerobic lagoons, liquid/slurry, solid storage, deep pit; dairy heifers: managed; feedlot beef: dry lot; swine: solid storage, liquid slurry, anaerobic lagoon, and deep pit; turkey: solid storage, liquid slurry, anaerobic lagoon, and without bedding.
NDS = Unmanaged Nitrogen from daily spread of manure
= $U_{Aani} * (\text{sum all } \%_{DS}) * TAM * K_N * C_7$
$\%_{DS}$ = % of daily spread manure for dairy cows and dairy heifers only.
$EF_{NV}$ = Emission factor for ground application of manure.

---

$E_{NL}$ = Emissions of nitrous oxide from leaching (MT/yr).
= $([(((N_{UVS} + N_{UVO}) / C_3) * \%_{Leach}) + ((N_T * (1-\%_{VM}) * \%_{Leach}) / C_3)] * F_{Leach}) * C_9$
$N_{UVS}$ = Unvolatilized Nitrogen from synthetic fertilizer. - See CN4: Nitrous Oxide emissions from Fertilizer use.
$N_{UVO}$ = Unvolatilized Nitrogen from organic fertilizer. - See CN4: Nitrous Oxide emissions from Fertilizer use.
$\%_{Leach}$ = Percent leached from soils
$F_{Leach}$ = Leaching Factor (kg $N_2O$-N / kg N)
$\%_{VM}$ = % volitazation from manure management.

**CN3: Nitrous Oxide from Crop Growth:**

$$E_{NCG} = E_{NLeg} + E_{NRes} + E_{NHis}$$

Where:

$E_{NCG}$ = Emissions of nitrous oxide from crop growth (MT/yr).

---

$E_{NLeg}$ = Emissions of nitrous oxide from legumes (nitrogen fixing crops)
= $(F_{NT} / C_3) * EF_{NDE} * C_9$

$F_{NT}$ = Total nitrogen fixed in soil by all crops (formula below is to be repeated for each applicable crop and then totaled.

= $U_C * C_3 * (1 - R_{RC}) * F_{DM} * C_8$

$U_C$ = Total crop production in tons

$C_3$ = Conversion factor from kg to metric tons. (1,000 kg/MT)

$R_{RC}$ = Residue crop-mass ratio for given crop

$F_{DM}$ = Residue fraction that is dry matter by crop

$C_8$ = Nitrogen content of aboveground biomass for N-fixing crop production

$EF_{NDE}$ = Emission factor for soils (kg $N_2O$-N/kg N) 0.01

$C_9$ = Molecular weight ratio $N_2O:N_2$ 1.57

---

**$E_{NRES}$** = Emissions of nitrous oxides from crop residues (MT/yr).

= $(N_{RS} / C_3) * EF_{DIR} * C_9$

$N_{RS}$ = Total nitrogen returned to soil from crop residue degradation. (Formula below is repeated for each applicable crop then totaled).

= $(U_C * C_3) * R_{RC} * F_{DM} * F_{RA} * NC$

$F_{RA}$ = Fraction of residue applied to soil by crop.

$N_{CR}$ = Nitrogen content of crop residue.

---

**$E_{NHIS}$** = Emissions of nitrous oxide from soil histols (based on climate zone of project) (MT/yr).

= $((((U_{CT} * C_{10}) * EF_{NHT}) + ((U_{CT} * C_{10}) * EF_{NHS}))*C_9) / C_3$

$U_{CT}$ = Total crop production in acres planted

$C_{10}$ = Conversion from acres to hectares 0.40469446 ha/acre

$EF_{NHT}$ = Emission Factor for Temperate zone Histols (kg $N_2O$-N / ha_yr)

$EF_{NHS}$ = Emission Factor for Subtropic zone Histols (kg $N_2O$-N / ha_yr)

**CN4: Nitrous Oxide emissions from fertilizer use**

$$E_{FU} = E_{ND} + E_{NID}$$

Where:

$E_{FU}$ = Emissions of nitrous oxide from fertilizer use (MT/yr)

---

**$E_{ND}$** = Direct emissions of nitrous oxide from fertilizer use (MT/yr).

= $((N_{UVS} + N_{UVO}) / C_3) * EF_{NDE} * C_9$

$EF_{NDE}$ = Emission factor for $N_2O$ in soils (kg N2O-N/kgN) 0.01

$C_9$ = Molecular weight ratio $N_2O:N_2$

$C_3$ = Conversion factor from kg to metric tons. (1,000 kg/MT)

---

$N_{UVS}$ = Unvolitazied nitrogen from application of synthetic fertilizer.

= $((U_{F1S} * C_{12}) + (U_{F2S} * C_{13})) * (1-V_{FS})$

$U_{F1S}$ = Annual synthetic fertilizer use (in kg N) for target year (Determined as a percentage of total state usage based on acres planted)

= $(U_{FS} * \%_P) * \%_{FS} * 1000$

$U_{FS}$ = Total fertilizer use for the state.

$\%_P$ = % of total acres planted. (Total project acres planted divided by total state acres planted) for that year.

$\%_{FS}$ = % usage of synthetic fertilizers for that year.

$U_{F2S}$ = Annual synthetic fertilizer use (in kg N) for next growing year (Determined as a percentage of total state usage based on acres planted). Can be estimated if future year.

= $(U_{FS} * \%_P) * \%_{FS} * 1000$

$V_{FS}$ = Volatization of synthetic fertilizers

$C_{12}$ = Constant % of target year applied.

$C_{13}$ = Constant % of following year applied.

---

$N_{UVO}$ = Unvolitazied nitrogen from application of non-manure organic fertilizer.

= $[((U_{F1DM} * C_{12}) + (U_{F2DM} * 0C_{13})) + ((U_{F1ASS} * C_{12}) + (U_{F2ASS} * C_{13})) + ((U_{F1OO} * C_{12}) + (U_{F2OO} * C_{13}))] * N_{org} * (1-V_{FO})$

$U_{F1DM}$ = Annual dried manure fertilizer use (in kg N) for target year (Determined as a percentage of total state usage based on acres planted)

= $(U_{FS} * \%_P) * \%_{FDM} * 1000$

$U_{F2DM}$ = Annual dried manure fertilizer use (in kg N) for next growing year (Determined as a percentage of total state usage based on acres planted). Can be estimated if future year.

= $(U_{FS} * \%_P) * \%_{FDM} * 1000$

$\%_{FDM}$ = % of fertilizer from dried manure

$U_{F1ASS}$ = Annual Sewage sludge fertilizer use (in kg N) for target year (Determined as a percentage of total state usage based on acres planted)

= $(U_{FS} * \%_P) * \%_{FASS} * 1000$

$U_{F2ASS}$ = Annual sewage sludge fertilizer use (in kg N) for next growing year (Determined as a percentage of total state usage based on acres planted). Can be estimated if future year.

= $(U_{FS} * \%_P) * \%_{FASS} * 1000$

$\%_{FASS}$ = % of fertilizer from annual sewage sludge

$U_{F1OO}$ = Annual other organic fertilizer use (in kg N) for target year (Determined as a percentage of total state usage based on acres planted)

= $(U_{FS} * \%_P) * \%_{FOO} * 1000$

$U_{F2OO}$ = Annual other organic use (in kg N) for next growing year (Determined as a percentage of total state usage based on acres planted). Can be estimated if future year.

= $(U_{FS} * \%_P) * \%_{FOO} * 1000$

$\%_{FOO}$ = % of other organic fertilizers used

$N_{ORG}$ = Nitrogen Content of Non-manure Organics

$V_{FO}$ = Volitazation of organic fertilizers

---

**$E_{NID}$** = Indirect emissions of nitrous oxide from fertilizer use (MT/yr).

= $((N_{VS} + N_{VO}) / C_3) * EF_{NIE} * C_9$

$EF_{NIE}$ = $N_2O$ emissions from volitazation

$C_9$ = Molecular weight ratio $N_2O$:$N_2$

$N_{VS}$ = Volatized nitrogen from application of synthetic fertilizer.

= $((U_{F1S} * C_{12}) + (U_{F2S} * C_{13})) * V_{FS}$

$N_{VO}$ = Volatized nitrogen from application of non-manure organic fertilizer.

= $[((U_{F1DM} * C_{12}) + (U_{F2DM} * C_{13})) + ((U_{F1ASS} * C_{12}) + (U_{F2ASS} * C_{13})) + ((U_{F1OO} * C_{12}) + (U_{F2OO} * C13))] * N_{org} * V_{FO}$

**CN5. Emissions on $N_2O$ from agricultural residue burning**

$$E_{NARB} = (U_C * R_{RC} * F_{RB} * F_{DM} * BE * CE * CC) * R_{N20\text{-}N} * C_9)$$

Where:

$E_{MARB}$ = Emissions of methane from agricultural residue burning (MT/yr)

$U_C$ = Annual crop production in metric tons

$R_{RC}$ = Residue to Crop ratio by crop.

$F_{RB}$ = Fraction of residue burned by crop.

$F_{DM}$ = Fraction of residue from dry matter

BE = Burning efficiency per crop

CE = Combustion efficiency per crop

NC = Nitrogen content of crop

$R_{N2O\text{-}N}$ = Ratio of emissions $N_2O$-N

$C_9$ = Molecular weight ratio $N_2O$:$N_2$

# Appendix C: 1990 URBEMIS Output and GHG Calculations

**Sutter County**
**Emissions by Source**
**1990**
**Inventory**
**By Source**

| Transportation | | |
|---|---|---|
| | **Source:** | **Metric tons of $CO_2e$** |
| 1 | On-Road Vehicles | 226,778 |
| 2 | Airport Operations | 132 |
| | **Total** | **226,910** |

| Energy | | |
|---|---|---|
| | **Sources:** | **Metric tons of $CO_2e$** |
| 1 | Electric | 55,823 |
| 2 | Natural Gas | 90,179 |
| | **Total** | **146,001** |

| Solid Waste | | |
|---|---|---|
| | **Source** | **Metric tons of $CO_2e$** |
| 1 | Solid Waste Disposal | 8,939 |
| 2 | Green Waste Recycling | No Data Available |
| 3 | Materials Recycling | No Data Available |
| | **Total** | **8,939** |

| Landscape Emissions | | |
|---|---|---|
| | **Sources:** | **Metric tons of $CO_2e$** |
| 1 | Landscape Emissions | 27 |
| 2 | Carbon sink from $CO_2$ sequestration | No Data Available |
| | **Total** | **27** |

| Agriculture | | |
|---|---|---|
| | **Sources:** | **Metric tons of $CO_2e$** |
| 1 | Enteric Fermentation | 106,095 |
| 2 | Manure Management | 131,555 |
| 3 | Rice Cultivation | 132,703 |
| 4 | Agricultural Residue Burning | 15,329 |
| 5 | Crop Growth | 397,944 |
| 6 | Animals and Runoff | 105,515 |
| 7 | Fertilizer Use | 67,173 |
| | **Total** | **956,315** |

| Net Total Emissions | |
|---|---|
| **Category** | **Metric tons of $CO_2e$** |
| Energy | 146,001 |
| Solid Waste | 8,939 |
| Landscape Emissions | 27 |
| Agriculture | 956,315 |
| Transportation | 226,910 |
| **Total** | **1,338,192** |

**Sutter County**
**Emissions by Land Use**
**1990**
**Inventory**
**By Land Use Category**

| Source Type | | $CO_2e$ MT/yr | | | |
|---|---|---|---|---|---|
| | | $CO_2$ | $CH_4$ | $N_2O$ | combined $CO_2e$ |
| Residential | AG/ER | 148,617.83 | 6,045.92 | 4,719.60 | 159,383 |
| | Low Density Residential | 51,774.17 | 2,106.18 | 1,644.14 | 55,524 |
| | Medium Density Residential | 9,592.99 | 390.31 | 304.69 | 10,288 |
| | High Density Residential | 0.00 | 0.00 | 0.00 | 0 |
| | **Total Residential** | **209,984.98** | **8,542.42** | **6,668.44** | **225,196** |
| Commercial | Park | 165.15 | 2.91 | 2.25 | 170 |
| | Commercial | 44,511.23 | 776.38 | 600.10 | 45,888 |
| | Mixed Use | 0.00 | 0.00 | 0.00 | 0 |
| | **Total Commercial** | **44,676.39** | **779.29** | **602.35** | **46,058** |
| Industrial | Industrial | 107,379.26 | 1,796.24 | 1,447.66 | 110,623 |
| | **Total Industrial** | **107,379.26** | **1,796.24** | **1,447.66** | **110,623** |
| Agriculture | | 0.00 | 373,212.42 | 583,102.45 | 956,315 |
| | **Total** | **362,040.63** | **384,330.36** | **591,820.89** | **1,338,192** |

*For consistency with 2008 and 2020 inventories, High Density Residential and Mixed use categories are listed although there is no land designated as such for 1990.

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**

| Land Use Type (units) | Total Trips | Total VMT | Total Trips (2008) | Total VMT (2008) | Unit Totals | Unit Type |
|---|---|---|---|---|---|---|
| **AG/ER** | 40,550 | 447,512 | 47,706 | 526,485 | 4,386 | du |
| **Low Density Residential** | 30,513 | 336,739 | 35,897 | 396,164 | 3,300 | du |
| **Medium Density Residential** | 5,655 | 62,407 | 6,653 | 73,420 | 612 | du |
| **High Density Residential** | 0 | 0 | 0 | 0 | 0 | du |
| **Park** | 5 | 62 | 6 | 73 | 23,718,729.69 | Sq/ft |
| **Commercial** | 25,550 | 288,589 | 30,059 | 339,516 | 1,154,864.75 | Sq/ft |
| **Mixed Use** | 0 | 0 | 0 | 0 | 0.00 | du |
| **Industrial** | 9,729 | 109,453 | 11,446 | 128,768 | 2,785,973.60 | Sq/ft |
| **Total** | **112,002.63** | **1,244,762.45** | **131767.8** | **1464426.41** | | |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**

| Land Use Type (units) | Natural gas usage rate (MMBTU/yr) | Kilowatt-hour/ year | Potable Water Usage (gallons/year) | Solid Waste (lbs/year) | % of square footage - Res/Non-Res | % of Total square footage |
|---|---|---|---|---|---|---|
| **AG/ER** | 161,670.35 | 59,267,390.8 | 25,291,790.47 | 18,510,113.63 | 0.7078 | 0.5466 |
| **Low Density Residential** | 56,321.36 | 20,647,075.8 | 8,810,941.52 | 6,448,267.49 | 0.2466 | 0.1904 |
| **Medium Density Residential** | 10,436.90 | 3,826,106.8 | 1,632,754.37 | 1,194,976.42 | 0.0457 | 0.0353 |
| **High Density Residential** | 0.00 | 0.0 | 0.00 | 0.00 | 0.0000 | 0.0000 |
| **Park** | 1,396.03 | 123,300.6 | 2,192.81 | 8,465.40 | 0.0011 | 0.0003 |
| **Commercial** | 378,387.76 | 33,420,178.6 | 594,353.46 | 2,256,538.07 | 0.2927 | 0.0666 |
| **Mixed Use** | 0.00 | 0.0 | 0.00 | 0.00 | 0.0000 | 0.0000 |
| **Industrial** | 912,833.16 | 80,623,769.0 | 1,433,834.82 | 5,443,593.35 | 0.7062 | 0.1608 |
| **Total** | **1,521,045.55** | **197,907,821.60** | **37,765,867.45** | **33,861,954.37** | | |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**

**City Parks**

| Year | # of City Parks | Estimated SQ / "building" | Estimated Buildings per |
|---|---|---|---|
| 1990 | 9 | 500 | 1 |
| 2008 | 10 | 500 | 1 |

**Airports**

| Year | # of planes | Gallons fuel per day | Annual days of operation | Annual Fuel Usage (g/yr) |
|---|---|---|---|---|
| 1990 | 65 | 43 | 365 | 15,513 |
| 2008 | 77 | 50 | 365 | 18,250 |

| Operational(*2a,b) / Area Scenario(*3a,b) | Vehicle | | | Natural Gas | | | Total Vehicle + Natural Gas |
|---|---|---|---|---|---|---|---|
| | (lbs/day) | Winter (lbs/day) | tons/Year | Summer | Winter | Year | |
| 1990 | 1,169,087.35 | 1,033,279.91 | 205,096.82 | 0.00 | 0.00 | 0.00 | 205,096.82 |
| 2008 | 1,375,396.88 | 1,215,623.42 | 241,290.38 | 0.00 | | | 241,290.38 |

| Area Scenario(*3b,c) | Landscaping | | | Hearth | | |
|---|---|---|---|---|---|---|
| | Summer | Winter | Year | Summer | Winter | Year |
| 1990 | 322.66 | 0.00 | 29.04 | 0.00 | 223,467.50 | 9,162.17 |
| 2008 | 379.60 | 0.00 | 34.16 | 0.00 | 262,902.94 | 10,779.02 |

| Vehicle Type | Fleet % | | Non-Catalyst | | Catalyst | | Diesel | |
|---|---|---|---|---|---|---|---|---|
| Light Auto | 39.50 | 0.3950 | 2.00 | 0.0200 | 97.50 | 0.9750 | 0.50 | 0.0050 |
| Light Truck <3,750 lbs | 19.30 | 0.1930 | 4.10 | 0.0410 | 85.50 | 0.8550 | 10.40 | 0.1040 |
| Light Truck 3,751-5,750 lbs | 19.70 | 0.1970 | 2.00 | 0.0200 | 97.50 | 0.9750 | 0.50 | 0.0050 |
| Med Truck 5,751-8,500 lbs | 9.30 | 0.0930 | 1.10 | 0.0110 | 97.80 | 0.9780 | 1.10 | 0.0110 |
| Lite-Heavy Truck 8,501-10,000 lbs | 2.50 | 0.0250 | 0.00 | 0.0000 | 64.00 | 0.6400 | 36.00 | 0.3600 |
| Lite-Heavy Truck 10,001-14,000 lbs | 0.90 | 0.0090 | 0.00 | 0.0000 | 44.40 | 0.4440 | 55.60 | 0.5560 |
| Med-Heavy Truck 14,001 - 33,000 lbs | 1.50 | 0.0150 | 6.70 | 0.0670 | 20.00 | 0.2000 | 73.30 | 0.7330 |
| Heavy-Heavy Truck 33,001-60,000 lbs | 1.90 | 0.0190 | 0.00 | 0.0000 | 5.30 | 0.0530 | 94.70 | 0.9470 |
| Other bus | 0.10 | 0.0010 | 0.00 | 0.0000 | 0.00 | 0.0000 | 100.00 | 1.0000 |
| Urban bus | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 100.00 | 1.0000 |
| Motorcycle | 4.00 | 0.0400 | 70.00 | 0.7000 | 30.00 | 0.3000 | 0.00 | 0.0000 |
| School Bus | 0.10 | 0.0010 | 0.00 | 0.0000 | 0.00 | 0.0000 | 100.00 | 1.0000 |
| Motor Home | 1.20 | 0.0120 | 8.30 | 0.0830 | 75.00 | 0.7500 | 16.70 | 0.1670 |

| Disposal Facility | Jurisdiction? | No | | Type of Facility: | Landfill w/o recovery | | year began: | ? |
|---|---|---|---|---|---|---|---|---|
| Landfill | Landfill Total Annual (tons) | City's % of Total | Daily Hours of Facility | Hours attributed to | Days per year of operation | % Waste delivered | Distance (one way) | Round Trip Distance (miles) |
| Recology Landfill | 16,930.81 | 1.00 | 9 | 9.00 | 313.00 | 100 | 4.81 | 9.62 |
| | | 0.00 | | 0.00 | | 0 | | |
| | | 0.00 | | 0.00 | | 0 | | |
| | | 0.00 | | 0.00 | | 0 | | |
| | | 0.00 | | 0.00 | | 0 | | |
| | | | | 9.00 | 313.00 | **Total** | | **9.62** |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**

**Electrical Usage (kWh/yr)**

**83,739,736** Total Residential Electrical Usage 1990
**114,168,493** Total Non-Residential Electrical Usage 1990

| *1990* | *% decrease* | *2008* | |
|---|---|---|---|
| | | ***Residential*** | |
| 31,989 | 15.00% | 37,634 | County facilities located in Yuba City |
| 182 | 15.00% | 214 | County facilities located in Live Oak City |
| 21,654 | 15.00% | 25,475 | County facilities located in Unincorporated Sutter |
| 71,124,951 | 15.00% | 83,676,413 | Residential in Unincorporated Sutter County |
| | | ***Non-Residential*** | |
| 5,153,007 | 15.00% | 6,062,361 | County facilities located in Yuba City |
| 75,107 | 15.00% | 88,361 | County facilities located in Live Oak City |
| 674,059 | 15.00% | 793,010 | County facilities located in Unincorporated Sutter |
| 108,266,321 | 15.00% | 127,372,142 | Commercial in Unincorporated Sutter County |

**Water Usage**

| *Total Gal/Yr* | *% decrease* | *2008* | |
|---|---|---|---|
| **35,735,097** | 15.00% | 42,041,290.32 | Residential (gallons per year) |
| **2,030,403** | 15.00% | 2,388,710 | Non-Residential (gallons/year) |

**Solid Waste for Unincorporated Sutter County**

**33,861,616** lbs/year - 1990
39,837,195.00 2006 lbs/year

**Natural Gas Data (Provided by PG&E)**

**228,426** Total Natural gas usage rate (MMBTU/yr) - Residential
**1,292,631** Total Natural gas usage rate (MMBTU/yr) - Non-Residential

| *1990* | *2008* | | |
|---|---|---|---|
| 228,426 | 268,737 | TotalResidential Natural gas usage rate (MMBTU/yr) | |
| | | ***MMBTU*** | ***Therms*** |
| | | 14 | 135 |
| | | 0 | 2 |
| | | 0 | 0 |
| | | 268,723 | 2687229 |
| 1,292,631 | 1,520,742 | Total Commercial Natural gas usage rate (MMBTU/yr) | |
| | | ***MMBTU*** | ***Therms*** |
| | | 14,856 | 148564 |
| | | 312 | 3116 |
| | | 501 | 5014 |
| | | 1,505,073 | 15050730 |

**Sutter County**
**Input data for Agriculture**
**1990**

| | Enteric Fermentation Emission Factor ($EF_{MEF}$) | Typical Animal Mass - kg- (TAM) | Volatile Solids -kg VS/1000kg mass/day- (VS) | Max $CH_4$ Capacity - $m^3CH_4$/kg VS- ($B_O$) | K-Nitrogen - kg/day/1000kg animal mass- ($K_N$) | Number of Head |
|---|---|---|---|---|---|---|
| | EF used | EF used | EF used | EF used | EF used | |
| ***Dairy Cow*** | | | | | | |
| Dairy Cows | 138.4 | 604.0 | 10.2 | 0.2 | 0.4 | 31,625 |
| **Swine** | | | | | | |
| Market 120-179 lbs | 1.5 | 67.8 | 5.4 | 0.5 | 0.4 | 8591 |
| **Poultry** | | | | | | |
| Hens > 1 yr | N/A | 1.8 | 10.8 | 0.4 | 0.8 | 215630 |
| Turkeys | N/A | 6.8 | 9.7 | 0.4 | 0.7 | 94177.5 |
| **Other** | | | | | | |
| Sheep on Feed | 8.0 | 27.0 | 9.2 | 0.4 | 0.4 | 23965 |
| Goats | 5.0 | 64.0 | 9.5 | 0.2 | 0.5 | 94177.5 |

**Sutter County**
**Input data for Agriculture**
**1990**

| | Residue/Crop Ratio ($R_{RC}$) | Fraction Residue Burned ($F_{RB}$) | Fraction Dry Matter ($F_{DM}$) | Burning Efficiency (BE) | Combustion Efficiency (CE) | Carbon Content (CC) | Fraction of Residue Applied ($F_{RA}$) | Nitrogen Content of Residue (NC) |
|---|---|---|---|---|---|---|---|---|
| | EF used | EF used | EF used | EF used | EF used | EF used | EF used | EF used |
| Hay (inc Alfalfa) | 0.0 | 0.00 | 0.85 | 0.00 | 0.00 | 0.00 | 0.00 | N/A |
| Barley | 1.2 | 0.03 | 0.93 | 0.93 | 0.88 | 0.45 | 0.90 | 0.01 |
| Dry Edible Beans | 2.1 | 0.00 | 0.87 | 0.00 | 0.00 | 0.00 | 1.60 | 0.02 |
| Corn | 1.0 | 0.03 | 0.91 | 0.93 | 0.88 | 0.45 | 0.90 | 0.01 |
| Corn for Grain | 1.0 | 0.00 | 0.91 | 0.00 | 0.00 | 0.00 | 0.90 | 0.01 |
| Oats | 1.3 | 0.00 | 0.92 | 0.00 | 0.00 | 0.00 | 0.90 | 0.01 |
| Rice | 1.4 | 0.75 | 0.91 | 0.93 | 0.88 | 0.38 | 1.00 | 0.01 |
| Sorghum | 1.4 | 0.00 | 0.91 | 0.00 | 0.00 | 0.00 | 0.90 | 0.01 |
| All Wheat | 1.3 | 0.03 | 0.93 | 0.93 | 0.88 | 0.44 | 0.90 | 0.01 |
| Sugar Beet | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vegetable Crops & Fruit Trees | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Safflower & Sunflower | 2.1 | 0.03 | 0.87 | 0.93 | 0.88 | 0.45 | 0.90 | 0.02 |

**Sutter County**
**Input data for Agriculture**
**1990**

| | | Growing Season Emission Factor | | |
|---|---|---|---|---|
| Primary | | **EF used** | **Entered** | **Default** |
| | | 210 | | 210 |
| Rattoon | | 780 | | 780 |
| | | ***State*** | ***Project*** | ***% of State ($\%_P$)*** |
| Total acres | 1990 | 8,093,357 | 230,466.00 | 0.0284759 |
| Total acres | 1991 | 7,600,890 | 210,639.19 | 0.0277124 |
| Climate Zone | Temperate | Yes | Sub Tropic | No |

| | 1990 | | | | | 1991 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Primary (Acres Harvested)** | **Annual Yield** | **Unit of Yield** | **Annual Yield (MT/yr)** | **State Acres Harvested** | **Primary (Acres Harvested)** | **Annual Yield** | **Unit of Yield** | **Annual Yield (MT/yr)** | **State Acres Harvested** |
| Hay (inc Alfalfa) | 10,953 | 40,350 | tons | 36,605 | 1,630,000 | 11,289 | 41,588 | tons | 37,728 | 1,680,000 |
| Barley | 4,996 | 5,959 | tons | 5,406 | 230,000 | 3,475 | 4,145 | tons | | 160,000 |
| Dry Edible Beans | 19,984 | 15,977 | tons | 14,494 | 166,000 | 18,058 | 14,437 | tons | 13,097 | 150,000 |
| Corn | 3,500 | 70,000 | tons | 63,503 | 210,000 | 3,500 | 70,000 | tons | 63,503 | 210,000 |
| Corn for Grain | 2,200 | 7,898 | tons | 7,165 | 160,000 | 1,581 | 5,677 | tons | 5,150 | 115,000 |
| Oats | 2,114 | 2,169 | tons | 1,968 | 45,000 | 2,114 | 2,169 | tons | 1,968 | 45,000 |
| Rice | 74,356 | 273,237 | tons | 247,877 | 395,000 | 67,015 | 246,259 | tons | 223,403 | 356,000 |
| Sorghum | 802 | 2,005 | tons | 1,819 | 9,000 | 802 | 2,005 | tons | 1,819 | 9,000 |
| All Wheat | 18,090 | 44,483 | tons | 40,354 | 619,000 | 12,917 | 31,763 | tons | 28,815 | 442,000 |
| Sugar Beet | 5,371 | 131,590 | tons | 119,376 | 169,000 | 5,339 | 130,811 | tons | 118,670 | 168,000 |
| Vegetable Crops & Fruit Trees | 77,020 | 711,612 | tons | 645,564 | 3,211,479 | 74,422 | 687,607 | tons | 623,787 | 3,103,145 |
| Safflower & Sunflower | 11,080 | 12,033 | tons | 10,916 | 74,778 | 10,127 | 10,997 | tons | 9,977 | 68,345 |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Carbon Dioxide**

**A. Direct Sources**

**A1-4. Mobile (Construction Equipment, Motor Vehicles, Landscape Equipment, and wood burning Hearths)**

| Con (MT/yr) | Motor Vehicles (MT/yr) | Landscape (MT/yr) ($E_{Cls}$) | Hearth | MT/yr |
|---|---|---|---|---|
| 0.00 | 217,009.87 | 26.34 | 8,311.78 | **225,347.99** |
| 0.00 | 0.96 | 0.00 | | |

***Fuel emissions from Airports***

| Annual Fuel Usage ($U_{AAF}$) | kg/gallon ($EF_{CAF}$) | kg/MT ($C_3$) | MT/yr ($E_{CAF}$) |
|---|---|---|---|
| 15,512.50 | 8.32 | 1,000.00 | **129.06** |

**Mobile Source (Motor Vehicles)**

| Unit Type | miles/yr (M) | gr/mile ($EF_{CMV}$) | gr/MT ($C_6$) | tons/yr ($E_{CMV}$) |
|---|---|---|---|---|
| Non Cat passenger Car | 3,589,273 | 480.74 | 1,000,000 | 1,725.49 |
| Cat passenger Car | 174,977,035 | 403.47 | 1,000,000 | 70,598.68 |
| Diesel Passenger Car | 897,318 | 373.82 | 1,000,000 | 335.44 |
| Non cat light-duty truck | 3,595,179 | 476.14 | 1,000,000 | 1,711.80 |
| Cat light duty truck | 74,972,634 | 438.47 | 1,000,000 | 32,873.33 |
| Diesel Light duty Truck | 9,119,478 | 358.26 | 1,000,000 | 3,267.13 |
| Non Cat light-duty truck 2 | 1,790,093 | 476.69 | 1,000,000 | 853.31 |
| Cat light duty truck 2 | 87,267,028 | 431.99 | 1,000,000 | 37,698.48 |
| Diesel Light duty truck 2 | 447,523 | 369.35 | 1,000,000 | 165.29 |
| Non Cat Medium duty Truck | 464,788 | 605.05 | 1,000,000 | 281.22 |
| Cat med duty truck | 41,323,885 | 649.94 | 1,000,000 | 26,857.84 |
| Diesel Med duty truck | 464,788 | 362.67 | 1,000,000 | 168.56 |
| Non Cat lite-heavy duty truck | 0 | 567.90 | 1,000,000 | 0.00 |
| Cat Light-heavy duty truck | 7,269,413 | 567.90 | 1,000,000 | 4,128.26 |
| Diesel Lite-heavy duty truck | 4,089,045 | 642.00 | 1,000,000 | 2,625.17 |
| Non Cat lite-heavy duty truck 2 | 0 | 567.90 | 1,000,000 | 0.00 |
| Cat Light-heavy duty truck 2 | 1,815,536 | 567.90 | 1,000,000 | 1,031.03 |
| Diesel Lite-heavy duty truck 2 | 2,273,509 | 642.00 | 1,000,000 | 1,459.59 |
| Non Cat med-heavy duty truck | 456,610 | 567.90 | 1,000,000 | 259.31 |
| Cat med-heavy duty truck | 1,363,015 | 567.90 | 1,000,000 | 774.05 |
| Diesel med-heavy duty truck | 4,995,450 | 1,505.00 | 1,000,000 | 7,518.15 |
| Non cat Heavy Duty truck | 0 | 567.90 | 1,000,000 | 0.00 |
| Cat heavy duty truck | 457,519 | 567.90 | 1,000,000 | 259.82 |
| Diesel heavy duty truck | 8,174,909 | 1,924.23 | 1,000,000 | 15,730.44 |
| Non Cat Other Bus | 0 | 567.90 | 1,000,000 | 0.00 |
| Cat other bus | 0 | 567.90 | 1,000,000 | 0.00 |
| Diesel Other Bus | 454,338 | 1,505.00 | 1,000,000 | 683.78 |
| Non Cat Urban Bus | 0 | 567.90 | 1,000,000 | 0.00 |
| Cat Urban Bus | 0 | 567.90 | 1,000,000 | 0.00 |
| Diesel Urban Bus | 0 | 3,020.11 | 1,000,000 | 0.00 |
| Non cat motorcycle | 12,721,472 | 107.73 | 1,000,000 | 1,370.48 |
| Cat motorcycle | 5,452,060 | 0.00 | 1,000,000 | 0.00 |
| Diesel Motorcycle | 0 | 0.00 | 1,000,000 | 0.00 |
| Non Cat School Bus | 0 | 567.90 | 1,000,000 | 0.00 |
| Cat School Bus | 0 | 567.90 | 1,000,000 | 0.00 |
| Diesel School Bus | 454,338 | 1,505.00 | 1,000,000 | 683.78 |
| Non Cat Motor home | 452,521 | 567.90 | 1,000,000 | 256.98 |
| Cat Motor home | 4,089,045 | 567.90 | 1,000,000 | 2,322.15 |
| Diesel Motor home | 910,494 | 1,505.00 | 1,000,000 | 1,370.29 |
| | | | **Total (MT/year)** | **217,009.87** |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Carbon Dioxide**

**A5. Stationary Sources (Natural Gas)**

| Unit Type | MMBTU/yr ($U_{Ang}$) | kg/MMBTU ($EF_{Cng}$) | kg/MT ($C_3$) | MT/yr ($E_{Cng}$) |
|---|---|---|---|---|
| AG/ER | 161,670 | 53.07 | 1,000.00 | 8,579.85 |
| Low Density Residential | 56,321 | 53.07 | 1,000.00 | 2,988.97 |
| Medium Density Residential | 10,437 | 53.07 | 1,000.00 | 553.89 |
| High Density Residential | 0 | 53.07 | 1,000.00 | 0.00 |
| Park | 1,396 | 53.07 | 1,000.00 | 74.09 |
| Commercial | 378,388 | 53.07 | 1,000.00 | 20,081.04 |
| Mixed Use | 0 | 53.07 | 1,000.00 | 0.00 |
| Industrial | 912,833 | 53.07 | 1,000.00 | 48,444.06 |
| | | | **Total (MT/year)** | **80,721.89** |

**B. Indirect Sources**

**B1. Electricity**

| Unit Type | kWh/yr | Unit | Unit type | MWh/yr ($U_{Ae}$) | lbs/MWh ($EF_{Cele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Cele}$) |
|---|---|---|---|---|---|---|---|
| AG/ER | 59267390.8 | 4,386 | du | 59,267.39 | 620.00 | 2,204.62 | 16,667.63 |
| Low Density Residential | 20647075.8 | 3,300 | du | 20,647.08 | 620.00 | 2,204.62 | 5,806.53 |
| Medium Density Residential | 3826106.8 | 612 | du | 3,826.11 | 620.00 | 2,204.62 | 1,076.01 |
| High Density Residential | 0 | 0 | du | 0.00 | 620.00 | 2,204.62 | 0.00 |
| Park | 123300.628 | 23,718,730 | Sq/ft | 123.30 | 620.00 | 2,204.62 | 34.68 |
| Commercial | 33420178.6 | 1,154,865 | Sq/ft | 33,420.18 | 620.00 | 2,204.62 | 9,398.68 |
| Mixed Use | 0 | 0 | Sq/ft | 0.00 | 620.00 | 2,204.62 | 0.00 |
| Industrial | 80623769 | 2,785,974 | Sq/ft | 80,623.77 | 620.00 | 2,204.62 | 22,673.63 |
| | | | | | | **Total (MT/year)** | **55,657.14** |

**B2. Potable Water**

| Unit Type | unit type | unit number | MG/yr ($U_{Apot}$) | MWh/MG ($C_4$) | MWh/yr ($U_{epot}$) | lbs/MWh ($EF_{Cele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Cpot}$) |
|---|---|---|---|---|---|---|---|---|
| AG/ER | du | 4,386 | 25.2918 | 3.50 | 88.52 | 620.00 | 2,204.62 | 24.89 |
| Low Density Residential | du | 3,300 | 8.8109 | 3.50 | 30.84 | 620.00 | 2,204.62 | 8.67 |
| Medium Density Residential | du | 612 | 1.6328 | 0.01 | 0.02 | 804.54 | 2,000 | 0.01 |
| High Density Residential | du | 0 | 0.0000 | 0.01 | 0.00 | 804.54 | 2,000 | 0.00 |
| Park | Sq/ft | 23,718,730 | 0.0022 | 3.50 | 0.01 | 620.00 | 2,204.62 | 0.00 |
| Commercial | Sq/ft | 1,154,865 | 0.5944 | 3.50 | 2.08 | 620.00 | 2,204.62 | 0.59 |
| Mixed Use | Sq/ft | 0 | 0.0000 | 3.50 | 0.00 | 620.00 | 2,204.62 | 0.00 |
| Industrial | Sq/ft | 2,785,974 | 1.4338 | 3.50 | 5.02 | 620.00 | 2,204.62 | 1.41 |
| | | | | | | | **Total (MT/year)** | **35.57** |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Carbon Dioxide**

**B3. Solid Waste**

**B3a. Anthropogenic Carbon**

***$CO_2$ emissions are considered anthropogenic and are not counted in this inventory.***

*Source:* EPA Solid Waste Management and Greenhouse Gases; A life-cycle assessment of emissions and Sinks, 3rd edition, September 2006.

**B3b. Exhaust Emissions (Hauling Trucks)**

| Unit Type | tons/yr ($U_{SW}$) | tons/cuyd (d) | cuyd/trip ($C_T$) | miles/trip (M) | gr/mile ($EF_{CWT}$) | g/MT ($C_6$) | tons/yr ($E_{CWT}$) |
|---|---|---|---|---|---|---|---|
| AG/ER | 9,255.06 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 83.08 |
| Low Density Residential | 3,224.13 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 28.94 |
| Medium Density Residential | 597.49 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 5.36 |
| High Density Residential | 0.00 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 0.00 |
| Park | 4.23 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 0.02 |
| Commercial | 1,128.27 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 5.06 |
| Mixed Use | 0.00 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 0.00 |
| Industrial | 2,721.80 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 12.22 |
| | | | | | | **Total (MT/year)** | **134.68** |

**B4. Wastewater**

| Unit Type | MG/yr Potable ($U_{Apot}$) | % used indoors ($\%_{in}$) | MG/yr ww generated ($U_{AWW}$) | MWh/MG | MWh/yr ($U_{eWW}$) | lbs/MWh ($EF_{Cele}$) | lbs/MT ($C_1$) | MT/yr ($E_{CWW}$) |
|---|---|---|---|---|---|---|---|---|
| AG/ER | 25.2918 | 0.65 | 16.43967 | 1.911 | 31.4162094 | 620.00 | 2,205 | 8.84 |
| Low Density Residential | 8.8109 | 0.82 | 7.224938 | 1.911 | 13.8068565 | 620.00 | 2,205 | 3.88 |
| Medium Density Residential | 1.6328 | 0.82 | 1.338896 | 1.911 | 2.55863026 | 620.00 | 2,205 | 0.72 |
| High Density Residential | 0.0000 | 0.82 | 0 | 1.911 | 0 | 620.00 | 2,205 | 0.00 |
| Park | 0.0022 | 0.71 | 0.001562 | 1.911 | 0.00298498 | 620.00 | 2,205 | 0.00 |
| Commercial | 0.5944 | 0.71 | 0.422024 | 1.911 | 0.80648786 | 620.00 | 2,205 | 0.23 |
| Mixed Use | 0.0000 | 0.71 | 0 | 1.911 | 0 | 620.00 | 2,205 | 0.00 |
| Industrial | 1.4338 | 0.8 | 1.14704 | 1.911 | 2.19199344 | 620.00 | 2,205 | 0.62 |
| | | | | | | | **Total (MT/year)** | 14.28 |

**C. Reserved for AG emissions for $CH_4$ and $N_2O$, not applicable for $CO_2$.**

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Carbon Dioxide**

**D. Summary Table**

| Source Type | | Emissions, MT /yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Direct | Construction equipment | 0.00 | 0.00 |
| | Motor vehicles & Aircraft | 217138.93 | 217,138.93 |
| | Landscape equipment | 26.34 | 26.34 |
| | Cooling and heating | 89033.67 | 89,033.67 |
| **Total direct, tons/yr** | | **306198.94** | **306198.94** |
| Indirect | Electricity | 55657.14 | 55,657.14 |
| | Potable water | 35.57 | 35.57 |
| | Solid waste | 134.68 | 134.68 |
| | Wastewater | 14.28 | 14.28 |
| **Total indirect, tons/yr** | | **55,841.68** | **55,841.68** |
| **Total, tons/yr** | | **362,040.62** | **362,040.62** |
| **Global warming potential index** | | **1** | |

| Source Type | | Emissions, MT/yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Residential | AG/ER | 148,617.83 | 148,617.83 |
| | Low Density Residential | 51,774.17 | 51,774.17 |
| | Medium Density Residential | 9,592.99 | 9,592.99 |
| | High Density Residential | 0.00 | 0.00 |
| | **Total Residential** | **209,984.98** | **209,984.98** |
| Commercial | Park | 165.15 | 165.15 |
| | Commercial | 44,511.23 | 44,511.23 |
| | Mixed Use | 0.00 | 0.00 |
| | **Total Commercial** | **44,676.39** | **44,676.39** |
| Industrial | Industrial | 107,379.26 | 107,379.26 |
| | **Total Industrial** | **107,379.26** | **107,379.26** |
| **Total, tons/yr** | | **362,040.63** | **362,040.63** |
| **Global warming potential index** | | 1 | |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Methane**

## A. Direct Sources

### A1. Mobile Source (Construction Equipment)

| Unit Type | gallons/yr ($U_{AG}$) | gr/gallon ($EF_{MHDV}$) | gr/MT ($C_6$) | MT/yr ($E_{MCON}$) |
|---|---|---|---|---|
| Construction Equipment | 0.00 | 0.0580 | 1,000,000 | **0.00** |

### A2. Mobile Source (Motor Vehicles)

| Unit Type | miles/yr (M) | gr/mile ($EF_{MMV}$) | gr/MT ($C_6$) | tons/yr ($E_{MMV}$) |
|---|---|---|---|---|
| Non Cat passenger Car | 3,589,273 | 0.1696 | 1,000,000 | 0.61 |
| Cat passenger Car | 174,977,035 | 0.1355 | 1,000,000 | 23.71 |
| Diesel Passenger Car | 897,318 | 0.0006 | 1,000,000 | 0.00 |
| Non cat light-duty truck | 3,595,179 | 0.1908 | 1,000,000 | 0.69 |
| Cat light duty truck | 74,972,634 | 0.1516 | 1,000,000 | 11.37 |
| Diesel Light duty Truck | 9,119,478 | 0.0011 | 1,000,000 | 0.01 |
| Non Cat light-duty truck 2 | 1,790,093 | 0.1908 | 1,000,000 | 0.34 |
| Cat light duty truck 2 | 87,267,028 | 0.1516 | 1,000,000 | 13.23 |
| Diesel Light duty truck 2 | 447,523 | 0.0011 | 1,000,000 | 0.00 |
| Non Cat Medium duty Truck | 464,788 | 0.4181 | 1,000,000 | 0.19 |
| Cat med duty truck | 41,323,885 | 0.2356 | 1,000,000 | 9.74 |
| Diesel Med duty truck | 464,788 | 0.0051 | 1,000,000 | 0.00 |
| Non Cat lite-heavy duty truck | 0 | 0.4181 | 1,000,000 | 0.00 |
| Cat Light-heavy duty truck | 7,269,413 | 0.2356 | 1,000,000 | 1.71 |
| Diesel Lite-heavy duty truck | 4,089,045 | 0.0051 | 1,000,000 | 0.02 |
| Non Cat lite-heavy duty truck 2 | 0 | 0.4181 | 1,000,000 | 0.00 |
| Cat Light-heavy duty truck 2 | 1,815,536 | 0.2356 | 1,000,000 | 0.43 |
| Diesel Lite-heavy duty truck 2 | 2,273,509 | 0.0051 | 1,000,000 | 0.01 |
| Non Cat med-heavy duty truck | 456,610 | 0.4181 | 1,000,000 | 0.19 |
| Cat med-heavy duty truck | 1,363,015 | 0.2356 | 1,000,000 | 0.32 |
| Diesel med-heavy duty truck | 4,995,450 | 0.0051 | 1,000,000 | 0.03 |
| Non cat Heavy Duty truck | 0 | 0.4181 | 1,000,000 | 0.00 |
| Cat heavy duty truck | 457,519 | 0.2356 | 1,000,000 | 0.11 |
| Diesel heavy duty truck | 8,174,909 | 0.0051 | 1,000,000 | 0.04 |
| Non Cat Other Bus | 0 | 0.4181 | 1,000,000 | 0.00 |
| Cat other bus | 0 | 0.2356 | 1,000,000 | 0.00 |
| Diesel Other Bus | 454,338 | 0.0051 | 1,000,000 | 0.00 |
| Non Cat Urban Bus | 0 | 0.4181 | 1,000,000 | 0.00 |
| Cat Urban Bus | 0 | 0.2356 | 1,000,000 | 0.00 |
| Diesel Urban Bus | 0 | 0.0051 | 1,000,000 | 0.00 |
| Non cat motorcycle | 12,721,472 | 0.0672 | 1,000,000 | 0.85 |
| Cat motorcycle | 5,452,060 | 0.0672 | 1,000,000 | 0.37 |
| Diesel Motorcycle | 0 | 0 | 1,000,000 | 0.00 |
| Non Cat School Bus | 0 | 0.4181 | 1,000,000 | 0.00 |
| Cat School Bus | 0 | 0.2356 | 1,000,000 | 0.00 |
| Diesel School Bus | 454,338 | 0.0051 | 1,000,000 | 0.00 |
| Non Cat Motor home | 452,521 | 0.4181 | 1,000,000 | 0.19 |
| Cat Motor home | 4,089,045 | 0.2356 | 1,000,000 | 0.96 |
| Diesel Motor home | 910,494 | 0.0051 | 1,000,000 | 0.00 |
| | | | **Total (MT/yr)** | **65.12** |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Methane**

***Emissions from Aviation Fuel***

| Gasoline gallons/ year ($U_{AAF}$) | gr/gallon ($EF_{Maf}$) | gr/MT ($C_6$) | MT/yr ($E_{Maf}$) |
|---|---|---|---|
| 15,512.50 | 7.04 | 1,000,000 | **0.11** |

**A3. Mobile Source (Landscape Equipment)**

| Gasoline gallons/ year ($G_F$) | gr/gallon ($EF_{MF}$) | gr/MT ($C_6$) | MT/yr ($E_{Mls}$) |
|---|---|---|---|
| 2,993.40 | 0.50 | 1,000,000 | **0.0015** |

**A4. Wood burning Hearth**

| MMBtu | kg/MMBtu ($EF_{Mwood}$) | kg/MT ($C_3$) | MT/yr ($E_{Mls}$) |
|---|---|---|---|
| 127,835.18 | 0.32 | 1,000 | **40.40** |

**A5. Stationary Source (Cooling and Heating) - Natural Gas**

| Land Use Type | Unit Type | Units | MMBTUs/yr ($U_{Ang}$) | kg/MMBTU ($EF_{Mng}$) | kg/MT ($C_3$) | MT/yr ($E_{Mng}$) |
|---|---|---|---|---|---|---|
| AG/ER | du | 4,386 | 161,670.35 | 0.005 | 1,000 | 0.8084 |
| Low Density Residential | du | 3,300 | 56,321.36 | 0.005 | 1,000 | 0.2816 |
| Medium Density Residential | du | 612 | 10,436.90 | 0.005 | 1,000 | 0.0522 |
| High Density Residential | du | 0 | 0.00 | 0.005 | 1,000 | 0.0000 |
| Park | Sq/ft | 23,718,730 | 1,396.03 | 0.005 | 1,000 | 0.0070 |
| Commercial | Sq/ft | 1,154,865 | 378,387.76 | 0.005 | 1,000 | 1.8919 |
| Mixed Use | Sq/ft | 0 | 0.00 | 0.005 | 1,000 | 0.0000 |
| Industrial | Sq/ft | 2,785,974 | 912,833.16 | 0.001 | 1,000 | 0.9128 |
| | | | | | **Total (MT/yr)** | **3.95** |

**B. Indirect Sources**
**B1. Electricity**

| Land Use Type | Unit Type | Units | kWh/year | MWh/yr ($U_{Ae}$) | lbs/MWh ($EF_{Mele}$) | lbs/MT ($C_1$) | tons/yr ($E_{Mele}$) |
|---|---|---|---|---|---|---|---|
| AG/ER | du | 4,386 | 59,267,391 | 59,267 | 0.0067 | 2,205 | 0.180 |
| Low Density Residential | du | 3,300 | 20,647,076 | 20,647 | 0.0067 | 2,205 | 0.063 |
| Medium Density Residential | du | 612 | 3,826,107 | 3,826 | 0.0067 | 2,205 | 0.012 |
| High Density Residential | du | 0 | 0 | 0 | 0.0067 | 2,205 | 0.000 |
| Park | Sq/ft | 23,718,730 | 123,301 | 123 | 0.0067 | 2,205 | 0.000 |
| Commercial | Sq/ft | 1,154,865 | 33,420,179 | 33,420 | 0.0067 | 2,205 | 0.102 |
| Mixed Use | Sq/ft | 0 | 0 | 0 | 0.0067 | 2,205 | 0.000 |
| Industrial | Sq/ft | 2,785,974 | 80,623,769 | 80,624 | 0.0067 | 2,205 | 0.245 |
| | | | | | | **Total (MT/yr)** | **0.601** |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Methane**

**B2. Potable Water**

| Unit Type | unit type | unit number | MG/yr ($U_{Apot}$) | MWh/MG ($C_4$) | MWH/yr ($U_{epot}$) | lbs/MWh ($EF_{Mele}$) | lbs/MT ($C_1$) | tons/yr ($E_{Mpot}$) |
|---|---|---|---|---|---|---|---|---|
| AG/ER | du | 4,386 | 25.29179 | 3.50 | 88.52 | 0.0067 | 2,205 | 0.00 |
| Low Density Residential | du | 3,300 | 8.81094 | 3.50 | 30.84 | 0.0067 | 2,205 | 0.00 |
| Medium Density Residential | du | 612 | 1.63275 | 3.50 | 5.71 | 0.0067 | 2,205 | 0.00 |
| High Density Residential | du | 0 | 0.00000 | 3.50 | 0.00 | 0.0067 | 2,205 | 0.00 |
| Park | Sq/ft | 23,718,730 | 0.00219 | 3.50 | 0.01 | 0.0067 | 2,205 | 0.00 |
| Commercial | Sq/ft | 1,154,865 | 0.59435 | 3.50 | 2.08 | 0.0067 | 2,205 | 0.00 |
| Mixed Use | Sq/ft | 0 | 0.00000 | 3.50 | 0.00 | 0.0067 | 2,205 | 0.00 |
| Industrial | Sq/ft | 2,785,974 | 1.43383 | 3.50 | 5.02 | 0.0067 | 2,205 | 0.00 |
| | | | | | | | **Total (MT/yr)** | **0.00** |

**B3. Solid Waste**
**B3a. Fugitive Emissions**

| Unit Type | Unit Type | unit | tons/yr ($U_{SW}$) | MT $CO_2e$/ton ($EF_{MWF}$) | MT $CO_2e$/yr ($E_{MWF}$) |
|---|---|---|---|---|---|
| AG/ER | du | 4,386 | 9,255.06 | 0.520000 | 4,812.63 |
| Low Density Residential | du | 3,300 | 3,224.13 | 0.520000 | 1,676.55 |
| Medium Density Residential | du | 612 | 597.49 | 0.520000 | 310.69 |
| High Density Residential | du | 0 | 0.00 | 0.520000 | 0.00 |
| Park | Sq/ft | 23,718,730 | 4.23 | 0.520000 | 2.20 |
| Commercial | Sq/ft | 1,154,865 | 1,128.27 | 0.520000 | 586.70 |
| Mixed Use | Sq/ft | 0 | 0.00 | 0.520000 | 0.00 |
| Industrial | Sq/ft | 2,785,974 | 2,721.80 | 0.520000 | 1,415.33 |
| | | | | **Total (MT/yr)** | **8,804.11** |

**B3b. Exhaust Emissions (Hauling Trucks)**

| Unit Type | tons/yr ($U_{SW}$) | tons/cuyd (d) | cuyd/trip ($C_T$) | miles/trip (M) | gr/mile ($EF_{MWT}$) | gr/MT ($C_6$) | tons/yr ($E_{MWT}$) |
|---|---|---|---|---|---|---|---|
| AG/ER | 9,255.0568 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000122 |
| Low Density Residential | 3,224.1337 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000043 |
| Medium Density Residential | 597.4882 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000008 |
| High Density Residential | 0.0000 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000000 |
| Park | 4.2327 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000000 |
| Commercial | 1,128.2690 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000007 |
| Mixed Use | 0.0000 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000000 |
| Industrial | 2,721.7967 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000018 |
| | | | | | | **Total (MT/yr)** | **0.000198** |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Methane**

**B3c. Exhaust Emissions (Disposal Equipment)**

| Vehicle Type | # of equip | lbs/hr ($EF_{MWD}$) | hrs/day (h) | days/yr (n) | lbs/MT ($C_1$) | MT/yr ($E_{MWD}$) |
|---|---|---|---|---|---|---|
| Excavator | 0 | 0.0164 | 9.00 | 313 | 2,205 | 0.00 |
| Grader | 0 | 0.0185 | 9.00 | 313 | 2,205 | 0.00 |
| Off-Highway Tractor | 0 | 0.0243 | 9.00 | 313 | 2,205 | 0.00 |
| Off-Highway Truck | 0 | 0.0260 | 9.00 | 313 | 2,205 | 0.00 |
| Rubber Tired Dozer | 0 | 0.0342 | 9.00 | 313 | 2,205 | 0.00 |
| Disposal Facility run by City? | | | | | No | 0.00 |
| | | | | | **Total (MT/yr)** | **0.00** |

**B4. Wastewater**

| Land Use Type | MG/yr Potable ($U_{Apot}$) | % used indoors ($\%_{in}$) | MG/yr ww generated ($U_{AWW}$) | MWh/MG ($C_5$) | MWh/yr ($U_{eWW}$) | lbs/MWh ($EF_{Mele}$) | lbs/MT ($C_1$) | MT/yr ($E_{MWW}$) |
|---|---|---|---|---|---|---|---|---|
| AG/ER | 25.29179 | 65 | 16.44 | 1.91 | 31.42 | 0.0067 | 2,205 | 0.000095 |
| Low Density Residential | 8.81094 | 82 | 7.22 | 1.91 | 13.81 | 0.0067 | 2,205 | 0.000042 |
| Medium Density Residential | 1.63275 | 82 | 1.34 | 1.91 | 2.56 | 0.0067 | 2,205 | 0.000008 |
| High Density Residential | 0.00000 | 82 | 0.00 | 1.91 | 0.00 | 0.0067 | 2,205 | 0.000000 |
| Park | 0.00219 | 71 | 0.00 | 1.91 | 0.00 | 0.0067 | 2,205 | 0.000000 |
| Commercial | 0.59435 | 71 | 0.42 | 1.91 | 0.81 | 0.0067 | 2,205 | 0.000002 |
| Mixed Use | 0.00000 | 71 | 0.00 | 1.91 | 0.00 | 0.0067 | 2,205 | 0.000000 |
| Industrial | 1.43383 | 80 | 1.15 | 1.91 | 2.19 | 0.0067 | 2,205 | 0.000007 |
| | | | | | | | **Total (MT/yr)** | 0.000154 |

**C. See Methane Emissions from AG Formula Spreadsheet (entered into table below under commercial AG)**

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Methane**

**D. Summary Table**

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Direct | Construction equipment | 0.00 | 0.00 |
| | Motor vehicles & Aviation Fuel | 65.2292 | 1369.8132 |
| | Landscape equipment | 0.0015 | 0.0315 |
| | Cooling and heating | 44.3498 | 931.3458 |
| | Industrial | | |
| **Total direct, tons/yr** | | **109.58** | **2,301.19** |
| Indirect | Electricity | 0.6015 | 12.6315 |
| | Potable water | 0.0004 | 0.0084 |
| | Solid waste | 8,804.1083 | 8,804.1123 |
| | Wastewater | 0.0002 | 0.0032 |
| **Total indirect, tons/yr** | | **8,804.71** | **8,816.76** |
| **Total from Agriculture** | | **17,772.02** | **373,212.42** |
| ***Total, tons/yr*** | | ***26,686.31*** | ***384,330.37*** |
| **Global warming potential index** | | **21** | |

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Residential | AG/ER | 4,871.2985 | 6,045.92 |
| | Low Density Residential | 1,696.9878 | 2,106.18 |
| | Medium Density Residential | 314.4814 | 390.31 |
| | High Density Residential | 0.0000 | 0.00 |
| | **Total Residential** | **6,882.77** | **8,542.42** |
| Commercial | Park | 2.2347 | 2.91 |
| | Commercial | 595.7251 | 776.38 |
| | Mixed Use | 0.0000 | 0.00 |
| | **Total Commercial** | **597.96** | **779.29** |
| Industrial | Industrial | 1,433.4551 | 1,796.24 |
| **Total Industrial** | | **1,433.4551** | **1,796.24** |
| **Total from Agriculture** | | **17,772.02** | **373,212.42** |
| ***Total, tons/yr*** | | ***26,686.20*** | ***384,330.36*** |
| **Global warming potential index** | | 21 | |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Nitrous Oxide**

## A. Direct Sources

### A1. Mobile Source (Construction Equipment)

| Unit Type | gallons/yr ($U_{AG}$) | gr/gallon ($EF_{NHDV}$) | gr/MT ($C_6$) | MT/yr ($E_{NCON}$) |
|---|---|---|---|---|
| Non cat heavy-duty truck | 0.00 | 0.0260 | 1,000,000 | **0.00000** |

### A2. Mobile Source (Motor Vehicles)

| Unit Type | miles/yr (M) | gr/mile ($EF_{NMV}$) | gr/MT ($C_6$) | MT/yr ($E_{NMV}$) |
|---|---|---|---|---|
| Non Cat passenger Car | 3,589,273 | 0.0197 | 1,000,000 | 0.07071 |
| Cat passenger Car | 174,977,035 | 0.0504 | 1,000,000 | 8.81884 |
| Diesel Passenger Car | 897,318 | 0.0012 | 1,000,000 | 0.00108 |
| Non cat light-duty truck | 3,595,179 | 0.0218 | 1,000,000 | 0.07837 |
| Cat light duty truck | 74,972,634 | 0.0639 | 1,000,000 | 4.79075 |
| Diesel Light duty Truck | 9,119,478 | 0.0017 | 1,000,000 | 0.01550 |
| Non Cat light-duty truck 2 | 1,790,093 | 0.0218 | 1,000,000 | 0.03902 |
| Cat light duty truck 2 | 87,267,028 | 0.0639 | 1,000,000 | 5.57636 |
| Diesel Light duty truck 2 | 447,523 | 0.0017 | 1,000,000 | 0.00076 |
| Non Cat Medium duty Truck | 464,788 | 0.0473 | 1,000,000 | 0.02198 |
| Cat med duty truck | 41,323,885 | 0.1317 | 1,000,000 | 5.44236 |
| Diesel Med duty truck | 464,788 | 0.0048 | 1,000,000 | 0.00223 |
| Non Cat lite-heavy duty truck | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat Light-heavy duty truck | 7,269,413 | 0.1317 | 1,000,000 | 0.95738 |
| Diesel Lite-heavy duty truck | 4,089,045 | 0.0048 | 1,000,000 | 0.01963 |
| Non Cat lite-heavy duty truck 2 | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat Light-heavy duty truck 2 | 1,815,536 | 0.1317 | 1,000,000 | 0.23911 |
| Diesel Lite-heavy duty truck 2 | 2,273,509 | 0.0048 | 1,000,000 | 0.01091 |
| Non Cat med-heavy duty truck | 456,610 | 0.0473 | 1,000,000 | 0.02160 |
| Cat med-heavy duty truck | 1,363,015 | 0.1317 | 1,000,000 | 0.17951 |
| Diesel med-heavy duty truck | 4,995,450 | 0.0048 | 1,000,000 | 0.02398 |
| Non cat Heavy Duty truck | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat heavy duty truck | 457,519 | 0.1317 | 1,000,000 | 0.06026 |
| Diesel heavy duty truck | 8,174,909 | 0.0048 | 1,000,000 | 0.03924 |
| Non Cat Other Bus | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat other bus | 0 | 0.1317 | 1,000,000 | 0.00000 |
| Diesel Other Bus | 454,338 | 0.0048 | 1,000,000 | 0.00218 |
| Non Cat Urban Bus | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat Urban Bus | 0 | 0.1317 | 1,000,000 | 0.00000 |
| Diesel Urban Bus | 0 | 0.0048 | 1,000,000 | 0.00000 |
| Non cat motorcycle | 12,721,472 | 0.0069 | 1,000,000 | 0.08778 |
| Cat motorcycle | 5,452,060 | 0.0069 | 1,000,000 | 0.03762 |
| Diesel Motorcycle | 0 | 0 | 1,000,000 | 0.00000 |
| Non Cat School Bus | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat School Bus | 0 | 0.1317 | 1,000,000 | 0.00000 |
| Diesel School Bus | 454,338 | 0.0048 | 1,000,000 | 0.00218 |
| Non Cat Motor home | 452,521 | 0.0473 | 1,000,000 | 0.02140 |
| Cat Motor home | 4,089,045 | 0.1317 | 1,000,000 | 0.53853 |
| Diesel Motor home | 910,494 | 0.0048 | 1,000,000 | 0.00437 |
| | | | **Total (MT/yr)** | **27.10** |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Nitrous Oxide**

***Emissions from Aviation Fuel***

| Gasoline gallons/ year ($U_{Aaf}$) | gr/gallon ($EF_{Naf}$) | gr/lbs ($C_6$) | MT/yr ($E_{Nls}$) |
|---|---|---|---|
| 15,512.50 | 0.11000 | 1000000 | **0.001706** |

**A3. Mobile Source (Landscape Equipment)**

| Gasoline gallons/ year | gr/gallon ($EF_{Nls}$) | gr/lbs ($C_6$) | MT/yr ($E_{Nls}$) |
|---|---|---|---|
| 2,993.40 | 0.22000 | 1000000 | **0.000659** |

**A4. Wood burning Hearth**

| MMBtu | kg/MMBtu ($EF_{Mwood}$) | kg/MT ($C_3$) | MT/yr ($E_{Mls}$) |
|---|---|---|---|
| 127,835.18 | 0.00420 | 1000 | **0.536908** |

**A5. Stationary Source (Cooling and Heating)**

| Land Use Type | Unit Type | Units | MMBTUs/yr ($U_{Ang}$) | kg/MMBTU ($EF_{Nng}$) | kg/MT ($C_3$) | MT/yr ($E_{Nng}$) |
|---|---|---|---|---|---|---|
| AG/ER | du | 4,386 | 161,670.35 | 0.0001 | 1,000 | 0.016167 |
| Low Density Residential | du | 3,300 | 56,321.36 | 0.0001 | 1,000 | 0.005632 |
| Medium Density Residential | du | 612 | 10,436.90 | 0.0001 | 1,000 | 0.001044 |
| High Density Residential | du | 0 | 0.00 | 0.0001 | 1,000 | 0.000000 |
| Park | Sq/ft | 23718729.69 | 1,396.03 | 0.0001 | 1,000 | 0.000140 |
| Commercial | Sq/ft | 1154864.75 | 378,387.76 | 0.0001 | 1,000 | 0.037839 |
| Mixed Use | Sq/ft | 0.00 | 0.00 | 0.0001 | 1,000 | 0.000000 |
| Industrial | Sq/ft | 2785973.60 | 912,833.16 | 0.0001 | 1,000 | 0.091283 |
| | | | | | **Total (MT/yr)** | **0.152105** |

**B. Indirect Sources**
**B1. Electricity**

| Land Use Type | Unit Type | Units | kWh/yr | MWh/yr ($U_{Ae}$) | lbs/MWh ($EF_{Nele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Nele}$) |
|---|---|---|---|---|---|---|---|
| AG/ER | du | 4385.79 | 59,267,391 | 59,267 | 0.0037 | 2,205 | 0.09947 |
| Low Density Residential | du | 3300.17 | 20,647,076 | 20,647 | 0.0037 | 2,205 | 0.03465 |
| Medium Density Residential | du | 611.61 | 3,826,107 | 3,826 | 0.0037 | 2,205 | 0.00642 |
| High Density Residential | du | 0.00 | 0 | 0 | 0.0037 | 2,205 | 0.00000 |
| Park | Sq/ft | 23718729.69 | 123,301 | 123 | 0.0037 | 2,205 | 0.00021 |
| Commercial | Sq/ft | 1154864.75 | 33,420,179 | 33,420 | 0.0037 | 2,205 | 0.05609 |
| Mixed Use | Sq/ft | 0.00 | 0 | 0 | 0.0037 | 2,205 | 0.00000 |
| Industrial | Sq/ft | 2785973.60 | 80,623,769 | 80,624 | 0.0037 | 2,205 | 0.13531 |
| | | | | | | **Total (MT/yr)** | **0.33215** |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Nitrous Oxide**

**B2. Potable Water**

| Unit Type | unit type | unit number | MG/yr ($U_{Apot}$) | MWh/MG ($C_4$) | MWH/yr ($U_{epot}$) | lbs/MWh ($EF_{Nele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Npot}$) |
|---|---|---|---|---|---|---|---|---|
| AG/ER | du | 4385.79 | 25.2917905 | 3.50 | 88.52 | 0.0037 | 2,205 | 0.000 |
| Low Density Residential | du | 3300.17 | 8.8109415 | 3.50 | 30.84 | 0.0037 | 2,205 | 0.000 |
| Medium Density Residential | du | 611.61 | 1.6327544 | 3.50 | 5.71 | 0.0037 | 2,205 | 0.000 |
| High Density Residential | du | 0.00 | 0.0000000 | 3.50 | 0.00 | 0.0037 | 2,205 | 0.000 |
| Park | Sq/ft | 23718729.69 | 0.0021928 | 3.50 | 0.01 | 0.0037 | 2,205 | 0.000 |
| Commercial | Sq/ft | 1154864.75 | 0.5943535 | 3.50 | 2.08 | 0.0037 | 2,205 | 0.000 |
| Mixed Use | Sq/ft | 0.00 | 0.0000000 | 3.50 | 0.00 | 0.0037 | 2,205 | 0.000 |
| Industrial | Sq/ft | 2785973.60 | 1.4338348 | 3.50 | 5.02 | 0.0037 | 2,205 | 0.000 |
| | | | | | | | **Total (MT/yr)** | **0.000** |

**B3. Solid Waste**

**B3a. Fugitive Emissions** No Fugitive Nitrous Oxide Emissions

**B3b. Exhaust Emissions (Hauling Trucks)**

| Unit Type | tons/yr ($U_{SW}$) | tons/cuyd (d) | cuyd/trip ($C_T$) | miles/trip (M) | gr/mile ($EF_{NWT}$) | gr/MT ($C_6$) | MT/yr ($E_{NWT}$) |
|---|---|---|---|---|---|---|---|
| AG/ER | 9,255.06 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.000115 |
| Low Density Residential | 3,224.13 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.000040 |
| Medium Density Residential | 597.49 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.000007 |
| High Density Residential | 0.00 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.000000 |
| Park | 4.23 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.000000 |
| Commercial | 1,128.27 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.000007 |
| Mixed Use | 0.00 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.000000 |
| Industrial | 2,721.80 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.000017 |
| | | | | | | **Total (MT/yr)** | **0.000187** |

**B3c. Exhaust Emissions (Disposal Equipment)**

| Vehicle Type | # of equip. | lbs/hr ($EF_{NWD}$) | hrs/day (h) | days/yr (n) | lbs/MT ($C_1$) | tons/yr ($E_{NWD}$) |
|---|---|---|---|---|---|---|
| Excavator | 0 | 0.0074 | 9.00 | 313 | 2,205 | 0.00 |
| Grader | 0 | 0.0083 | 9.00 | 313 | 2,205 | 0.00 |
| Off-Highway Tractor | 0 | 0.0109 | 9.00 | 313 | 2,205 | 0.00 |
| Off-Highway Truck | 0 | 0.0117 | 9.00 | 313 | 2,205 | 0.00 |
| Rubber Tired Dozer | 0 | 0.0153 | 9.00 | 313 | 2,205 | 0.00 |
| Disposal Facility run by City? | | | | | No | 0.00 |
| | | | | | **Total, tons/yr** | **0.00** |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Nitrous Oxide**

**B4. Wastewater**

| Land Use Type | MG/yr Potable ($U_{Apot}$) | % used indoors ($\%_{in}$) | MG/yr ww generated ($U_{AWW}$) | MWh/MG ($C_5$) | MWh/yr ($U_{eWW}$) | lbs/MWh ($EF_{Nele}$) | lbs/MT ($C_1$) | MT/yr ($E_{NWW}$) |
|---|---|---|---|---|---|---|---|---|
| AG/ER | 25.29 | 65 | 16.44 | 1.91 | 31.4162 | 0.0037 | 2204.62 | 0.0000527 |
| Low Density Residential | 8.81 | 82 | 7.22 | 1.91 | 13.8069 | 0.0037 | 2204.62 | 0.0000232 |
| Medium Density Residential | 1.63 | 82 | 1.34 | 1.91 | 2.5586 | 0.0037 | 2204.62 | 0.0000043 |
| High Density Residential | 0.00 | 82 | 0.00 | 1.91 | 0.0000 | 0.0037 | 2204.62 | 0.0000000 |
| Park | 0.00 | 71 | 0.00 | 1.91 | 0.0030 | 0.0037 | 2204.62 | 0.0000000 |
| Commercial | 0.59 | 71 | 0.42 | 1.91 | 0.8064 | 0.0037 | 2204.62 | 0.0000014 |
| Mixed Use | 0.00 | 71 | 0.00 | 1.91 | 0.0000 | 0.0037 | 2204.62 | 0.0000000 |
| Industrial | 1.43 | 80 | 1.15 | 1.91 | 2.1920 | 0.0037 | 2204.62 | 0.0000037 |
| | | | | | | | **Total (MT/yr)** | **0.0000852** |

**C. See Nitrous Emissions from AG Formula Spreadsheet (entered into table below under commercial AG)**
**D. Summary Table**

| Source Type | | Emissions, tons/yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Direct | Construction equipment | 0.00000 | 0.00 |
| | Motor vehicles + aviation fuel | 27.1017 | 8,401.53 |
| | Landscape equipment | 0.0007 | 0.20 |
| | Cooling and heating | 0.6890 | 213.59 |
| **Total direct, tons/yr** | | **27.7914** | **8,615.33** |
| Indirect | Electricity | 0.3321 | 102.97 |
| | Potable water | 0.0002 | 0.07 |
| | Solid waste | 0.0002 | 0.06 |
| | Wastewater | 0.0001 | 0.03 |
| **Total indirect, tons/yr** | | **0.3326** | **103.12** |
| **Total From Agriculture** | | **1,880.98** | **583,102.45** |
| ***Total, tons/yr*** | | ***1,909.10*** | ***591,820.89*** |
| **Global warming potential index** | | **310** | |

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Residential | AG/ER | 15.2238 | 4,719.60 |
| | Low Density Residential | 5.3034 | 1,644.14 |
| | Medium Density Residential | 0.9828 | 304.69 |
| | High Density Residential | 0.0000 | 0.00 |
| | **Total Residential** | **21.5100** | **6,668.44** |
| Commercial | Park | 0.0073 | 2.25 |
| | Commercial | 1.9357 | 600.10 |
| | Mixed Use | 0.0000 | 0.00 |
| | **Total Commercial** | **1.9430** | **602.35** |
| Industrial | Industrial | 4.6696 | 1,447.66 |
| | **Total Industrial** | **4.6696** | **1,447.66** |
| **Total from Agriculture** | | **1,880.98** | **583,102.45** |
| **Total, tons/yr** | | **1,909.10** | **591,820.89** |
| **Global warming potential index** | | 310 | |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Agricultural Emissions**

## CM. Methane

### CM1. Enteric Fermentation

| Source | Number - Head/year ($U_{Aani}$) | Emission Factor kg $CH_4$/head ($EF_{MEF}$) | Conversion factor kg to MT ($C_3$) | MT $CH_4$/year ($E_{MEF}$) |
|---|---|---|---|---|
| ***Dairy Cow*** | | | | |
| Dairy Cows | 31,625.00 | 138.39 | 1000.0 | 4,376.67 |
| ***Others*** | | | | |
| Sheep | 23,965.00 | 8.00 | 1000.0 | 191.72 |
| Goats | 94,177.50 | 5.00 | 1000.0 | 470.89 |
| Swine | 8,591.00 | 1.50 | 1000.0 | 12.89 |
| | | | **Total** | **5,052.16** |

### CM2. Manure Management

| Source | Number - 1000s Head/year ($U_{Aani}$) | Typical Animal Mass kg/head (TAM) | Volatile Solids Produced kgVS/1000kg/year (VS) | Max $CH_4$ capacity $m^3CH_4$/kgVS ($B_O$) | Extent Capacity Realized (MCF) | Density of Methane ($C_8$) | MT $CH_4$/year ($E_{MMM}$) |
|---|---|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | | | |
| Dairy Cows | 31.625 | 604.0 | 3722.3 | 0.24 | 0.488 | 0.678 | 5,646.70 |
| Market 120-179 lbs | 8.591 | 67.8 | 1971.0 | 0.48 | 0.471 | 0.678 | 175.9764243 |
| **Poultry** | | | | | | | |
| Layers | | | | | | | |
| Hens > 1 yr | 215.63 | 1.8 | 3942.0 | 0.39 | 0.088 | 0.678 | 35.51676336 |
| Turkeys | 94.1775 | 6.8 | 3540.5 | 0.36 | 0.015 | 0.678 | 8.301262033 |
| **Other** | | | | | | | |
| Sheep on Feed | 23.965 | 27.0 | 3361.7 | 0.36 | 0.012 | 0.678 | 6.370993072 |
| Goats | 94.1775 | 64.0 | 3478.5 | 0.17 | 0.012 | 0.678 | 28.99831466 |
| | | | | | | **Total** | **5,901.86** |

### CM3. Rice Cultivation

| Season | Acres ($U_{AC}$) | Conversion hectares/acre ($C_{11}$) | Emission Factor ($EF_{PS}$) | Conversion kg/MT ($C_3$) | MT/year ($E_{MRC}$) |
|---|---|---|---|---|---|
| Primary | 74,356 | 0.40 | 210 | 1,000 | 6,319.21 |
| Rattoon | 0 | 0.40 | 780 | 1,000 | 0.00 |
| | | | | **Total** | **6,319.21** |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Agricultural Emissions**

## CM4. Agricultural Residue Burning

| Source | Production - Tons ($U_C$) | Residue/Crop Ratio ($R_{RC}$) | Fraction Burned ($F_{RB}$) | Fraction Dry ($F_{DM}$) | Burning Efficiency (BE) | Combust. Efficiency (CE) | Carbon Content (CC) | Ratio $CH_4$-C ($R_{CH4-C}$) | $CH_4$- to Mol.Wt. ($C_{11}$) | Emissions Tons/year ($E_{MARB}$) |
|---|---|---|---|---|---|---|---|---|---|---|
| Hay (inc Alfalfa) | 36,604.91 | 0 | 0.000 | 0.85 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Barley | 5,405.92 | 1.2 | 0.030 | 0.93 | 0.93 | 0.88 | 0.45 | 0.005 | 1.33 | 0.44 |
| Dry Edible Beans | 14,493.77 | 2.1 | 0.000 | 0.87 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Corn | 63,502.95 | 1 | 0.030 | 0.91 | 0.93 | 0.88 | 0.45 | 0.005 | 1.33 | 4.23 |
| Corn for Grain | 7,164.95 | 1 | 0.000 | 0.91 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Oats | 1,967.57 | 1.3 | 0.000 | 0.92 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Rice | 247,876.59 | 1.4 | 0.750 | 0.91 | 0.93 | 0.88 | 0.38 | 0.005 | 1.33 | 490.59 |
| Sorghum | 1,818.91 | 1.4 | 0.000 | 0.91 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| All Wheat | 40,354.35 | 1.3 | 0.030 | 0.93 | 0.93 | 0.88 | 0.44 | 0.005 | 1.33 | 3.53 |
| Sugar Beet | 119,376.47 | 0 | 0.000 | 0.00 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Vegetable Crops & Fruit Trees | 645,563.72 | 0 | 0.030 | 0.87 | 0.93 | 0.88 | 0.45 | 0.005 | 1.33 | 0.00 |
| Safflower & Sunflower | 10,915.85 | 2.1 | 0.000 | 0.00 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| | | | | | | | | | **Total** | **498.79** |

## CN. Nitrous Oxide

## CN1. Manure Management

| Source | Total Nitrogen Excreted ($N_T$) | Manure Anaerobic Lagoons ($\%_{AL}$) | Manure Liquid/Slurry ($\%_S$) | Manure Deep Pit ($\%_{DP}$) | Emission Factor for Liquid System ($EF_{NML}$) | $N_2O$ Emissions from Liquid System Mgt. | Manure Solid Storage/ Managed ($\%_{SS}$) | Manure Deep Pit / DryLot ($\%_{DP}$) | Manure Pasture / Poultry ($\%_P$) | Emission Factor for Solid System ($EF_{NMS}$) | $N_2O$ from solid system Mgt. | Total $N_2O$ MT/yr ($E_{NMM}$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | | | | | | | | |
| Dairy Cows | 3,067,701 | 1,665,142 | 691,130 | *N/A* | 0.001 | *3,702.71* | 278,706 | 14,445 | *N/A* | 0.02 | *9,213.34* | 12.92 |
| ***Beef Cow*** | | | | | | | | | | | | |
| ***Swine*** | | | | | | | | | | | | |
| Market 120-179 lbs | 89,293 | 41,750 | 7,132 | 12,277 | 0.001 | *96.11* | 2,980 | *N/A* | *N/A* | 0.02 | *93.66* | 0.19 |
| ***Poultry*** | | | | | | | | | | | | |
| ***Layers*** | | | | | | | | | | | | |
| Hens > 1 yr | 117,585 | 8,231 | 3,528 | *N/A* | 0.001 | *18.48* | 52,913 | *N/A* | 52,913 | 0.02 | *3,325.98* | 3.34 |
| Turkeys | 172,974 | *N/A* | *N/A* | *N/A* | *N/A* | *N/A* | *N/A* | *N/A* | 160,866 | 0.02 | *5,055.78* | 5.06 |
| ***Other*** | | | | | | | | | | | | |
| Sheep on Feed | 99,194 | *N/A* | *N/A* | *N/A* | *N/A* | *N/A* | 97,453 | *N/A* | *N/A* | 0.02 | *3,062.82* | 3.06 |
| | | | | | | | | | | | **Total** | **24.57** |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Agricultural Emissions**

## CN2. Emissions from Animals and Runoff

Indirect emissions from animals

| Source | Total Nitrogen Excreted ($N_T$) | % of Indirect Volitazition ($\%_{VI}$) | conversion from $NH_3$ to $NO_X$ ($EF_{NH3-NOX}$) | Conversion factor for kg to MT ($C_3$) | Tons/year ($E_{NIA}$) |
|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | |
| Dairy Cows | 3,067,701 | 0.20 | 0.01 | 1,000 | 9.64 |
| ***Swine*** | | | | | |
| Market 120-179 lbs | 89,293 | 0.20 | 0.01 | 1,000 | 0.28 |
| ***Poultry*** | | | | | |
| Hens > 1 yr | 117,585 | 0.20 | 0.01 | 1,000 | 0.37 |
| Turkeys | 172,974 | 0.20 | 0.01 | 1,000 | 0.54 |
| ***Other*** | | | | | |
| Sheep on Feed | 99,194 | 0.20 | 0.01 | 1,000 | 0.31 |
| Goats | 989,994 | 0.20 | 0.01 | 1,000 | 3.11 |
| | | | | **Total** | **14.26** |

Direct emissions from animals

| Source | Unmanaged Nitrogen ($N_{UM}$) | Emission Factor for Pastures, Ranges and Paddocks ($EF_{PRP}$) | Conversion factor for kg to MT ($C_3$) | Manure for Pasture, Range and Paddock ($M_{PRP}$) | Managed Nitrogen ($N_M$) | Unmanaged Daily Spread ($N_{DS}$) | % of Indirect Volit. ($\%_{VI}$) | Emission Factor for ground App. ($EF_{NV}$) | Manure applied to Soils ($M_{AS}$) | MT/year ($E_{NDA}$) |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | | | | | | |
| Dairy Cows | 57,904.64 | 0.02 | 1,000 | 1.158 | 2,649,424 | 360,373 | 0.20 | 0.0125 | 30.098 | 50.937 |
| ***Swine*** | | | | | | | | | | |
| Market 120-179 lbs | 11,173.60 | 0.02 | 1,000 | 0.223 | 78,119 | *N/A* | 0.20 | 0.0125 | 0.781 | 1.930 |
| ***Poultry*** | | | | | | | | | | |
| Hens > 1 yr | *N/A* | 0.02 | 1,000 | *0.000* | 117,585 | *N/A* | 0.20 | 0.0125 | 1.176 | 1.848 |
| Turkeys | 12,108.18 | 0.02 | 1,000 | 0.242 | 160,866 | *N/A* | 0.20 | 0.0125 | 1.609 | 3.289 |
| ***Other*** | | | | | | | | | | |
| Sheep on Feed | 97,453.29 | 0.02 | 1,000 | 1.949 | 1,740 | *N/A* | 0.20 | 0.0125 | 0.017 | 6.153 |
| Goats | 989,993.88 | 0.02 | 1,000 | 19.800 | *N/A* | *N/A* | 0.20 | 0.0125 | *0.000* | 62.228 |
| | | | | | | | | | **Total** | **126.384** |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Agricultural Emissions**

Emissions from Leaching

| Source | Unvolatized Synthetic Nitrogen ($N_{UVS}$) | Unvolatized Non-Manure Organic Nitrogen ($N_{UVO}$) | Conversion factor for kg to MT ($C_3$) | Leaching % of Soil ($\%_{Leach}$) | Leaching Factor - kg N2O-N / kg N ($F_{Leach}$) | Molecular Weight Ratio $N_2O:N_2$ ($C_{10}$) | Total Leaching from non-manure Fertilizer ($L_{fert}$) | Total Nitrogen Excreted ($N_T$) | % of Volitazation from Manure ($\%_{VM}$) | Total Leaching from Manure ($L_{man}$) | Total from Leaching MT/yr ($E_{NL}$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total emissions of $N_2O$ from Leaching | 12,407,050 | 2789.83 | 1,000 | 0.3000 | 0.025 | 1.57 | 146.26 | 4,536,740 | 0.00 | 53.47 | **199.73** |

**CN3: Nitrous Oxide from Crop Growth:**

| Source | Crop Production MTs | Conversion factor for kg to tons ($C_3$) | Residue/Crop Ratio ($R_{RC}$) | Fraction Dry ($F_{DM}$) | Nitrogen Content of biomass | Nitrogen Fixed by Crops (FN) | Fraction of Residue Applied ($F_{RA}$) | Nitrogen Content of Residue ($N_{CR}$) | Nitrogen Returned to Soil ($N_{RS}$) |
|---|---|---|---|---|---|---|---|---|---|
| Hay (inc Alfalfa) | 36,604.91 | 1,000 | 0.0 | 0.8500 | 0.03 | 933,425 | 0.00 | *N/A* | *0* |
| Barley | 5,405.92 | 1,000 | 1.2 | 0.9300 | *N/A* | *0.00* | 0.90 | 0.01 | 41,809 |
| Dry Edible Beans | 14,493.77 | 1,000 | 2.1 | 0.8700 | 0.03 | 1,172,691 | 1.60 | 0.02 | 711,786 |
| Corn | 63,502.95 | 1,000 | 1.0 | 0.9100 | *N/A* | *0.00* | 0.90 | 0.01 | 301,652 |
| Corn for Grain | 7,164.95 | 1,000 | 1.0 | 0.9100 | *N/A* | *0.00* | 0.90 | 0.01 | 34,035 |
| Oats | 1,967.57 | 1,000 | 1.3 | 0.9200 | *N/A* | *0.00* | 0.90 | 0.01 | 14,825 |
| Rice | 247,876.59 | 1,000 | 1.4 | 0.9100 | *N/A* | *0.00* | 1.00 | 0.01 | 2,273,722 |
| Sorghum | 1,818.91 | 1,000 | 1.4 | 0.9100 | *N/A* | *0.00* | 0.90 | 0.01 | 22,524 |
| All Wheat | 40,354.35 | 1,000 | 1.3 | 0.9300 | *N/A* | *0.00* | 0.90 | 0.01 | 272,239 |
| Sugar Beet | 119,376.47 | 1,000 | 0.0 | 0.0000 | 0.03 | 0.00 | 0.00 | 0.00 | 0 |
| Vegetable Crops & Fruit Trees | 645,563.72 | 1,000 | 0.0 | 0.0000 | 0.03 | 0.00 | 0.00 | 0.00 | 0 |
| Safflower & Sunflower | 10,915.85 | 1,000 | 2.1 | 0.8700 | 0.03 | 883,201 | 0.90 | 0.02 | 412,825 |
| Total | | | | | | 2,989,317 | | | 4,085,417 |

| Source | Crop Production (Hectares) | Nitrogen Fixed by Crops ($FN_T$) | Nitrogen Returned to Soil ($N_{RST}$) | Conversion factor for kg to tons ($C_3$) | factor for soils (kg N2O-N/kgN) ($EF_{DIR}$) | Molecular Weight Ratio $N_2O:N_2$ ($C_{10}$) | Emission factor kg $N_2O$-N / ha_yr | Emissions in MT ($N_{CG}$) |
|---|---|---|---|---|---|---|---|---|
| N2O emissions from Legumes | - | 2,989,317 | - | 1,000 | 0.0100 | 1.57 | - | 46.97 |
| N2O emissions from Residues | - | - | 4,085,417 | 1,000 | 0.0100 | 1.57 | - | 64.20 |
| $N_2O$ from Histols (Temperate Zone) | 93,268.31 | - | - | 1,000 | - | 1.57 | 8 | 1,172.52 |
| | | | | | | | **Total** | **1,283.69** |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Agricultural Emissions**

## CN4. Emissions from Fertilizers

| Source | Target Year Total Fertilizer Use (kg N) | Following Year Total Fertilizer Use (kg N) | Total N in Fertilizers (Calendar Year) | Unvol. N (kg) (NUV) | Volatized N (kg) (NV) | Direct $N_2O$ Emissions (metric tons) | $N_2O$ Emissions (metric tons) | Total Emissions from Fertilizers |
|---|---|---|---|---|---|---|---|---|
| Synthetic | 14,235,595 | 12,949,928 | 13,785,611 | 12,407,050 | 1,378,561 | 195.01 | 21.67 | **216.69** |
| Organic | 84,053 | 89,459 | 85,945 | 2,790 | 697.46 | | | |
| Dried Manure | 924 | 824 | 889 | | | | | |
| Activated Sewage Sludge | 72,148 | 72,826 | 72,385 | | | | | |
| Other | 10,981 | 15,808 | 12,671 | | | | | |
| *Dried Manure %* | 1.10% | 0.92% | 1.03% | | | | | |
| *Non-Manure Organics* | 83,129 | 88,635 | 85,056 | | | | | |

## CN5. Emissions on $N_2O$ from agricultural residue burning

| Source | Production - MTTons ($U_C$) | Residue/Crop Ratio ($R_{RC}$) | Fraction Burned ($F_{RB}$) | Fraction Dry ($F_{DM}$) | Burning Efficiency (BE) | Combust. Efficiency (CE) | Nitrogen Content (NC) | Ratio N2O-N ($R_{N2O-N}$) | Conv. to Mol.Wt. ($C_{10}$) | Emissions MT/year ($E_{NARB}$) |
|---|---|---|---|---|---|---|---|---|---|---|
| Hay (inc Alfalfa) | 36,604.91 | 0.0000 | 0.000 | 0.85 | 0.000 | 0.00 | *N/A* | 0.007 | 1.57 | *0.00* |
| Barley | 5,405.92 | 1.2000 | 0.030 | 0.93 | 0.930 | 0.88 | 0.008 | 0.007 | 1.57 | 0.01 |
| Dry Edible Beans | 14,493.77 | 2.1000 | 0.000 | 0.87 | 0.000 | 0.00 | 0.017 | 0.007 | 1.57 | 0.00 |
| Corn | 63,502.95 | 1.0000 | 0.030 | 0.91 | 0.930 | 0.88 | 0.006 | 0.007 | 1.57 | 0.09 |
| Corn for Grain | 7,164.95 | 1.0000 | 0.000 | 0.91 | 0.000 | 0.00 | 0.006 | 0.007 | 1.57 | 0.00 |
| Oats | 1,967.57 | 1.3000 | 0.000 | 0.92 | 0.000 | 0.00 | 0.007 | 0.007 | 1.57 | 0.00 |
| Rice | 247,876.59 | 1.4000 | 0.750 | 0.91 | 0.930 | 0.88 | 0.007 | 0.007 | 1.57 | 15.35 |
| Sorghum | 1,818.91 | 1.4000 | 0.000 | 0.91 | 0.000 | 0.00 | 0.011 | 0.007 | 1.57 | 0.00 |
| All Wheat | 40,354.35 | 1.3000 | 0.030 | 0.93 | 0.930 | 0.88 | 0.006 | 0.007 | 1.57 | 0.08 |
| Sugar Beet | 119,376.47 | 0.0000 | 0.000 | 0.00 | 0.000 | 0.00 | 0.000 | 0.007 | 1.57 | 0.00 |
| Vegetable Crops & Fruit Trees | 645,563.72 | 0.0000 | 0.000 | 0.00 | 0.000 | 0.00 | 0.000 | 0.007 | 1.57 | 0.00 |
| Safflower & Sunflower | 10,915.85 | 2.1000 | 0.030 | 0.87 | 0.930 | 0.88 | 0.023 | 0.007 | 1.57 | 0.12 |
| | | | | | | | | | **Total** | **15.66** |

**Sutter County**
**Input data for Green House Gas Emissions**
**1990**
**Inventory**
**Agricultural Emissions**

**D. Summary Table**

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Methane | Enteric Fermentation | 5,052.16 | 106,095.45 |
| | Manure Management | 5,901.86 | 123,939.07 |
| | Rice Cultivation | 6,319.21 | 132,703.34 |
| | Agricultural Residue Burning | 498.79 | 10,474.55 |
| **Total Methane** | | 17,772.02 | **373,212.42** |
| Nitrous Oxide | Manure Management | 24.57 | 7,616.35 |
| | Animals and Runoff | 340.37 | 105,514.77 |
| | Crop Growth | 1,283.69 | 397,944.00 |
| | Fertilizer Use | 216.69 | 67,172.61 |
| | Agricultural Residue Burning | 15.66 | 4,854.71 |
| **Total Nitrous Oxide** | | 1,880.98 | **583,102.45** |
| | **Total emissions from Agriculture** | | **956,314.87** |

# Appendix D:2008 URBEMIS Output and GHG Calculations

**4/14/2010 2:20:19 PM**

Urbemis 2007 Version 9.2.4

Detail Report for Summer Area Source Unmitigated Emissions (Pounds/Day)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\Sutter County 2009 - Existing 04-14-2010.urb924

Project Name: Sutter County 2009 Existing

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

| Source | CO2 |
|---|---|
| Natural Gas | |
| Hearth - No Summer Emissions | |
| Landscape | 379.60 |
| Consumer Products | |
| Architectural Coatings | |
| TOTALS (lbs/day, unmitigated) | 379.60 |

Area Source Changes to Defaults

Percentage of residences with natural gas fireplaces changed from 55% to 0%

**4/14/2010 2:20:45 PM**

Urbemis 2007 Version 9.2.4

Detail Report for Winter Area Source Unmitigated Emissions (Pounds/Day)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\Sutter County 2009 - Existing 04-14-2010.urb924

Project Name: Sutter County 2009 Existing

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Winter Pounds Per Day, Unmitigated)

| Source | CO2 |
|---|---|
| Natural Gas | |
| Hearth | 262,902.94 |
| Landscaping - No Winter Emissions | |
| Consumer Products | |
| Architectural Coatings | |
| TOTALS (lbs/day, unmitigated) | 262,902.94 |

Area Source Changes to Defaults

Percentage of residences with natural gas fireplaces changed from 55% to 0%

**4/14/2010 2:21:07 PM**

Urbemis 2007 Version 9.2.4

Detail Report for Annual Area Source Unmitigated Emissions (Tons/Year)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\Sutter County 2009 - Existing 04-14-2010.urb924

Project Name: Sutter County 2009 Existing

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

| Source | CO2 |
|---|---|
| Natural Gas | |
| Hearth | 10,779.02 |
| Landscape | 34.16 |
| Consumer Products | |
| Architectural Coatings | |
| TOTALS (tons/year, unmitigated) | 10,813.18 |

Area Source Changes to Defaults

Percentage of residences with natural gas fireplaces changed from 55% to 0%

**4/14/2010 2:20:34 PM**

Urbemis 2007 Version 9.2.4

Detail Report for Summer Operational Unmitigated Emissions (Pounds/Day)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\Sutter County 2009 - Existing 04-14-2010.urb924

Project Name: Sutter County 2009 Existing

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

| Source | CO2 |
|---|---|
| Single family housing | 420,605.71 |
| Apartments low rise | 304,568.02 |
| Apartments mid rise | 54,101.44 |
| City park | 75.46 |
| General office building | 396,974.89 |
| General light industry | 199,071.36 |
| TOTALS (lbs/day, unmitigated) | 1,375,396.88 |

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2009 Temperature (F): 85 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

**4/14/2010 2:20:34 PM**

Summary of Land Uses

| Land Use Type | Acreage | Trip Rate | Unit Type | No. Units | Total Trips | Total VMT |
|---|---|---|---|---|---|---|
| Single family housing | 1,700.00 | 7.16 | dwelling units | 5,100.00 | 36,516.00 | 402,990.57 |
| Apartments low rise | 230.81 | 7.16 | dwelling units | 3,693.00 | 26,441.88 | 291,812.58 |
| Apartments mid rise | 17.26 | 7.16 | dwelling units | 656.00 | 4,696.96 | 51,835.65 |
| City park | | 0.01 | acres | 641.00 | 6.41 | 72.98 |
| General office building | | 24.88 | 1000 sq ft | 1,359.52 | 33,824.86 | 382,051.75 |
| General light industry | | 5.18 | 1000 sq ft | 3,279.68 | 16,988.74 | 191,123.34 |
| | | | | | 118,474.85 | 1,319,886.87 |

Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Light Auto | 39.5 | 2.0 | 97.5 | 0.5 |
| Light Truck < 3750 lbs | 19.3 | 4.1 | 85.5 | 10.4 |
| Light Truck 3751-5750 lbs | 19.7 | 2.0 | 97.5 | 0.5 |
| Med Truck 5751-8500 lbs | 9.3 | 1.1 | 97.8 | 1.1 |
| Lite-Heavy Truck 8501-10,000 lbs | 2.5 | 0.0 | 64.0 | 36.0 |
| Lite-Heavy Truck 10,001-14,000 lbs | 0.9 | 0.0 | 44.4 | 55.6 |
| Med-Heavy Truck 14,001-33,000 lbs | 1.5 | 6.7 | 20.0 | 73.3 |
| Heavy-Heavy Truck 33,001-60,000 lbs | 1.9 | 0.0 | 5.3 | 94.7 |
| Other Bus | 0.1 | 0.0 | 0.0 | 100.0 |
| Urban Bus | 0.0 | 0.0 | 0.0 | 0.0 |
| Motorcycle | 4.0 | 70.0 | 30.0 | 0.0 |

**4/14/2010 2:20:34 PM**

Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| School Bus | 0.1 | 0.0 | 0.0 | 100.0 |
| Motor Home | 1.2 | 8.3 | 75.0 | 16.7 |

Travel Conditions

| | Residential | | | Commercial | | |
|---|---|---|---|---|---|---|
| | Home-Work | Home-Shop | Home-Other | Commute | Non-Work | Customer |
| Urban Trip Length (miles) | 10.8 | 7.3 | 7.5 | 9.5 | 7.4 | 7.4 |
| Rural Trip Length (miles) | 11.0 | 11.2 | 11.0 | 11.2 | 11.2 | 11.4 |
| Trip speeds (mph) | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 |
| % of Trips - Residential | 32.9 | 18.0 | 49.1 | | | |
| % of Trips - Commercial (by land use) | | | | | | |
| City park | | | | 5.0 | 2.5 | 92.5 |
| General office building | | | | 35.0 | 17.5 | 47.5 |
| General light industry | | | | 50.0 | 25.0 | 25.0 |

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Home-based work rural trip length changed from 16.8 miles to 11 miles

Home-based shop rural trip length changed from 7.1 miles to 11.2 miles

Home-based other rural trip length changed from 7.9 miles to 11 miles

Commercial-based commute rural trip length changed from 14.7 miles to 11.2 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 11.2 miles

Operational Changes to Defaults

Commercial-based customer rural trip length changed from 6.6 miles to 11.4 miles

**4/14/2010 2:20:56 PM**

Urbemis 2007 Version 9.2.4

Detail Report for Winter Operational Unmitigated Emissions (Pounds/Day)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\Sutter County 2009 - Existing 04-14-2010.urb924

Project Name: Sutter County 2009 Existing

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Winter Pounds Per Day, Unmitigated)

| Source | CO2 |
|---|---|
| Single family housing | 371,823.35 |
| Apartments low rise | 269,243.85 |
| Apartments mid rise | 47,826.69 |
| City park | 66.63 |
| General office building | 350,727.19 |
| General light industry | 175,935.71 |
| TOTALS (lbs/day, unmitigated) | 1,215,623.42 |

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2009 Temperature (F): 40 Season: Winter

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

**4/14/2010 2:20:56 PM**

Summary of Land Uses

| Land Use Type | Acreage | Trip Rate | Unit Type | No. Units | Total Trips | Total VMT |
|---|---|---|---|---|---|---|
| Single family housing | 1,700.00 | 7.16 | dwelling units | 5,100.00 | 36,516.00 | 402,990.57 |
| Apartments low rise | 230.81 | 7.16 | dwelling units | 3,693.00 | 26,441.88 | 291,812.58 |
| Apartments mid rise | 17.26 | 7.16 | dwelling units | 656.00 | 4,696.96 | 51,835.65 |
| City park | | 0.01 | acres | 641.00 | 6.41 | 72.98 |
| General office building | | 24.88 | 1000 sq ft | 1,359.52 | 33,824.86 | 382,051.75 |
| General light industry | | 5.18 | 1000 sq ft | 3,279.68 | 16,988.74 | 191,123.34 |
| | | | | | 118,474.85 | 1,319,886.87 |

Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Light Auto | 39.5 | 2.0 | 97.5 | 0.5 |
| Light Truck < 3750 lbs | 19.3 | 4.1 | 85.5 | 10.4 |
| Light Truck 3751-5750 lbs | 19.7 | 2.0 | 97.5 | 0.5 |
| Med Truck 5751-8500 lbs | 9.3 | 1.1 | 97.8 | 1.1 |
| Lite-Heavy Truck 8501-10,000 lbs | 2.5 | 0.0 | 64.0 | 36.0 |
| Lite-Heavy Truck 10,001-14,000 lbs | 0.9 | 0.0 | 44.4 | 55.6 |
| Med-Heavy Truck 14,001-33,000 lbs | 1.5 | 6.7 | 20.0 | 73.3 |
| Heavy-Heavy Truck 33,001-60,000 lbs | 1.9 | 0.0 | 5.3 | 94.7 |
| Other Bus | 0.1 | 0.0 | 0.0 | 100.0 |
| Urban Bus | 0.0 | 0.0 | 0.0 | 0.0 |
| Motorcycle | 4.0 | 70.0 | 30.0 | 0.0 |

**4/14/2010 2:20:56 PM**

Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| School Bus | 0.1 | 0.0 | 0.0 | 100.0 |
| Motor Home | 1.2 | 8.3 | 75.0 | 16.7 |

Travel Conditions

| | Residential | | | Commercial | | |
|---|---|---|---|---|---|---|
| | Home-Work | Home-Shop | Home-Other | Commute | Non-Work | Customer |
| Urban Trip Length (miles) | 10.8 | 7.3 | 7.5 | 9.5 | 7.4 | 7.4 |
| Rural Trip Length (miles) | 11.0 | 11.2 | 11.0 | 11.2 | 11.2 | 11.4 |
| Trip speeds (mph) | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 |
| % of Trips - Residential | 32.9 | 18.0 | 49.1 | | | |
| % of Trips - Commercial (by land use) | | | | | | |
| City park | | | | 5.0 | 2.5 | 92.5 |
| General office building | | | | 35.0 | 17.5 | 47.5 |
| General light industry | | | | 50.0 | 25.0 | 25.0 |

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Home-based work rural trip length changed from 16.8 miles to 11 miles

Home-based shop rural trip length changed from 7.1 miles to 11.2 miles

Home-based other rural trip length changed from 7.9 miles to 11 miles

Commercial-based commute rural trip length changed from 14.7 miles to 11.2 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 11.2 miles

Operational Changes to Defaults

Commercial-based customer rural trip length changed from 6.6 miles to 11.4 miles

**4/14/2010 2:21:18 PM**

Urbemis 2007 Version 9.2.4

Detail Report for Annual Operational Unmitigated Emissions (Tons/Year)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\Sutter County 2009 - Existing 04-14-2010.urb924

Project Name: Sutter County 2009 Existing

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

| Source | CO2 |
|---|---|
| Single family housing | 73,792.95 |
| Apartments low rise | 53,434.78 |
| Apartments mid rise | 9,491.80 |
| City park | 13.23 |
| General office building | 69,634.52 |
| General light industry | 34,923.10 |
| TOTALS (tons/year, unmitigated) | 241,290.38 |

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2009 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

**4/14/2010 2:21:18 PM**

Summary of Land Uses

| Land Use Type | Acreage | Trip Rate | Unit Type | No. Units | Total Trips | Total VMT |
|---|---|---|---|---|---|---|
| Single family housing | 1,700.00 | 7.16 | dwelling units | 5,100.00 | 36,516.00 | 402,990.57 |
| Apartments low rise | 230.81 | 7.16 | dwelling units | 3,693.00 | 26,441.88 | 291,812.58 |
| Apartments mid rise | 17.26 | 7.16 | dwelling units | 656.00 | 4,696.96 | 51,835.65 |
| City park | | 0.01 | acres | 641.00 | 6.41 | 72.98 |
| General office building | | 24.88 | 1000 sq ft | 1,359.52 | 33,824.86 | 382,051.75 |
| General light industry | | 5.18 | 1000 sq ft | 3,279.68 | 16,988.74 | 191,123.34 |
| | | | | | 118,474.85 | 1,319,886.87 |

Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Light Auto | 39.5 | 2.0 | 97.5 | 0.5 |
| Light Truck < 3750 lbs | 19.3 | 4.1 | 85.5 | 10.4 |
| Light Truck 3751-5750 lbs | 19.7 | 2.0 | 97.5 | 0.5 |
| Med Truck 5751-8500 lbs | 9.3 | 1.1 | 97.8 | 1.1 |
| Lite-Heavy Truck 8501-10,000 lbs | 2.5 | 0.0 | 64.0 | 36.0 |
| Lite-Heavy Truck 10,001-14,000 lbs | 0.9 | 0.0 | 44.4 | 55.6 |
| Med-Heavy Truck 14,001-33,000 lbs | 1.5 | 6.7 | 20.0 | 73.3 |
| Heavy-Heavy Truck 33,001-60,000 lbs | 1.9 | 0.0 | 5.3 | 94.7 |
| Other Bus | 0.1 | 0.0 | 0.0 | 100.0 |
| Urban Bus | 0.0 | 0.0 | 0.0 | 0.0 |
| Motorcycle | 4.0 | 70.0 | 30.0 | 0.0 |

**4/14/2010 2:21:18 PM**

Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| School Bus | 0.1 | 0.0 | 0.0 | 100.0 |
| Motor Home | 1.2 | 8.3 | 75.0 | 16.7 |

Travel Conditions

| | Residential | | | Commercial | | |
|---|---|---|---|---|---|---|
| | Home-Work | Home-Shop | Home-Other | Commute | Non-Work | Customer |
| Urban Trip Length (miles) | 10.8 | 7.3 | 7.5 | 9.5 | 7.4 | 7.4 |
| Rural Trip Length (miles) | 11.0 | 11.2 | 11.0 | 11.2 | 11.2 | 11.4 |
| Trip speeds (mph) | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 |
| % of Trips - Residential | 32.9 | 18.0 | 49.1 | | | |
| % of Trips - Commercial (by land use) | | | | | | |
| City park | | | | 5.0 | 2.5 | 92.5 |
| General office building | | | | 35.0 | 17.5 | 47.5 |
| General light industry | | | | 50.0 | 25.0 | 25.0 |

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Home-based work rural trip length changed from 16.8 miles to 11 miles

Home-based shop rural trip length changed from 7.1 miles to 11.2 miles

Home-based other rural trip length changed from 7.9 miles to 11 miles

Commercial-based commute rural trip length changed from 14.7 miles to 11.2 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 11.2 miles

Operational Changes to Defaults

Commercial-based customer rural trip length changed from 6.6 miles to 11.4 miles

**Sutter County Base Year Climate Action Plan**
**Emissions by Source**
**2008**
**Inventory**
**By Source**

| Transportation | | |
|---|---|---|
| **Source:** | | **Metric tons of $CO_2e$** |
| 1 On-Road Vehicles | | 254,455 |
| 2 Airport Operations | | 155 |
| | **Total** | **254,610** |

| Energy | | |
|---|---|---|
| **Sources:** | | **Metric tons of $CO_2e$** |
| 1 Electric | | 52,186 |
| 2 Natural Gas | | 106,441 |
| | **Total** | **158,627** |

| Solid Waste | | |
|---|---|---|
| **Source** | | **Metric tons of $CO_2e$** |
| 1 Solid Waste Disposal | | 2,750 |
| 2 Green Waste Recycling | | Data Not Available |
| 3 Materials Recycling | | Data Not Available |
| | **Total** | **2,750** |

| Landscape Emissions | | |
|---|---|---|
| **Sources:** | | **Metric tons of $CO_2e$** |
| 1 Landscape Emissions | | 32 |
| 2 Carbon sink from $CO_2$ sequestration | | Data Not Available |
| | **Total** | **32** |

| Agriculture | | |
|---|---|---|
| **Sources:** | | **Metric tons of $CO_2e$** |
| 1 Enteric Fermentation | | 24,248 |
| 2 Manure Management | | 29,780 |
| 3 Rice Cultivation | | 181,067 |
| 4 Agricultural Residue Burning | | 3,051 |
| 5 Crop Growth | | 386,054 |
| 6 Animals and Runoff | | 78,453 |
| 7 Fertilizer Use | | 102,351 |
| | **Total** | **805,005** |

| Net Total Emissions | | |
|---|---|---|
| **Category** | | **Metric tons of $CO_2e$** |
| Energy | | 158,627 |
| Solid Waste | | 2,750 |
| Landscape Emissions | | 32 |
| Agriculture | | 805,005 |
| Transportation | | 254,610 |
| | **Total** | **1,221,024** |

**Sutter County Base Year Climate Action Plan**
**Emissions by Land Use**
**2008**
**Inventory**
**By Land Use Category**

| Source Type | | $CO_2e$ MT/yr | | | |
|---|---|---|---|---|---|
| | | $CO_2$ | $CH_4$ | $N_2O$ | combined $CO_2e$ |
| Residential | AG/RAN/ER | 164,546 | 2,943 | 5,680 | 173,170 |
| | Low Density Residential | 61,120 | 1,093 | 2,110 | 64,323 |
| | Medium Density Residential | 11,326 | 203 | 389 | 11,917 |
| | High Density Residential | 0 | 0 | 0 | 0 |
| | **Total Residential** | **236,992** | **4,239** | **8,179** | **249,410** |
| Commercial | Park | 175 | 1 | 2 | 178 |
| | Commercial | 47,742 | 363 | 647 | 48,753 |
| | Mixed Use | 0 | 0 | 0 | 0 |
| | **Total Commercial** | **47,917** | **365** | **650** | **48,931** |
| Industrial | Industrial | 115,327 | 789 | 1,562 | 117,678 |
| | **Total Industrial** | **115,327** | **789** | **1,562** | **117,678** |
| Agriculture | | 0 | 235,461 | 569,544 | 805,005 |
| | **Total** | **400,236** | **240,854** | **579,935** | **1,221,024** |

*For consistency with 2008 and 2020 inventories, High Density Residential and Mixed use categories are listed although there is no land designated as such for 1990.

**Sutter County Base Year Climate Action Plan**
**Input data for Green House Gas Emissions**
**2008 Inventory**

| Land Use Type (units) | Total Trips | Total VMT | Total Trips | Total VMT | Unit Totals | Unit Type |
|---|---|---|---|---|---|---|
| AG/RAN/ER | 47,706.12 | 526484.73 | 47706.12 | 526484.73 | 5163 | du |
| Low Density Residential | 35897.4 | 396163.7 | 35897.4 | 396163.7 | 3885 | du |
| Medium Density Residential | 6652.8 | 73420.3 | 6652.8 | 73420.3 | 720 | du |
| High Density Residential | 0 | 0 | 0 | 0 | 0 | du |
| Park | 6.41 | 72.98 | 6.41 | 72.98 | 27,921,960.00 | Sq/ft |
| Commercial | 30058.99 | 339516.27 | 30058.99 | 339516.27 | 1,359,520.00 | Sq/ft |
| Mixed Use | 0 | 0 | 0 | 0 | 0.00 | Sq/ft |
| Industrial | 11446.08 | 128768.43 | 11446.08 | 128768.43 | 3,279,680.00 | Sq/ft |
| **Total** | **131,767.80** | **1,464,426.41** | **131767.8** | **1464426.41** | | |

**Sutter County Base Year Climate Action Plan**
**Input data for Green House Gas Emissions**
**2008 Inventory**

| Land Use Type (units) | Natural gas usage rate (MMBTU/yr) | Kilowatt-hour/ year | Potable Water Usage (gallons/year) | Solid Waste (lbs/year) | % of Total square SFR/MFR/Non-Res |
|---|---|---|---|---|---|
| **AG/RAN/ER** | 186,544 | 58,141,918 | 29,189,980 | 22,144,877 | 100.00% |
| **Low Density Residential** | 69,289 | 21,595,856 | 10,842,137 | 8,225,502 | 84.37% |
| **Medium Density Residential** | 12,840 | 4,001,962 | 2,009,173 | 1,524,554 | 15.64% |
| **High Density Residential** | 0 | 0 | 0 | 0 | 0.00% |
| **Park** | 1,642 | 145,060 | 2,580 | 8,366 | 0.11% |
| **Commercial** | 445,071 | 39,319,236 | 699,264 | 2,324,875 | 29.27% |
| **Mixed Use** | 0 | 0 | 0 | 0 | 0.00% |
| **Industrial** | 1,073,666 | 94,851,579 | 1,686,866 | 5,609,021 | 70.62% |
| **Total** | **1,789,051** | **218,055,610** | **44,430,000** | **39,837,195** | |

**Sutter County Base Year Climate Action Plan**
**Input data for Green House Gas Emissions**
**2008 Inventory**

**City Parks**

| # of City Parks | Estimated SQ / "building" | Estimated Buildings per |
|---|---|---|
| 10 | 500 | 1 |

**Airports**

| # of planes | Gallons fuel per day | Annual days of operation | Annual Fuel Usage (g/yr) |
|---|---|---|---|
| 77 | 50 | 365 | 18,250 |

| Operational(*2a,b) / Area Scenario(*3a,b) | Vehicle | | | Natural Gas | | | Total Vehicle + |
|---|---|---|---|---|---|---|---|
| | Summer (lbs/day) | (lbs/day) | tons/Year | Summer | Winter | Year | |
| 2008 | 1,526,584.72 | 1,349,314.62 | 267,817.78 | 0.00 | 0.00 | 0.00 | 267,817.78 |

| Area Scenario(*3b,c) | Landscaping | | | Hearth | | |
|---|---|---|---|---|---|---|
| | Summer | Winter | Year | Summer | Winter | Year |
| 2008 | 384.11 | 0.00 | 34.57 | 0.00 | 271,778.59 | 11,142.92 |

| Vehicle Type | Fleet % | | Non-Catalyst | | Catalyst | | Diesel | |
|---|---|---|---|---|---|---|---|---|
| Light Auto | 39.50 | 0.3950 | 2.00 | 0.0200 | 97.50 | 0.9750 | 0.50 | 0.0050 |
| Light Truck <3,750 lbs | 19.30 | 0.1930 | 4.10 | 0.0410 | 85.50 | 0.8550 | 10.40 | 0.1040 |
| Light Truck 3,751-5,750 lbs | 19.70 | 0.1970 | 2.00 | 0.0200 | 97.50 | 0.9750 | 0.50 | 0.0050 |
| Med Truck 5,751-8,500 lbs | 9.30 | 0.0930 | 1.10 | 0.0110 | 97.80 | 0.9780 | 1.10 | 0.0110 |
| Lite-Heavy Truck 8,501-10,( | 2.50 | 0.0250 | 0.00 | 0.0000 | 64.00 | 0.6400 | 36.00 | 0.3600 |
| Lite-Heavy Truck 10,001-14 | 0.90 | 0.0090 | 0.00 | 0.0000 | 44.40 | 0.4440 | 55.60 | 0.5560 |
| Med-Heavy Truck 14,001 - 1 | 1.50 | 0.0150 | 6.70 | 0.0670 | 20.00 | 0.2000 | 73.30 | 0.7330 |
| Heavy-Heavy Truck 33,001- | 1.90 | 0.0190 | 0.00 | 0.0000 | 5.30 | 0.0530 | 94.70 | 0.9470 |
| Other bus | 0.10 | 0.0010 | 0.00 | 0.0000 | 0.00 | 0.0000 | 100.00 | 1.0000 |
| Urban bus | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 100.00 | 1.0000 |
| Motorcycle | 4.00 | 0.0400 | 70.00 | 0.7000 | 30.00 | 0.3000 | 0.00 | 0.0000 |
| School Bus | 0.10 | 0.0010 | 0.00 | 0.0000 | 0.00 | 0.0000 | 100.00 | 1.0000 |
| Motor Home | 1.20 | 0.0120 | 8.30 | 0.0830 | 75.00 | 0.7500 | 16.70 | 0.1670 |
| | 100.00 | 1.00 | | | | | | |

**Disposal Facility** Have Jurisdiction? No Type of Facility: Landfill w/ Flaring year began: ?

| Landfill | Landfill Total Annual (tons) | City's % of Total | Daily Hours of Facility Operation | Hours attributed to City | Days per year of operation | % Waste delivered | Distance (one way) | Round Trip Distance (miles) |
|---|---|---|---|---|---|---|---|---|
| Recology Landfill | 19,918.60 | 1.00 | 9 | 9.00 | 325.00 | 100 | 4.81 | 9.62 |
| | | 0.00 | 6 | 0.00 | | 0 | | |
| | | 0.00 | | 0.00 | | 0 | | |
| | | 0.00 | | 0.00 | | 0 | | |
| | | 0.00 | | 0.00 | | 0 | | |
| | | | | 9.00 | 325.00 | **Total** | | **9.62** |

**Sutter County Base Year Climate Action Plan**
**Input data for Green House Gas Emissions**
**2008 Inventory**

**Electrical Usage (Provided by PG&E)**

**83,739,736** Total Residential Electrical Usage
**134,315,874** Total Non-Residential Electrical Usage

**Residential**

| | |
|---|---|
| 37,634 | County facilities located in Yuba City |
| 214 | County facilities located in Live Oak City |
| 25,475 | County facilities located in Unincorporated Sutter |
| 83,676,413 | Residential in Unincorporated Sutter County |

**Non-Residential**

| | |
|---|---|
| 6,062,361 | County facilities located in Yuba City |
| 88,361 | County facilities located in Live Oak City |
| 793,010 | County facilities located in Unincorporated Sutter |
| 127,372,142 | Commercial in Unincorporated Sutter County |

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**Water Usage (Provided by Department of Water Resources )**

| | | |
|---|---|---|
| **42,041,290** | 42,041,290.32 | Residential (gallons per year) |
| **2,388,710** | 2,388,710 | Commercial/Institutional/Industrial (gallons/year) |

---

**Solid Waste for Unincorporated Sutter County(Provided by CalRecycle and Yuba Sutter JPA - Reference #3 on Assumptions Page)**

| | | |
|---|---|---|
| **39,837,195** | 39,837,195 | lbs/year |

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**Natural Gas Data (Provided by PG&E)**

**268,672** Total Residential Natural gas usage rate (MMBTU/yr)
**1,520,379** Total Non-Residential Natural gas usage rate (MMBTU/yr)

Residential Natural gas usage rate (MMBTU/yr)

| MMBTU | Therms | |
|---|---|---|
| 13 | 135 | County facilities located in Yuba City |
| 0 | 2 | County facilities located in Live Oak City |
| 0 | 0 | County facilities located in Unincorporated Sutter |
| 268,659 | 2687229 | Residential in Unincorporated Sutter County |

Commercial Natural gas usage rate (MMBTU/yr)

| MMBTU | Therms | |
|---|---|---|
| 14,853 | 148564 | County facilities located in Yuba City |
| 312 | 3116 | County facilities located in Live Oak City |
| 501 | 5014 | County facilities located in Unincorporated Sutter |
| 1,504,713 | 15050730 | Commercial in Unincorporated Sutter County |

**Sutter County**
**Input data for Agriculture**
**2008**

| | Enteric Fermentation Emission Factor ($EF_{MEF}$) | Typical Animal Mass - kg- (TAM) | Volatile Solids -kg VS/1000kg mass/day- | Max $CH_4$ Capacity - $m^3CH_4$/kg VS- ($B_O$) | K-Nitrogen - kg/day/1000kg animal mass- ($K_N$) | Number of Head |
|---|---|---|---|---|---|---|
| | EF used | EF used | EF used | EF used | EF used | |
| ***Dairy Cow*** | | | | | | |
| Dairy Cows | 123.4 | 604.0 | 9.0 | 0.2 | 0.4 | 8,293 |
| **Other** | | | | | | |
| Sheep on Feed | 8.0 | 27.0 | 9.2 | 0.4 | 0.4 | 16,397 |

**Sutter County**
**Input data for Agriculture**
**2008**

| | Residue/Crop Ratio ($R_{RC}$) | Fraction Residue Burned ($F_{RB}$) | Fraction Dry Matter ($F_{DM}$) | Burning Efficiency (BE) | Combustion Efficiency (CE) | Carbon Content (CC) | Fraction of Residue Applied ($F_{RA}$) | Nitrogen Content of Residue (NC) |
|---|---|---|---|---|---|---|---|---|
| | EF used | EF used | EF used | EF used | EF used | EF used | EF used | EF used |
| Hay (inc Alfalfa) | 0.0 | 0.00 | 0.85 | 0.00 | 0.00 | 0.00 | 0.00 | N/A |
| Barley | 1.2 | 0.03 | 0.93 | 0.93 | 0.88 | 0.45 | 0.90 | 0.01 |
| Dry Edible Beans | 2.1 | 0.00 | 0.87 | 0.00 | 0.00 | 0.00 | 1.60 | 0.02 |
| Corn | 1.0 | 0.03 | 0.91 | 0.93 | 0.88 | 0.45 | 0.90 | 0.01 |
| Corn for Grain | 1.0 | 0.00 | 0.91 | 0.00 | 0.00 | 0.00 | 0.90 | 0.01 |
| Oats | 1.3 | 0.00 | 0.92 | 0.00 | 0.00 | 0.00 | 0.90 | 0.01 |
| Rice | 1.4 | 0.10 | 0.91 | 0.93 | 0.88 | 0.38 | 1.00 | 0.01 |
| Sorghum | 1.4 | 0.00 | 0.91 | 0.00 | 0.00 | 0.00 | 0.90 | 0.01 |
| All Wheat | 1.3 | 0.03 | 0.93 | 0.93 | 0.88 | 0.44 | 0.90 | 0.01 |
| Potatoes (inc Sweet) | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cotton | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sugar Beet | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vegetable Crops & Fruit Trees | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Safflower & Sunflower | 2.1 | 0.03 | 0.87 | 0.93 | 0.88 | 0.45 | 0.90 | 0.02 |

**Sutter County**
**Input data for Agriculture**
**2008**

| | | Growing Season Emission Factor | | |
|---|---|---|---|---|
| Primary | | **EF used** | **Entered** | **Default** |
| | | 210 | | 210 |
| Rattoon | | 780 | | 780 |
| | | ***State*** | ***Project*** | ***% of State ($\%_P$)*** |
| Total acres | 2008 | 7,667,570 | 220,038.00 | 0.0286972 |
| Total acres | 2009 | 7,667,570 | 220,918.15 | 0.028812 |
| Climate Zone | Temperate | Yes | Sub Tropic | No |

| | 2008 | | | | | 2009 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Primary (Acres Harvested)** | **Annual Yield** | **Unit of Yield** | **Annual Yield (MT/yr)** | **State Acres Harvested** | **Primary (Acres Harvested)** | **Annual Yield** | **Unit of Yield** | **Annual Yield (MT/yr)** | **State Acres Harvested** |
| Hay (inc Alfalfa) | 11,138 | 66,983 | tons | 60,766 | 1,610,000 | 11,183 | 67,251 | tons | 61,009 | 1,610,000 |
| Barley | | | tons | | 60,000 | 0 | 0 | tons | | 60,000 |
| Dry Edible Beans | 8,446 | 8,459 | tons | 7,674 | 51,900 | 8,480 | 8,493 | tons | 7,704 | 51,900 |
| Corn | | | tons | 0 | 495,000 | 0 | 0 | tons | 0 | 495,000 |
| Corn for Grain | 7,720 | 47,941 | tons | 43,491 | 170,000 | 7,751 | 48,133 | tons | 43,665 | 170,000 |
| Oats | 2,035 | 24,223 | tons | 21,975 | 25,000 | 2,043 | 24,320 | tons | 22,063 | 25,000 |
| Rice | 101,455 | 409,137 | tons | 371,163 | 517,000 | 101,861 | 410,774 | tons | 372,648 | 517,000 |
| Sorghum | 572 | 2,168 | tons | 1,967 | 9,000 | 574 | 2,177 | tons | 1,975 | 9,000 |
| All Wheat | 7,631 | 48,493 | tons | 43,992 | 545,000 | 7,662 | 48,687 | tons | 44,168 | 545,000 |
| Potatoes (inc Sweet) | | | tons | 0 | 53,200 | 0 | 0 | tons | 0 | 53,200 |
| Cotton | | | bales | | 268,000 | 0 | 0 | bales | | 268,000 |
| Sugar Beet | | | | | 25,300 | 0 | 0 | | | 25,300 |
| Vegetable Crops & Fru | 66,815 | 511,775 | tons | 464,274 | 3,734,170 | 67,082 | 513,822 | tons | 466,132 | 3,734,170 |
| Safflower & Sunflower | 14,226 | 12,673 | tons | 11,497 | 104,000 | 14,283 | 12,724 | tons | 11,543 | 104,000 |

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**Carbon Dioxide**

## A. Direct Sources

### A1-4. Mobile (Construction Equipment, Motor Vehicles, Landscape Equipment, and Wood Burning Hearth)

| Con (MT/yr) | Motor Vehicles (MT/yr) | Landscape (MT/yr) ($E_{Cls}$) | Wood Burning Hearth (MT/yr) | MT/yr |
|---|---|---|---|---|
| 0.00 | 242,960.27 | 31.36 | 10,108.69 | **253,100.32** |
| 0.00 | 0.96 | 0.00 | | |

***Fuel emissions from Airports***

| Annual Fuel Usage ($U_{AAF}$) | kg/gallon ($EF_{CAF}$) | kg/MT ($C_3$) | MT/yr ($E_{CAF}$) |
|---|---|---|---|
| 18,250.00 | 8.32 | 1,000.00 | **151.84** |

### A5. Stationary Sources (Natural Gas)

| Unit Type | MMBTU/yr ($U_{Ang}$) | kg/MMBTU ($EF_{Cng}$) | kg/MT ($C_3$) | MT/yr ($E_{Cng}$) |
|---|---|---|---|---|
| AG/RAN/ER | 186,543.79 | 53.07 | 1,000.00 | 9,899.88 |
| Low Density Residential | 69,288.61 | 53.07 | 1,000.00 | 3,677.15 |
| Medium Density Residential | 12,839.98 | 53.07 | 1,000.00 | 681.42 |
| High Density Residential | 0.00 | 53.07 | 1,000.00 | 0.00 |
| Park | 1,641.99 | 53.07 | 1,000.00 | 87.14 |
| Commercial | 445,071.28 | 53.07 | 1,000.00 | 23,619.93 |
| Mixed Use | 0.00 | 53.07 | 1,000.00 | 0.00 |
| Industrial | 1,073,665.67 | 53.07 | 1,000.00 | 56,979.44 |
| | | | **Total (MT/year)** | **94,944.95** |

## B. Indirect Sources

### B1. Electricity

| Unit Type | kWh/yr | Unit | Unit type | MWh/yr ($U_{Ae}$) | lbs/MWh ($EF_{Cele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Cele}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 58141917.52 | 5,163 | du | 58,141.92 | 524.00 | 2,204.62 | 13,819.33 |
| Low Density Residential | 21595856.47 | 3,885 | du | 21,595.86 | 524.00 | 2,204.62 | 5,132.96 |
| Medium Density Residential | 4001962.003 | 720 | du | 4,001.96 | 524.00 | 2,204.62 | 951.20 |
| High Density Residential | 0 | 0 | du | 0.00 | 524.00 | 2,204.62 | 0.00 |
| Park | 145059.6934 | 27,921,960 | Sq/ft | 145.06 | 524.00 | 2,204.62 | 34.48 |
| Commercial | 39319235.78 | 1,359,520 | Sq/ft | 39,319.24 | 524.00 | 2,204.62 | 9,345.50 |
| Mixed Use | 0 | 0 | Sq/ft | 0.00 | 524.00 | 2,204.62 | 0.00 |
| Industrial | 94851578.58 | 3,279,680 | Sq/ft | 94,851.58 | 524.00 | 2,204.62 | 22,544.58 |
| | | | | | | **Total (MT/year)** | **51,828.05** |

**Sutter County Base Year Climate Action Plan**
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## B2. Potable Water

| Unit Type | unit type | unit number | MG/yr ($U_{Apot}$) | MWh/MG ($C_4$) | MWh/yr ($U_{epot}$) | lbs/MWh ($EF_{Cele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Cpot}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 5163.00 | 29.1900 | 3.50 | 102.17 | 524.00 | 2,204.62 | 24.28 |
| Low Density Residential | du | 3885.00 | 10.8421 | 3.50 | 37.95 | 524.00 | 2,204.62 | 9.02 |
| Medium Density Residential | du | 720.00 | 2.0092 | 0.01 | 0.02 | 804.54 | 2,000 | 0.01 |
| High Density Residential | du | 0.00 | 0.0000 | 0.01 | 0.00 | 804.54 | 2,000 | 0.00 |
| Park | Sq/ft | 27921960.00 | 0.0026 | 3.50 | 0.01 | 524.00 | 2,204.62 | 0.00 |
| Commercial | Sq/ft | 1359520.00 | 0.6993 | 3.50 | 2.45 | 524.00 | 2,204.62 | 0.58 |
| Mixed Use | Sq/ft | 0.00 | 0.0000 | 3.50 | 0.00 | 524.00 | 2,204.62 | 0.00 |
| Industrial | Sq/ft | 3279680.00 | 1.6869 | 3.50 | 5.90 | 524.00 | 2,204.62 | 1.40 |
| | | | | | | | **Total (MT/year)** | **35.29** |

## B3. Solid Waste

### B3a. Anthropogenic Carbon

***$CO_2$ emissions are considered anthropogenic and are not counted in this inventory.***

*Source:* EPA Solid Waste Management and Greenhouse Gases; A life-cycle assessment of emissions and Sinks, 3rd edition, September 2006.

### B3b. Exhaust Emissions (Hauling Trucks)

| Unit Type | tons/yr ($U_{SW}$) | tons/cuyd (d) | cuyd/trip ($C_T$) | miles/trip (M) | gr/mile ($EF_{CWT}$) | g/MT ($C_6$) | tons/yr ($E_{CWT}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 11,072.44 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 99.39 |
| Low Density Residential | 4,112.75 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 36.92 |
| Medium Density Residential | 762.28 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 6.84 |
| High Density Residential | 0.00 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 0.00 |
| Park | 4.18 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 0.02 |
| Commercial | 1,162.44 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 5.22 |
| Mixed Use | 0.00 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 0.00 |
| Industrial | 2,804.51 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 12.59 |
| | | | | | | **Total (MT/year)** | **160.98** |

## B4. Wastewater

| Unit Type | MG/yr Potable ($U_{Apot}$) | % used indoors ($\%_{in}$) | MG/yr ww generated ($U_{AWW}$) | MWh/MG | MWh/yr ($U_{eWW}$) | lbs/MWh ($EF_{Cele}$) | lbs/MT ($C_1$) | MT/yr ($E_{CWW}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 29.1900 | 0.65 | 18.9735 | 1.911 | 36.25836 | 524.00 | 2,205 | 8.62 |
| Low Density Residential | 10.8421 | 0.82 | 8.890522 | 1.911 | 16.98979 | 524.00 | 2,205 | 4.04 |
| Medium Density Residential | 2.0092 | 0.82 | 1.647544 | 1.911 | 3.148457 | 524.00 | 2,205 | 0.75 |
| High Density Residential | 0.0000 | 0.82 | 0 | 1.911 | 0 | 524.00 | 2,205 | 0.00 |
| Park | 0.0026 | 0.71 | 0.001846 | 1.911 | 0.003528 | 524.00 | 2,205 | 0.00 |
| Commercial | 0.6993 | 0.71 | 0.496503 | 1.911 | 0.948817 | 524.00 | 2,205 | 0.23 |
| Mixed Use | 0.0000 | 0.71 | 0 | 1.911 | 0 | 524.00 | 2,205 | 0.00 |
| Industrial | 1.6869 | 0.8 | 1.34952 | 1.911 | 2.578933 | 524.00 | 2,205 | 0.61 |
| | | | | | | | **Total (MT/year)** | 14.24 |

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**C. Reserved for AG emissions for $CH_4$ and $N_2O$, not applicable for $CO_2$.**

**D. Summary Table**

| Source Type | | Emissions, MT /yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Direct | Motor vehicles & Aircraft | 243112.11 | 243,112.11 |
| | Landscape equipment | 31.36 | 31.36 |
| | Cooling and heating | 105053.64 | 105,053.64 |
| | **Total direct, tons/yr** | **348197.12** | **348197.12** |
| Indirect | Electricity | 51828.05 | 51,828.05 |
| | Potable water | 35.29 | 35.29 |
| | Solid waste | 160.98 | 160.98 |
| | Wastewater | 14.24 | 14.24 |
| | **Total indirect, tons/yr** | **52,038.56** | **52,038.56** |
| | **Total, tons/yr** | **400,235.68** | **400,235.68** |
| | **Global warming potential index** | **1** | |

| Source Type | | Emissions, MT/yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Residential | AG/RAN/ER | 164,546.03 | 164,546.03 |
| | Low Density Residential | 61,119.72 | 61,119.72 |
| | Medium Density Residential | 11,326.27 | 11,326.27 |
| | High Density Residential | 0.00 | 0.00 |
| | **Total Residential** | **236,992.02** | **236,992.02** |
| Commercial | Park | 174.79 | 174.79 |
| | Commercial | 47,742.25 | 47,742.25 |
| | Mixed Use | 0.00 | 0.00 |
| | **Total Commercial** | **47,917.04** | **47,917.04** |
| Industrial | Industrial | 115,326.63 | 115,326.63 |
| | **Total Industrial** | **115,326.63** | **115,326.63** |
| | | | |
| | **Total, tons/yr** | **400,235.68** | **400,235.68** |
| | **Global warming potential index** | 1 | |

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**2008**
**Inventory**
**Methane**

## A. Direct Sources

### A1. Mobile Source (Construction Equipment)

| Unit Type | gallons/yr ($U_{AG}$) | gr/gallon ($EF_{MHDV}$) | gr/MT ($C_6$) | MT/yr ($E_{MCON}$) |
|---|---|---|---|---|
| Construction Equipment | 0.00 | 0.0580 | 1,000,000 | **0.00** |

### A2. Mobile Source (Motor Vehicles)

| Unit Type | miles/yr (M) | gr/mile ($EF_{MMV}$) | gr/MT ($C_6$) | tons/yr ($E_{MMV}$) |
|---|---|---|---|---|
| Non Cat passenger Car | 4222673.56 | 0.1696 | 1,000,000 | 0.72 |
| Cat passenger Car | 205855335.86 | 0.1355 | 1,000,000 | 27.89 |
| Diesel Passenger Car | 1055668.39 | 0.0006 | 1,000,000 | 0.00 |
| Non cat light-duty truck | 4229622.26 | 0.1908 | 1,000,000 | 0.81 |
| Cat light duty truck | 88203098.33 | 0.1516 | 1,000,000 | 13.37 |
| Diesel Light duty Truck | 10728797.93 | 0.0011 | 1,000,000 | 0.01 |
| Non Cat light-duty truck 2 | 2105991.62 | 0.1908 | 1,000,000 | 0.40 |
| Cat light duty truck 2 | 102667091.55 | 0.1516 | 1,000,000 | 15.56 |
| Diesel Light duty truck 2 | 526497.91 | 0.0011 | 1,000,000 | 0.00 |
| Non Cat Medium duty Truck | 546809.50 | 0.4181 | 1,000,000 | 0.23 |
| Cat med duty truck | 48616335.52 | 0.2356 | 1,000,000 | 11.45 |
| Diesel Med duty truck | 546809.50 | 0.0051 | 1,000,000 | 0.00 |
| Non Cat lite-heavy duty truck | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat Light-heavy duty truck | 8552250.24 | 0.2356 | 1,000,000 | 2.01 |
| Diesel Lite-heavy duty truck | 4810640.76 | 0.0051 | 1,000,000 | 0.02 |
| Non Cat lite-heavy duty truck 2 | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat Light-heavy duty truck 2 | 2135924.50 | 0.2356 | 1,000,000 | 0.50 |
| Diesel Lite-heavy duty truck 2 | 2674716.26 | 0.0051 | 1,000,000 | 0.01 |
| Non Cat med-heavy duty truck | 537188.22 | 0.4181 | 1,000,000 | 0.22 |
| Cat med-heavy duty truck | 1603546.92 | 0.2356 | 1,000,000 | 0.38 |
| Diesel med-heavy duty truck | 5876999.46 | 0.0051 | 1,000,000 | 0.03 |
| Non cat Heavy Duty truck | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat heavy duty truck | 538257.25 | 0.2356 | 1,000,000 | 0.13 |
| Diesel heavy duty truck | 9617539.91 | 0.0051 | 1,000,000 | 0.05 |
| Non Cat Other Bus | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat other bus | 0.00 | 0.2356 | 1,000,000 | 0.00 |
| Diesel Other Bus | 534515.64 | 0.0051 | 1,000,000 | 0.00 |
| Non Cat Urban Bus | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat Urban Bus | 0.00 | 0.2356 | 1,000,000 | 0.00 |
| Diesel Urban Bus | 0.00 | 0.0051 | 1,000,000 | 0.00 |
| Non cat motorcycle | 14966437.92 | 0.0672 | 1,000,000 | 1.01 |
| Cat motorcycle | 6414187.68 | 0.0672 | 1,000,000 | 0.43 |
| Diesel Motorcycle | 0.00 | 0.0000 | 1,000,000 | 0.00 |
| Non Cat School Bus | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat School Bus | 0.00 | 0.2356 | 1,000,000 | 0.00 |
| Diesel School Bus | 534515.64 | 0.0051 | 1,000,000 | 0.00 |
| Non Cat Motor home | 532377.58 | 0.4181 | 1,000,000 | 0.22 |
| Cat Motor home | 4810640.76 | 0.2356 | 1,000,000 | 1.13 |
| Diesel Motor home | 1071169.34 | 0.0051 | 1,000,000 | 0.01 |
| | | | **Total (MT/yr)** | **76.59** |

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***Emissions from Aviation Fuel***

| Gasoline gallons/ year ($U_{AAF}$) | gr/gallon ($EF_{Maf}$) | gr/MT ($C_6$) | MT/yr ($E_{Maf}$) |
|---|---|---|---|
| 18,250.00 | 7.04 | 1,000,000 | **0.13** |

**A3. Mobile Source (Landscape Equipment)**

| Gasoline gallons/ year ($G_F$) | gr/gallon ($EF_{MF}$) | gr/MT ($C_6$) | MT/yr ($E_{Mls}$) |
|---|---|---|---|
| 3,563.91 | 0.50 | 1,000,000 | **0.00** |

**A4. Wood burning Hearth**

| MMBtu | kg/MMBtu ($EF_{Mwood}$) | kg/MT ($C_3$) | MT/yr ($E_{Mls}$) |
|---|---|---|---|
| 155,471.65 | 0.32 | 1,000 | **49.13** |

**A5. Stationary Source (Cooling and Heating) - Natural Gas**

| Land Use Type | Unit Type | Units | MMBTUs/yr ($U_{Ang}$) | kg/MMBTU ($EF_{Mng}$) | kg/MT ($C_3$) | MT/yr ($E_{Mng}$) |
|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 5163.00 | 186,544 | 0.005 | 1,000 | 0.9327 |
| Low Density Residential | du | 3885.00 | 69,289 | 0.005 | 1,000 | 0.3464 |
| Medium Density Residential | du | 720.00 | 12,840 | 0.005 | 1,000 | 0.0642 |
| High Density Residential | du | 0.00 | 0 | 0.005 | 1,000 | 0.0000 |
| Park | Sq/ft | 27921960.00 | 1,642 | 0.005 | 1,000 | 0.0082 |
| Commercial | Sq/ft | 1359520.00 | 445,071 | 0.005 | 1,000 | 2.2254 |
| Mixed Use | Sq/ft | 0.00 | 0 | 0.005 | 1,000 | 0.0000 |
| Industrial | Sq/ft | 3279680.00 | 1,073,666 | 0.001 | 1,000 | 1.0737 |
| | | | | | **Total (MT/yr)** | **4.65** |

**B. Indirect Sources**

**B1. Electricity**

| Land Use Type | Unit Type | Units | kWh/year | MWh/yr ($U_{Ae}$) | lbs/MWh ($EF_{Mele}$) | lbs/MT ($C_1$) | tons/yr ($E_{Mele}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 5163.00 | 58141917.5 | 58,141.92 | 0.0302 | 2,205 | 0.796 |
| Low Density Residential | du | 3885.00 | 21595856.5 | 21,595.86 | 0.0302 | 2,205 | 0.296 |
| Medium Density Residential | du | 720.00 | 4001962 | 4,001.96 | 0.0302 | 2,205 | 0.055 |
| High Density Residential | du | 0.00 | 0 | 0.00 | 0.0302 | 2,205 | 0.000 |
| Park | Sq/ft | 27921960.00 | 145059.693 | 145.06 | 0.0302 | 2,205 | 0.002 |
| Commercial | Sq/ft | 1359520.00 | 39319235.8 | 39,319.24 | 0.0302 | 2,205 | 0.539 |
| Mixed Use | Sq/ft | 0.00 | 0 | 0.00 | 0.0302 | 2,205 | 0.000 |
| Industrial | Sq/ft | 3279680.00 | 94851578.6 | 94,851.58 | 0.0302 | 2,205 | 1.299 |
| | | | | | | **Total (MT/yr)** | **2.987** |

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**2008**
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**Methane**

**B2. Potable Water**

| Unit Type | unit type | unit number | MG/yr ($U_{Apot}$) | MWh/MG ($C_4$) | MWH/yr ($U_{epot}$) | lbs/MWh ($EF_{Mele}$) | lbs/MT ($C_1$) | tons/yr ($E_{Mpot}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 5163.00 | 29.18998 | 3.50 | 102.16 | 0.0302 | 2,205 | 0.00140 |
| Low Density Residential | du | 3885.00 | 10.84214 | 3.50 | 37.95 | 0.0302 | 2,205 | 0.00052 |
| Medium Density Residential | du | 720.00 | 2.00917 | 3.50 | 7.03 | 0.0302 | 2,205 | 0.00010 |
| High Density Residential | du | 0.00 | 0.00000 | 3.50 | 0.00 | 0.0302 | 2,205 | 0.00000 |
| Park | Sq/ft | 27921960.00 | 0.00258 | 3.50 | 0.01 | 0.0302 | 2,205 | 0.00000 |
| Commercial | Sq/ft | 1359520.00 | 0.69926 | 3.50 | 2.45 | 0.0302 | 2,205 | 0.00003 |
| Mixed Use | Sq/ft | 0.00 | 0.00000 | 3.50 | 0.00 | 0.0302 | 2,205 | 0.00000 |
| Industrial | Sq/ft | 3279680.00 | 1.68687 | 3.50 | 5.90 | 0.0302 | 2,205 | 0.00008 |
| | | | | | | | **Total (MT/yr)** | **0.00213** |

**B3. Solid Waste**
**B3a. Fugitive Emissions**

| Unit Type | Unit Type | unit | tons/yr ($U_{SW}$) | MT $CO_2e$/ton ($EF_{MWF}$) | MT $CO_2e$/yr ($E_{MWF}$) |
|---|---|---|---|---|---|
| AG/RAN/ER | du | 5163.00 | 11,072.44 | 0.130000 | 1,439.42 |
| Low Density Residential | du | 3885.00 | 4,112.75 | 0.130000 | 534.66 |
| Medium Density Residential | du | 720.00 | 762.28 | 0.130000 | 99.10 |
| High Density Residential | du | 0.00 | 0.00 | 0.130000 | 0.00 |
| Park | Sq/ft | 27921960.00 | 4.18 | 0.130000 | 0.54 |
| Commercial | Sq/ft | 1359520.00 | 1,162.44 | 0.130000 | 151.12 |
| Mixed Use | Sq/ft | 0.00 | 0.00 | 0.130000 | 0.00 |
| Industrial | Sq/ft | 3279680.00 | 2,804.51 | 0.130000 | 364.59 |
| | | | | **Total (MT/yr)** | **2,589.42** |

**B3b. Exhaust Emissions (Hauling Trucks)**

| Unit Type | tons/yr ($U_{SW}$) | tons/cuyd (d) | cuyd/trip ($C_T$) | miles/trip (M) | gr/mile ($EF_{MWT}$) | gr/MT ($C_6$) | tons/yr ($E_{MWT}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 11,072.4384 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000146 |
| Low Density Residential | 4,112.7509 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000054 |
| Medium Density Residential | 762.2771 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000010 |
| High Density Residential | 0.0000 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000000 |
| Park | 4.1829 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000000 |
| Commercial | 1,162.4377 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000008 |
| Mixed Use | 0.0000 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000000 |
| Industrial | 2,804.5105 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000019 |
| | | | | | | **Total (MT/yr)** | **0.000237** |

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**B3c. Exhaust Emissions (Disposal Equipment)**

| Vehicle Type | # of equip | lbs/hr ($EF_{MWD}$) | hrs/day (h) | days/yr (n) | lbs/MT ($C_1$) | MT/yr ($E_{MWD}$) |
|---|---|---|---|---|---|---|
| Excavator | 0 | 0.0164 | 9.00 | 325 | 2,205 | 0.00 |
| Grader | 0 | 0.0185 | 9.00 | 325 | 2,205 | 0.00 |
| Off-Highway Tractor | 0 | 0.0243 | 9.00 | 325 | 2,205 | 0.00 |
| Off-Highway Truck | 0 | 0.0260 | 9.00 | 325 | 2,205 | 0.00 |
| Off-Highway Heavy Truck | 0 | 0.0342 | 9.00 | 325 | 2,205 | 0.00 |
| Disposal Facility run by City? | | | | | No | 0.00 |
| | | | | | **Total (MT/yr)** | **0.00** |

**B4. Wastewater**

| Land Use Type | MG/yr Potable ($U_{Apot}$) | % used indoors ($\%_{in}$) | MG/yr ww generated ($U_{AWW}$) | MWh/MG ($C_5$) | MWh/yr ($U_{eWW}$) | lbs/MWh ($EF_{Mele}$) | lbs/MT ($C_1$) | MT/yr ($E_{MWW}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 29.18998 | 65 | 18.97 | 1.91 | 36.26 | 0.0302 | 2,205 | 0.000497 |
| Low Density Residential | 10.84214 | 82 | 8.89 | 1.91 | 16.99 | 0.0302 | 2,205 | 0.000233 |
| Medium Density Residential | 2.00917 | 82 | 1.65 | 1.91 | 3.15 | 0.0302 | 2,205 | 0.000043 |
| High Density Residential | 0.00000 | 82 | 0.00 | 1.91 | 0.00 | 0.0302 | 2,205 | 0.000000 |
| Park | 0.00258 | 71 | 0.00 | 1.91 | 0.00 | 0.0302 | 2,205 | 0.000000 |
| Commercial | 0.69926 | 71 | 0.50 | 1.91 | 0.95 | 0.0302 | 2,205 | 0.000013 |
| Mixed Use | 0.00000 | 71 | 0.00 | 1.91 | 0.00 | 0.0302 | 2,205 | 0.000000 |
| Industrial | 1.68687 | 80 | 1.35 | 1.91 | 2.58 | 0.0302 | 2,205 | 0.000035 |
| | | | | | | | **Total (MT/yr)** | 0.000821 |

**C. See Methane Emissions from AG Formula Spreadsheet (entered into table below under commercial AG)**

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**2008**
**Inventory**
**Methane**

**D. Summary Table**

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Direct | Construction equipment | 0.00 | 0.00 |
| | Motor vehicles & Aviation Fuel | 76.72 | 1,611.09 |
| | Landscape equipment | 0.00 | 0.04 |
| | Cooling and heating | 53.78 | 1,129.37 |
| **Total direct, tons/yr** | | **130.50** | **2,740.50** |
| Indirect | Electricity | 2.99 | 62.73 |
| | Potable water | 0.00 | 0.04 |
| | Solid waste | 2,589.42 | 2,589.42 |
| | Wastewater | 0.00 | 0.02 |
| **Total indirect, tons/yr** | | **2,592.41** | **2,652.21** |
| **Total from Agriculture** | | **11,212.42** | **235,460.91** |
| ***Total, tons/yr*** | | ***13,935.33*** | ***240,853.62*** |
| **Global warming potential index** | | **21** | |

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Residential | AG/RAN/ER | 1,511.0352 | 2,943.38 |
| | Low Density Residential | 561.2595 | 1,093.29 |
| | Medium Density Residential | 104.0265 | 202.64 |
| | High Density Residential | 0.0000 | 0.00 |
| | **Total Residential** | **2,176.32** | **4,239.31** |
| Commercial | Park | 0.5804 | 1.31 |
| | Commercial | 161.2180 | 363.24 |
| | Mixed Use | 0.0000 | 0.00 |
| | **Total Commercial** | **161.80** | **364.55** |
| Industrial | Industrial | 384.7895 | 788.85 |
| **Total Industrial** | | **384.7895** | **788.85** |
| **Total from Agriculture** | | **11,212.42** | **235,460.91** |
| ***Total, tons/yr*** | | ***13,935.33*** | ***240,853.62*** |
| **Global warming potential index** | | 21 | |

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**Nitrous Oxide**

## A. Direct Sources

### A1. Mobile Source (Construction Equipment)

| Unit Type | gallons/yr ($U_{AG}$) | gr/gallon ($EF_{NHDV}$) | gr/MT ($C_6$) | MT/yr ($E_{NCON}$) |
|---|---|---|---|---|
| Non cat heavy-duty truck | 0.00 | 0.0260 | 1,000,000 | **0.00000** |

### A2. Mobile Source (Motor Vehicles)

| Unit Type | miles/yr (M) | gr/mile ($EF_{NMV}$) | gr/MT ($C_6$) | MT/yr ($E_{NMV}$) |
|---|---|---|---|---|
| Non Cat passenger Car | 4,222,674 | 0.0197 | 1,000,000 | 0.08319 |
| Cat passenger Car | 205,855,336 | 0.0504 | 1,000,000 | 10.37511 |
| Diesel Passenger Car | 1,055,668 | 0.0012 | 1,000,000 | 0.00127 |
| Non cat light-duty truck | 4,229,622 | 0.0218 | 1,000,000 | 0.09221 |
| Cat light duty truck | 88,203,098 | 0.0639 | 1,000,000 | 5.63618 |
| Diesel Light duty Truck | 10,728,798 | 0.0017 | 1,000,000 | 0.01824 |
| Non Cat light-duty truck 2 | 2,105,992 | 0.0218 | 1,000,000 | 0.04591 |
| Cat light duty truck 2 | 102,667,092 | 0.0639 | 1,000,000 | 6.56043 |
| Diesel Light duty truck 2 | 526,498 | 0.0017 | 1,000,000 | 0.00090 |
| Non Cat Medium duty Truck | 546,809 | 0.0473 | 1,000,000 | 0.02586 |
| Cat med duty truck | 48,616,336 | 0.1317 | 1,000,000 | 6.40277 |
| Diesel Med duty truck | 546,809 | 0.0048 | 1,000,000 | 0.00262 |
| Non Cat lite-heavy duty truck | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat Light-heavy duty truck | 8,552,250 | 0.1317 | 1,000,000 | 1.12633 |
| Diesel Lite-heavy duty truck | 4,810,641 | 0.0048 | 1,000,000 | 0.02309 |
| Non Cat lite-heavy duty truck 2 | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat Light-heavy duty truck 2 | 2,135,924 | 0.1317 | 1,000,000 | 0.28130 |
| Diesel Lite-heavy duty truck 2 | 2,674,716 | 0.0048 | 1,000,000 | 0.01284 |
| Non Cat med-heavy duty truck | 537,188 | 0.0473 | 1,000,000 | 0.02541 |
| Cat med-heavy duty truck | 1,603,547 | 0.1317 | 1,000,000 | 0.21119 |
| Diesel med-heavy duty truck | 5,876,999 | 0.0048 | 1,000,000 | 0.02821 |
| Non cat Heavy Duty truck | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat heavy duty truck | 538,257 | 0.1317 | 1,000,000 | 0.07089 |
| Diesel heavy duty truck | 9,617,540 | 0.0048 | 1,000,000 | 0.04616 |
| Non Cat Other Bus | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat other bus | 0 | 0.1317 | 1,000,000 | 0.00000 |
| Diesel Other Bus | 534,516 | 0.0048 | 1,000,000 | 0.00257 |
| Non Cat Urban Bus | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat Urban Bus | 0 | 0.1317 | 1,000,000 | 0.00000 |
| Diesel Urban Bus | 0 | 0.0048 | 1,000,000 | 0.00000 |
| Non cat motorcycle | 14,966,438 | 0.0069 | 1,000,000 | 0.10327 |
| Cat motorcycle | 6,414,188 | 0.0069 | 1,000,000 | 0.04426 |
| Diesel Motorcycle | 0 | 0.0000 | 1,000,000 | 0.00000 |
| Non Cat School Bus | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat School Bus | 0 | 0.1317 | 1,000,000 | 0.00000 |
| Diesel School Bus | 534,516 | 0.0048 | 1,000,000 | 0.00257 |
| Non Cat Motor home | 532,378 | 0.0473 | 1,000,000 | 0.02518 |
| Cat Motor home | 4,810,641 | 0.1317 | 1,000,000 | 0.63356 |
| Diesel Motor home | 1,071,169 | 0.0048 | 1,000,000 | 0.00514 |
| | | | **Total (MT/yr)** | **31.89** |

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***Emissions from Aviation Fuel***

| Gasoline gallons/ year ($U_{Aaf}$) | gr/gallon ($EF_{Naf}$) | gr/lbs ($C_6$) | MT/yr ($E_{Nls}$) |
|---|---|---|---|
| 18,250.00 | 0.11000 | 1000000 | **0.002008** |

**A3. Mobile Source (Landscape Equipment)**

| Gasoline gallons/ year | gr/gallon ($EF_{Nls}$) | gr/lbs ($C_6$) | MT/yr ($E_{Nls}$) |
|---|---|---|---|
| 3,563.91 | 0.22000 | 1000000 | **0.000784** |

**A4. Wood burning Hearth**

| MMBtu | kg/MMBtu ($EF_{Mwood}$) | kg/MT ($C_3$) | MT/yr ($E_{Mls}$) |
|---|---|---|---|
| 155,471.65 | 0.00420 | 1000 | **0.652981** |

**A5. Stationary Source (Cooling and Heating)**

| Land Use Type | Unit Type | Units | MMBTUs/yr ($U_{Ang}$) | TU ($EF_{Nng}$) | kg/MT ($C_3$) | MT/yr ($E_{Nng}$) |
|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 5,163 | 186,544 | 0.0001 | 1,000 | 0.018654 |
| Low Density Residential | du | 3,885 | 69,289 | 0.0001 | 1,000 | 0.006929 |
| Medium Density Residential | du | 720 | 12,840 | 0.0001 | 1,000 | 0.001284 |
| High Density Residential | du | 0 | 0 | 0.0001 | 1,000 | 0.000000 |
| Park | Sq/ft | 27,921,960 | 1,642 | 0.0001 | 1,000 | 0.000164 |
| Commercial | Sq/ft | 1,359,520 | 445,071 | 0.0001 | 1,000 | 0.044507 |
| Mixed Use | Sq/ft | 0 | 0 | 0.0001 | 1,000 | 0.000000 |
| Industrial | Sq/ft | 3,279,680 | 1,073,666 | 0.0001 | 1,000 | 0.107367 |
| | | | | | **Total (MT/yr)** | **0.178905** |

**B. Indirect Sources**

**B1. Electricity**

| Land Use Type | Unit Type | Units | kWh/yr | MWh/yr ($U_{Ae}$) | lbs/MWh ($EF_{Nele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Nele}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 5,163 | 58141918 | 58,142 | 0.0081 | 2,205 | 0.21362 |
| Low Density Residential | du | 3,885 | 21595856 | 21,596 | 0.0081 | 2,205 | 0.07935 |
| Medium Density Residential | du | 720 | 4001962 | 4,002 | 0.0037 | 2,205 | 0.00672 |
| High Density Residential | du | 0 | 0 | 0 | 0.0037 | 2,205 | 0.00000 |
| Park | Sq/ft | 27,921,960 | 145059.69 | 145 | 0.0081 | 2,205 | 0.00053 |
| Commercial | Sq/ft | 1,359,520 | 39319236 | 39,319 | 0.0081 | 2,205 | 0.14446 |
| Mixed Use | Sq/ft | 0 | 0 | 0 | 0.0081 | 2,205 | 0.00000 |
| Industrial | Sq/ft | 3,279,680 | 94851579 | 94,852 | 0.0081 | 2,205 | 0.34849 |
| | | | | | | **Total (MT/yr)** | **0.79317** |

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**B2. Potable Water**

| Unit Type | unit type | unit number | MG/yr ($U_{Apot}$) | MWh/MG ($C_4$) | MWH/yr ($U_{epot}$) | lbs/MWh ($EF_{Nele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Npot}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 5,163 | 29.1899802 | 3.50 | 102.16 | 0.0081 | 2,205 | 0.000 |
| Low Density Residential | du | 3,885 | 10.8421368 | 3.50 | 37.95 | 0.0081 | 2,205 | 0.000 |
| Medium Density Residential | du | 720 | 2.0091734 | 3.50 | 7.03 | 0.0081 | 2,205 | 0.000 |
| High Density Residential | du | 0 | 0.0000000 | 3.50 | 0.00 | 0.0081 | 2,205 | 0.000 |
| Park | Sq/ft | 27,921,960 | 0.0025798 | 3.50 | 0.01 | 0.0081 | 2,205 | 0.000 |
| Commercial | Sq/ft | 1,359,520 | 0.6992639 | 3.50 | 2.45 | 0.0081 | 2,205 | 0.000 |
| Mixed Use | Sq/ft | 0 | 0.0000000 | 3.50 | 0.00 | 0.0081 | 2,205 | 0.000 |
| Industrial | Sq/ft | 3,279,680 | 1.6868660 | 3.50 | 5.90 | 0.0081 | 2,205 | 0.000 |
| | | | | | | | **Total (MT/yr)** | **0.001** |

**B3. Solid Waste**

**B3a. Fugitive Emissions** No Fugitive Nitrous Oxide Emissions

**B3b. Exhaust Emissions (Hauling Trucks)**

| Unit Type | tons/yr ($U_{SW}$) | tons/cuyd (d) | cuyd/trip ($C_T$) | miles/trip (M) | gr/mile ($EF_{NWT}$) | gr/MT ($C_6$) | MT/yr ($E_{NWT}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 11,072.44 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00013772 |
| Low Density Residential | 4,112.75 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00005115 |
| Medium Density Residential | 762.28 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00000948 |
| High Density Residential | 0.00 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00000000 |
| Park | 4.18 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00000003 |
| Commercial | 1,162.44 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00000723 |
| Mixed Use | 0.00 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00000000 |
| Industrial | 2,804.51 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00001744 |
| | | | | | | **Total (MT/yr)** | **0.000223** |

**B3c. Exhaust Emissions (Disposal Equipment)**

| Vehicle Type | # of equip. | lbs/hr ($EF_{NWD}$) | hrs/day (h) | days/yr (n) | lbs/MT ($C_1$) | tons/yr ($E_{NWD}$) |
|---|---|---|---|---|---|---|
| Excavator | 0 | 0.0074 | 9.00 | 325 | 2,205 | 0.00 |
| Grader | 0 | 0.0083 | 9.00 | 325 | 2,205 | 0.00 |
| Off-Highway Tractor | 0 | 0.0109 | 9.00 | 325 | 2,205 | 0.00 |
| Off-Highway Truck | 0 | 0.0117 | 9.00 | 325 | 2,205 | 0.00 |
| Rubber Tired Dozer | 0 | 0.0153 | 9.00 | 325 | 2,205 | 0.00 |
| Disposal Facility run by City? | | | | | No | 0.00 |
| | | | | | **Total, tons/yr** | **0.00** |

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**B4. Wastewater**

| AG/RAN/ER | MG/yr Potable ($U_{Apot}$) | % used indoors ($\%_{in}$) | MG/yr ww generated ($U_{AWW}$) | MWh/MG ($C_5$) | MWh/yr ($U_{eWW}$) | lbs/MWh ($EF_{Nele}$) | lbs/MT ($C_1$) | MT/yr ($E_{NWW}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 29.19 | 65 | 18.97 | 1.91 | 36.2583 | 0.0081 | 2204.62 | 0.00013322 |
| Low Density Residential | 10.84 | 82 | 8.89 | 1.91 | 16.9898 | 0.0081 | 2204.62 | 0.00006242 |
| Medium Density Residential | 2.01 | 82 | 1.65 | 1.91 | 3.1484 | 0.0037 | 2204.62 | 0.00000528 |
| High Density Residential | 0.00 | 82 | 0.00 | 1.91 | 0.0000 | 0.0037 | 2204.62 | 0.00000000 |
| Park | 0.00 | 71 | 0.00 | 1.91 | 0.0035 | 0.0081 | 2204.62 | 0.00000001 |
| Commercial | 0.70 | 71 | 0.50 | 1.91 | 0.9488 | 0.0081 | 2204.62 | 0.00000349 |
| Mixed Use | 0.00 | 71 | 0.00 | 1.91 | 0.0000 | 0.0081 | 2204.62 | 0.00000000 |
| Industrial | 1.69 | 80 | 1.35 | 1.91 | 2.5789 | 0.0081 | 2204.62 | 0.00000948 |
| | | | | | | | **Total (MT/yr)** | **0.00021390** |

**C. See Nitrous Emissions from AG Formula Spreadsheet (entered into table below under commercial AG)**
**D. Summary Table**

| Source Type | | Emissions, tons/yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Direct | Construction equipment | 0.00000 | 0.00 |
| | Motor vehicles + aviation fuel | 31.8920 | 9,886.52 |
| | Landscape equipment | 0.0008 | 0.24 |
| | Cooling and heating | 0.8319 | 257.88 |
| | Industrial | | |
| **Total direct, tons/yr** | | **32.7247** | **10,144.65** |
| Indirect | Electricity | 0.7932 | 245.88 |
| | Potable water | 0.0006 | 0.18 |
| | Solid waste | 0.0002 | 0.07 |
| | Wastewater | 0.0002 | 0.07 |
| | Industrial | | |
| **Total indirect, tons/yr** | | **0.7942** | **246.20** |
| **Total From Agriculture** | | **1,837.24** | **569,543.93** |
| ***Total, tons/yr*** | | ***1,870.76*** | ***579,934.77*** |
| **Global warming potential index** | | **310** | |

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Residential | AG/RAN/ER | 18.3237 | 5,680.28 |
| | Low Density Residential | 6.8062 | 2,109.89 |
| | Medium Density Residential | 1.2535 | 388.58 |
| | High Density Residential | 0.0000 | 0.00 |
| | **Total Residential** | **26.3833** | **8,178.75** |
| Commercial | Park | 0.0075 | 2.33 |
| | Commercial | 2.0882 | 647.35 |
| | Mixed Use | 0.0000 | 0.00 |
| | **Total Commercial** | **2.0958** | **649.68** |
| Industrial | Industrial | 5.0401 | 1,562.41 |
| | **Total Industrial** | **5.0401** | **1,562.41** |
| **Total from Agriculture** | | **1,837.24** | **569,543.93** |
| **Total, tons/yr** | | **1,870.76** | **579,934.77** |
| **Global warming potential index** | | 310 | |

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**CM. Methane**

**CM1. Enteric Fermentation**

| Source | Number - Head/year ($U_{Aani}$) | Emission Factor kg $CH_4$/head ($EF_{MEF}$) | Conversion factor kg to MT ($C_3$) | MT $CH_4$/year ($E_{MEF}$) |
|---|---|---|---|---|
| ***Dairy Cow*** | | | | |
| Dairy Cows | 8,293.00 | 123.42 | 1000.0 | 1,023.51 |
| ***Others*** | | | | |
| Sheep | 16,397.00 | 8.00 | 1000.0 | 131.18 |
| | | | **Total** | **1,154.68** |

**CM2. Manure Management**

| Source | Number - 1000s Head/year ($U_{Aani}$) | Typical Animal Mass kg/head (TAM) | Volatile Solids Produced kgVS/1000kg /year (VS) | Max $CH_4$ capacity $m^3CH_4$/kgVS ($B_O$) | Extent Capacity Realized (MCF) | Density of Methane ($C_8$) | MT $CH_4$/year ($E_{MMM}$) |
|---|---|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | | | |
| Dairy Cows | 8.293 | 604.0 | 3278.5 | 0.24 | 0.499 | 0.678 | 1,332.76 |
| **Other** | | | | | | | |
| Sheep on Feed | 16.397 | 27.0 | 3361.7 | 0.36 | 0.012 | 0.678 | 4.36 |
| | | | | | | **Total** | **1,337.11** |

**CM3. Rice Cultivation**

| Season | Acres ($U_{AC}$) | Conversion hectares/acre ($C_{11}$) | Emission Factor ($EF_{PS}$) | Conversion kg/MT ($C_3$) | MT/year ($E_{MRC}$) |
|---|---|---|---|---|---|
| Primary | 101,455 | 0.40 | 210 | 1,000 | 8,622.24 |
| Rattoon | 0 | 0.40 | 780 | 1,000 | 0.00 |
| | | | | **Total** | **8,622.24** |

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**CM4. Agricultural Residue Burning**

| Source | Production - Tons ($U_C$) | Residue/Crop Ratio ($R_{RC}$) | Fraction Burned ($F_{RB}$) | Fraction Dry ($F_{DM}$) | Burning Efficiency (BE) | Combustion Efficiency (CE) | Carbon Content (CC) | Ratio $CH_4$-C ($R_{CH4-C}$) | Conversion $CH_4$- to Mol.Wt. ($C_{11}$) | Tons/year ($E_{MARB}$) |
|---|---|---|---|---|---|---|---|---|---|---|
| Hay (inc Alfalfa) | 60,765.97 | 0 | 0.000 | 0.85 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Dry Edible Beans | 7,673.75 | 2.1 | 0.000 | 0.87 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Corn for Grain | 43,491.36 | 1 | 0.000 | 0.91 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Oats | 21,974.74 | 1.3 | 0.000 | 0.92 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Rice | 371,163.14 | 1.4 | 0.097 | 0.91 | 0.93 | 0.88 | 0.38 | 0.005 | 1.33 | 94.54 |
| Sorghum | 1,966.78 | 1.4 | 0.000 | 0.91 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| All Wheat | 43,991.75 | 1.3 | 0.030 | 0.93 | 0.93 | 0.88 | 0.44 | 0.005 | 1.33 | 3.85 |
| Vegetable Crops & Fruit Trees | 464,274.43 | 0 | 0.030 | 0.87 | 0.93 | 0.88 | 0.45 | 0.005 | 1.33 | 0.00 |
| Safflower & Sunflower | 11,496.73 | 2.1 | 0.000 | 0.00 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| | | | | | | | | | **Total** | **98.39** |

**CN. Nitrous Oxide**

**CN1. Manure Management**

| Source | Total Nitrogen Excreted ($N_T$) | Manure Anaerobic Lagoons ($\%_{AL}$) | Manure Liquid/Slurry ($\%_S$) | Manure Deep Pit ($\%_{DP}$) | Emission Factor for Liquid System ($EF_{NML}$) | $N_2O$ Emissions from Liquid System Mgt. | Manure Solid Storage/ Managed ($\%_{SS}$) | Manure Deep Pit / DryLot ($\%_{DP}$) | Manure Pasture / Poultry ($\%_P$) | Emission Factor for Solid System ($EF_{NMS}$) | $N_2O$ from solid system Mgt. | Total $N_2O$ MT/yr ($E_{NMM}$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | | | | | | | | |
| Dairy Cows | 804,440.90 | 467,234 | 166,683 | *N/A* | 0.001 | *996.16* | 74,355 | 1,830 | *N/A* | 0.02 | *2,394.41* | 3.39 |
| ***Other*** | | | | | | | | | | | | |
| Sheep on Feed | 67,868.82 | *N/A* | *N/A* | *N/A* | *N/A* | *N/A* | 66,678 | *N/A* | *N/A* | 0.02 | *2,095.60* | 2.10 |
| | | | | | | | | | | | **Total** | **5.49** |

**CN2. Emissions from Animals and Runoff**

Indirect emissions from animals

| Source | Total Nitrogen Excreted ($N_T$) | % of Indirect Volitazition ($\%_{VI}$) | Rate of conversion from $NH_3$ to $NO_X$ ($EF_{NH3-NOX}$) | Conversion factor for kg to MT ($C_3$) | Tons/year ($E_{NIA}$) |
|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | |
| Dairy Cows | 804,440.90 | 0.20 | 0.01 | 1,000 | 2.53 |
| ***Other*** | | | | | |
| Sheep on Feed | 67,868.82 | 0.20 | 0.01 | 1,000 | 0.21 |
| | | | | **Total** | **2.74** |

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Direct emissions from animals

| Source | Unmanaged Nitrogen ($N_{UM}$) | Emission Factor for Pastures, Ranges and Paddocks ($EF_{PRP}$) | Conversion factor for kg to MT ($C_3$) | Manure for Pasture, Range and Paddock ($M_{PRP}$) | Managed Nitrogen ($N_M$) | Unmanaged Daily Spread ($N_{DS}$) | % of Indirect Vol. ($\%_{VI}$) | Emission Factor for ground Applications ($EF_{NV}$) | Manure applied to Soils ($M_{AS}$) | MT/year ($E_{NDA}$) |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | | | | | | |
| Dairy Cows | 7,442.98 | 0.02 | 1,000 | 0.149 | 710,102.83 | 86,895.10 | 0.20 | 0.0125 | 7.970 | 12.992 |
| ***Other*** | | | | | | | | | | |
| Sheep on Feed | 66,678.14 | 0.02 | 1,000 | 1.334 | 1,190.68 | *N/A* | 0.20 | 0.0125 | 0.012 | 4.210 |
| | | | | | | | | | **Total** | **17.202** |

Emissions from Leaching

| Source | Unvolatized Synthetic Nitrogen ($N_{UVS}$) | Unvolatized Non-Manure Organic Nitrogen ($N_{UVO}$) | Conversion factor for kg to MT ($C_3$) | Leaching % of Soil ($\%_{Leach}$) | Leaching Factor - kg N2O-N / kg N ($F_{Leach}$) | Molecular Weight Ratio $N_2O:N_2$ ($C_{10}$) | Total Leaching from non-manure Fertilizer ($L_{fert}$) | Total Nitrogen Excreted ($N_T$) | % of Volitazation from Manure ($\%_{VM}$) | Total Leaching from Manure ($L_{man}$) | Total from Leaching MT/yr ($E_{NL}$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total emissions of $N_2O$ from Leaching | 18,900,484 | 7927.61 | 1,000 | 0.3000 | 0.025 | 1.57 | 222.85 | 872,310 | 0.00 | 10.28 | **233.13** |

**CN3: Nitrous Oxide from Crop Growth:**

| Source | Crop Production MTs | Conversion factor for kg to tons ($C_3$) | Residue/Crop Ratio ($R_{RC}$) | Fraction Dry ($F_{DM}$) | Nitrogen Content of biomass | Nitrogen Fixed by Crops (FN) | Fraction of Residue Applied ($F_{RA}$) | Nitrogen Content of Residue ($N_{CR}$) | Nitrogen Returned to Soil ($N_{RS}$) |
|---|---|---|---|---|---|---|---|---|---|
| Hay (inc Alfalfa) | 60,765.97 | 1,000 | 0.0 | 0.8500 | 0.03 | 1,549,532 | 0.00 | *N/A* | *0* |
| Dry Edible Beans | 7,673.75 | 1,000 | 2.1 | 0.8700 | 0.03 | 620,883 | 1.60 | 0.02 | 376,856 |
| Corn for Grain | 43,491.36 | 1,000 | 1.0 | 0.9100 | *N/A* | *0* | 0.90 | 0.01 | 206,593 |
| Oats | 21,974.74 | 1,000 | 1.3 | 0.9200 | *N/A* | *0* | 0.90 | 0.01 | 165,575 |
| Rice | 371,163.14 | 1,000 | 1.4 | 0.9100 | *N/A* | *0* | 1.00 | 0.01 | 3,404,605 |
| Sorghum | 1,966.78 | 1,000 | 1.4 | 0.9100 | *N/A* | *0* | 0.90 | 0.01 | 24,355 |
| All Wheat | 43,991.75 | 1,000 | 1.3 | 0.9300 | *N/A* | *0* | 0.90 | 0.01 | 296,778 |
| Vegetable Crops & Fruit Trees | 464,274.43 | 1,000 | 0.0 | 0.0000 | 0.03 | 0 | 0.00 | 0.00 | 0 |
| Safflower & Sunflower | 11,496.73 | 1,000 | 2.1 | 0.8700 | 0.03 | 930,201 | 0.90 | 0.02 | 434,794 |
| Total | | | | | | 3,100,616 | | | 4,909,556 |

**Sutter County Base Year Climate Action Plan**
**Input data for Green House Gas Emissions**
**2008**
**Inventory**
**Agricultural Emissions**

| Source | Crop Production (Hectares) | Nitrogen Fixed by Crops ($FN_T$) | Nitrogen Returned to Soil ($N_{RST}$) | Conversion factor for kg to tons ($C_3$) | Emission factor for soils (kg N2O-N/kgN) ($EF_{DIR}$) | Molecular Weight Ratio $N_2O$:$N_2$ ($C_{10}$) | Emission factor kg $N_2O$-N / ha_yr | Emissions in MT ($N_{CG}$) |
|---|---|---|---|---|---|---|---|---|
| N2O emissions from Legumes | - | 3,100,616.40 | - | 1,000 | 0.0100 | 1.57 | - | 48.72 |
| N2O emissions from Residues | - | - | 4,909,556 | 1,000 | 0.0100 | 1.57 | - | 77.15 |
| $N_2O$ from Histols (Temperate Zone) | 89,048.16 | - | - | 1,000 | - | 1.57 | 8 | 1,119.46 |
| $N_2O$ from Histols (Sub tropic Zone) | 0.00 | - | - | 1,000 | - | 1.57 | 12 | 0.00 |
| | | | | | | | **Total** | **1,245.34** |

**CN4. Emissions from Fertilizers**

| Source | Target Year Total Fertilizer Use (kg N) | Following Year Total Fertilizer Use (kg N) | Total N in Fertilizers (Calendar Year) | Unvolatized N (kg) (NUV) | Volatized N (kg) (NV) | Direct $N_2O$ Emissions (metric tons) | $N_2O$ Emissions (metric tons) | Total Emissions from Fertilizers |
|---|---|---|---|---|---|---|---|---|
| Synthetic | 20,971,178 | 21,055,063 | 21,000,538 | 18,900,484 | 2,100,054 | 297.13 | 33.03 | **330.16** |
| Organic | 242,587 | 243,558 | 242,927 | 7,928 | 1,982 | | | |
| Dried Manure | 1,230 | 1,234 | 1,231 | | | | | |
| Activated Sewage Sludge | 209,887 | 210,727 | 210,181 | | | | | |
| Other | 31,471 | 31,597 | 31,515 | | | | | |
| *Dried Manure %* | 0.51% | 0.51% | 0.51% | | | | | |
| *Non-Manure Organics* | 241,358 | 242,323 | 241,696 | | | | | |

**CN5. Emissions on $N_2O$ from agricultural residue burning**

| Source | Production - MTTons ($U_C$) | Residue/Crop Ratio ($R_{RC}$) | Fraction Burned ($F_{RB}$) | Fraction Dry ($F_{DM}$) | Burning Efficiency (BE) | Combust.. Efficiency (CE) | Nitrogen Content (NC) | Ratio N2O-N ($R_{N2O-N}$) | Conversion to Mol.Wt. ($C_{10}$) | Emissions MT/year ($E_{NARB}$) |
|---|---|---|---|---|---|---|---|---|---|---|
| Hay (inc Alfalfa) | 60,765.97 | 0.0000 | 0.000 | 0.85 | 0.000 | 0.00 | *N/A* | 0.007 | 1.57 | *0.00* |
| Dry Edible Beans | 7,673.75 | 2.1000 | 0.000 | 0.87 | 0.000 | 0.00 | 0.017 | 0.007 | 1.57 | 0.00 |
| Corn for Grain | 43,491.36 | 1.0000 | 0.000 | 0.91 | 0.000 | 0.00 | 0.006 | 0.007 | 1.57 | 0.00 |
| Oats | 21,974.74 | 1.3000 | 0.000 | 0.92 | 0.000 | 0.00 | 0.007 | 0.007 | 1.57 | 0.00 |
| Rice | 371,163.14 | 1.4000 | 0.097 | 0.91 | 0.930 | 0.88 | 0.007 | 0.007 | 1.57 | 2.96 |
| Sorghum | 1,966.78 | 1.4000 | 0.000 | 0.91 | 0.000 | 0.00 | 0.011 | 0.007 | 1.57 | 0.00 |
| All Wheat | 43,991.75 | 1.3000 | 0.030 | 0.93 | 0.930 | 0.88 | 0.006 | 0.007 | 1.57 | 0.09 |
| Vegetable Crops & Fruit Trees | 464,274.43 | 0.0000 | 0.000 | 0.00 | 0.000 | 0.00 | 0.000 | 0.007 | 1.57 | 0.00 |
| Safflower & Sunflower | 11,496.73 | 2.1000 | 0.030 | 0.87 | 0.930 | 0.88 | 0.023 | 0.007 | 1.57 | 0.13 |
| | | | | | | | | | **Total** | **3.18** |

**Sutter County Base Year Climate Action Plan**
**Input data for Green House Gas Emissions**
**2008**
**Inventory**
**Agricultural Emissions**

**D. Summary Table**

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Methane | Enteric Fermentation | 1,154.68 | 24,248.37 |
| | Manure Management | 1,337.11 | 28,079.41 |
| | Rice Cultivation | 8,622.24 | 181,067.00 |
| | Agricultural Residue Burning | 98.39 | 2,066.13 |
| **Total Methane** | | 11,212.42 | **235,460.91** |
| Nitrous Oxide | Manure Management | 5.49 | 1,700.71 |
| | Animals and Runoff | 253.07 | 78,452.78 |
| | Crop Growth | 1,245.34 | 386,054.38 |
| | Fertilizer Use | 330.16 | 102,350.89 |
| | Agricultural Residue Burning | 3.18 | 985.17 |
| **Total Nitrous Oxide** | | 1,837.24 | **569,543.93** |
| | **Total emissions from Agriculture** | | **805,004.84** |

# Appendix E: 2020 BAU URBEMIS Output and GHG Calculations

**6/23/2010 4:42:29 PM**

Urbemis 2007 Version 9.2.4

Detail Report for Summer Area Source Mitigated Emissions (Pounds/Day)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\Sutter County 2020 - Projected 6-23-2010.urb924

Project Name: Sutter County 2020 General Plan Build out

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Summer Pounds Per Day, Mitigated)

| Source | CO2 |
|---|---|
| Natural Gas | |
| Hearth - No Summer Emissions | |
| Landscape | 435.67 |
| Consumer Products | |
| Architectural Coatings | |
| TOTALS (lbs/day, mitigated) | 435.67 |

Area Source Mitigation Measures Selected

| Mitigation Description | Percent Reduction |
|---|---|
| For Residential Interior Use Low VOC Coating | 10.00 |
| For Residential Exterior Use Low VOC Coating | 10.00 |
| For Nonresidential Interior Use Low VOC Coating | 10.00 |
| For Nonresidential Exterior Use Low VOC Coating | 10.00 |

Area Source Changes to Defaults

Percentage of residences with natural gas fireplaces changed from 55% to 0%

**6/23/2010 4:42:44 PM**

Urbemis 2007 Version 9.2.4

Detail Report for Winter Area Source Mitigated Emissions (Pounds/Day)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\Sutter County 2020 - Projected 6-23-2010.urb924

Project Name: Sutter County 2020 General Plan Build out

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Winter Pounds Per Day, Mitigated)

| Source | CO2 |
|---|---|
| Natural Gas | |
| Hearth | 422,386.44 |
| Landscaping - No Winter Emissions | |
| Consumer Products | |
| Architectural Coatings | |
| TOTALS (lbs/day, Mitigated) | 422,386.44 |

Area Source Mitigation Measures Selected

| Mitigation Description | Percent Reduction |
|---|---|
| For Residential Interior Use Low VOC Coating | 10.00 |
| For Residential Exterior Use Low VOC Coating | 10.00 |
| For Nonresidential Interior Use Low VOC Coating | 10.00 |
| For Nonresidential Exterior Use Low VOC Coating | 10.00 |

Area Source Changes to Defaults

**6/23/2010 4:42:44 PM**

Percentage of residences with natural gas fireplaces changed from 55% to 0%

**6/23/2010 4:43:00 PM**

Urbemis 2007 Version 9.2.4

Detail Report for Annual Area Source Mitigated Emissions (Tons/Year)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\Sutter County 2020 - Projected 6-23-2010.urb924

Project Name: Sutter County 2020 General Plan Build out

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Annual Tons Per Year, Mitigated)

| Source | CO2 |
|---|---|
| Natural Gas | |
| Hearth | 17,317.84 |
| Landscape | 39.21 |
| Consumer Products | |
| Architectural Coatings | |
| TOTALS (tons/year, mitigated) | 17,357.05 |

Area Source Mitigation Measures Selected

| Mitigation Description | Percent Reduction |
|---|---|
| For Residential Interior Use Low VOC Coating | 10.00 |
| For Residential Exterior Use Low VOC Coating | 10.00 |
| For Nonresidential Interior Use Low VOC Coating | 10.00 |
| For Nonresidential Exterior Use Low VOC Coating | 10.00 |

Area Source Changes to Defaults

Percentage of residences with natural gas fireplaces changed from 55% to 0%

**6/23/2010 4:42:39 PM**

Urbemis 2007 Version 9.2.4

Detail Report for Summer Operational Unmitigated Emissions (Pounds/Day)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\Sutter County 2020 - Projected 6-23-2010.urb924

Project Name: Sutter County 2020 General Plan Build out

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

| Source | CO2 |
|---|---|
| Single family housing | 614,717.26 |
| Apartments low rise | 661,424.76 |
| Apartments mid rise | 235,973.48 |
| Apartments high rise | 95,745.07 |
| City park | 72.82 |
| General office building | 827,526.76 |
| Office park | 129,583.22 |
| General light industry | 317,548.57 |
| TOTALS (lbs/day, unmitigated) | 2,882,591.94 |

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2020 Temperature (F): 85 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

**6/23/2010 4:42:39 PM**

Summary of Land Uses

| Land Use Type | Acreage | Trip Rate | Unit Type | No. Units | Total Trips | Total VMT |
|---|---|---|---|---|---|---|
| Single family housing | 1,934.67 | 9.24 | dwelling units | 5,804.00 | 53,628.96 | 584,555.63 |
| Apartments low rise | 390.31 | 9.24 | dwelling units | 6,245.00 | 57,703.80 | 628,971.38 |
| Apartments mid rise | 58.63 | 9.24 | dwelling units | 2,228.00 | 20,586.72 | 224,395.23 |
| Apartments high rise | 14.58 | 9.24 | dwelling units | 904.00 | 8,352.96 | 91,047.26 |
| City park | | 0.01 | acres | 641.00 | 6.41 | 69.87 |
| General office building | | 22.11 | 1000 sq ft | 3,278.68 | 72,491.62 | 790,158.58 |
| Office park | | 22.11 | 1000 sq ft | 512.33 | 11,327.62 | 123,471.02 |
| General light industry | | 3.49 | 1000 sq ft | 7,951.22 | 27,749.76 | 302,472.36 |
| | | | | | 251,847.85 | 2,745,141.33 |

Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Light Auto | 39.6 | 0.0 | 100.0 | 0.0 |
| Light Truck < 3750 lbs | 19.3 | 0.0 | 95.9 | 4.1 |
| Light Truck 3751-5750 lbs | 19.7 | 0.0 | 100.0 | 0.0 |
| Med Truck 5751-8500 lbs | 9.3 | 0.0 | 100.0 | 0.0 |
| Lite-Heavy Truck 8501-10,000 lbs | 2.5 | 0.0 | 72.0 | 28.0 |
| Lite-Heavy Truck 10,001-14,000 lbs | 0.9 | 0.0 | 55.6 | 44.4 |
| Med-Heavy Truck 14,001-33,000 lbs | 1.6 | 0.0 | 18.8 | 81.2 |
| Heavy-Heavy Truck 33,001-60,000 lbs | 1.7 | 0.0 | 0.0 | 100.0 |
| Other Bus | 0.1 | 0.0 | 0.0 | 100.0 |

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Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Urban Bus | 0.0 | 0.0 | 0.0 | 0.0 |
| Motorcycle | 4.0 | 40.0 | 60.0 | 0.0 |
| School Bus | 0.1 | 0.0 | 0.0 | 100.0 |
| Motor Home | 1.2 | 0.0 | 83.3 | 16.7 |

Travel Conditions

| | Residential | | | Commercial | | |
|---|---|---|---|---|---|---|
| | Home-Work | Home-Shop | Home-Other | Commute | Non-Work | Customer |
| Urban Trip Length (miles) | 10.8 | 7.3 | 7.5 | 9.5 | 7.4 | 7.4 |
| Rural Trip Length (miles) | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 |
| Trip speeds (mph) | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 |
| % of Trips - Residential | 32.9 | 18.0 | 49.1 | | | |
| % of Trips - Commercial (by land use) | | | | | | |
| City park | | | | 5.0 | 2.5 | 92.5 |
| General office building | | | | 35.0 | 17.5 | 47.5 |
| Office park | | | | 48.0 | 24.0 | 28.0 |
| General light industry | | | | 50.0 | 25.0 | 25.0 |

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Home-based work rural trip length changed from 16.8 miles to 10.9 miles

Home-based shop rural trip length changed from 7.1 miles to 10.9 miles

Operational Changes to Defaults

Home-based other rural trip length changed from 7.9 miles to 10.9 miles

Commercial-based commute rural trip length changed from 14.7 miles to 10.9 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 10.9 miles

Commercial-based customer rural trip length changed from 6.6 miles to 10.9 miles

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Urbemis 2007 Version 9.2.4

Detail Report for Winter Operational Unmitigated Emissions (Pounds/Day)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\Sutter County 2020 - Projected 6-23-2010.urb924

Project Name: Sutter County 2020 General Plan Build out

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Winter Pounds Per Day, Unmitigated)

| Source | CO2 |
|---|---|
| Single family housing | 537,445.95 |
| Apartments low rise | 578,282.21 |
| Apartments mid rise | 206,311.09 |
| Apartments high rise | 83,709.71 |
| City park | 63.58 |
| General office building | 723,077.18 |
| Office park | 113,261.81 |
| General light industry | 277,565.31 |
| TOTALS (lbs/day, unmitigated) | 2,519,716.84 |

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2020 Temperature (F): 40 Season: Winter

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

**6/23/2010 4:42:49 PM**

Summary of Land Uses

| Land Use Type | Acreage | Trip Rate | Unit Type | No. Units | Total Trips | Total VMT |
|---|---|---|---|---|---|---|
| Single family housing | 1,934.67 | 9.24 | dwelling units | 5,804.00 | 53,628.96 | 584,555.63 |
| Apartments low rise | 390.31 | 9.24 | dwelling units | 6,245.00 | 57,703.80 | 628,971.38 |
| Apartments mid rise | 58.63 | 9.24 | dwelling units | 2,228.00 | 20,586.72 | 224,395.23 |
| Apartments high rise | 14.58 | 9.24 | dwelling units | 904.00 | 8,352.96 | 91,047.26 |
| City park | | 0.01 | acres | 641.00 | 6.41 | 69.87 |
| General office building | | 22.11 | 1000 sq ft | 3,278.68 | 72,491.62 | 790,158.58 |
| Office park | | 22.11 | 1000 sq ft | 512.33 | 11,327.62 | 123,471.02 |
| General light industry | | 3.49 | 1000 sq ft | 7,951.22 | 27,749.76 | 302,472.36 |
| | | | | | 251,847.85 | 2,745,141.33 |

Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Light Auto | 39.6 | 0.0 | 100.0 | 0.0 |
| Light Truck < 3750 lbs | 19.3 | 0.0 | 95.9 | 4.1 |
| Light Truck 3751-5750 lbs | 19.7 | 0.0 | 100.0 | 0.0 |
| Med Truck 5751-8500 lbs | 9.3 | 0.0 | 100.0 | 0.0 |
| Lite-Heavy Truck 8501-10,000 lbs | 2.5 | 0.0 | 72.0 | 28.0 |
| Lite-Heavy Truck 10,001-14,000 lbs | 0.9 | 0.0 | 55.6 | 44.4 |
| Med-Heavy Truck 14,001-33,000 lbs | 1.6 | 0.0 | 18.8 | 81.2 |
| Heavy-Heavy Truck 33,001-60,000 lbs | 1.7 | 0.0 | 0.0 | 100.0 |
| Other Bus | 0.1 | 0.0 | 0.0 | 100.0 |

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Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Urban Bus | 0.0 | 0.0 | 0.0 | 0.0 |
| Motorcycle | 4.0 | 40.0 | 60.0 | 0.0 |
| School Bus | 0.1 | 0.0 | 0.0 | 100.0 |
| Motor Home | 1.2 | 0.0 | 83.3 | 16.7 |

Travel Conditions

| | Residential | | | Commercial | | |
|---|---|---|---|---|---|---|
| | Home-Work | Home-Shop | Home-Other | Commute | Non-Work | Customer |
| Urban Trip Length (miles) | 10.8 | 7.3 | 7.5 | 9.5 | 7.4 | 7.4 |
| Rural Trip Length (miles) | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 |
| Trip speeds (mph) | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 |
| % of Trips - Residential | 32.9 | 18.0 | 49.1 | | | |
| % of Trips - Commercial (by land use) | | | | | | |
| City park | | | | 5.0 | 2.5 | 92.5 |
| General office building | | | | 35.0 | 17.5 | 47.5 |
| Office park | | | | 48.0 | 24.0 | 28.0 |
| General light industry | | | | 50.0 | 25.0 | 25.0 |

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Home-based work rural trip length changed from 16.8 miles to 10.9 miles

Home-based shop rural trip length changed from 7.1 miles to 10.9 miles

Operational Changes to Defaults

Home-based other rural trip length changed from 7.9 miles to 10.9 miles

Commercial-based commute rural trip length changed from 14.7 miles to 10.9 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 10.9 miles

Commercial-based customer rural trip length changed from 6.6 miles to 10.9 miles

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Urbemis 2007 Version 9.2.4

Detail Report for Annual Operational Unmitigated Emissions (Tons/Year)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\Sutter County 2020 - Projected 6-23-2010.urb924

Project Name: Sutter County 2020 General Plan Build out

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

| Source | CO2 |
|---|---|
| Single family housing | 107,485.23 |
| Apartments low rise | 115,652.18 |
| Apartments mid rise | 41,260.70 |
| Apartments high rise | 16,741.32 |
| City park | 12.73 |
| General office building | 144,669.62 |
| Office park | 22,656.05 |
| General light industry | 55,520.30 |
| TOTALS (tons/year, unmitigated) | 503,998.13 |

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2020 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

**6/23/2010 4:43:04 PM**

Summary of Land Uses

| Land Use Type | Acreage | Trip Rate | Unit Type | No. Units | Total Trips | Total VMT |
|---|---|---|---|---|---|---|
| Single family housing | 1,934.67 | 9.24 | dwelling units | 5,804.00 | 53,628.96 | 584,555.63 |
| Apartments low rise | 390.31 | 9.24 | dwelling units | 6,245.00 | 57,703.80 | 628,971.38 |
| Apartments mid rise | 58.63 | 9.24 | dwelling units | 2,228.00 | 20,586.72 | 224,395.23 |
| Apartments high rise | 14.58 | 9.24 | dwelling units | 904.00 | 8,352.96 | 91,047.26 |
| City park | | 0.01 | acres | 641.00 | 6.41 | 69.87 |
| General office building | | 22.11 | 1000 sq ft | 3,278.68 | 72,491.62 | 790,158.58 |
| Office park | | 22.11 | 1000 sq ft | 512.33 | 11,327.62 | 123,471.02 |
| General light industry | | 3.49 | 1000 sq ft | 7,951.22 | 27,749.76 | 302,472.36 |
| | | | | | 251,847.85 | 2,745,141.33 |

Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Light Auto | 39.6 | 0.0 | 100.0 | 0.0 |
| Light Truck < 3750 lbs | 19.3 | 0.0 | 95.9 | 4.1 |
| Light Truck 3751-5750 lbs | 19.7 | 0.0 | 100.0 | 0.0 |
| Med Truck 5751-8500 lbs | 9.3 | 0.0 | 100.0 | 0.0 |
| Lite-Heavy Truck 8501-10,000 lbs | 2.5 | 0.0 | 72.0 | 28.0 |
| Lite-Heavy Truck 10,001-14,000 lbs | 0.9 | 0.0 | 55.6 | 44.4 |
| Med-Heavy Truck 14,001-33,000 lbs | 1.6 | 0.0 | 18.8 | 81.2 |
| Heavy-Heavy Truck 33,001-60,000 lbs | 1.7 | 0.0 | 0.0 | 100.0 |
| Other Bus | 0.1 | 0.0 | 0.0 | 100.0 |

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Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Urban Bus | 0.0 | 0.0 | 0.0 | 0.0 |
| Motorcycle | 4.0 | 40.0 | 60.0 | 0.0 |
| School Bus | 0.1 | 0.0 | 0.0 | 100.0 |
| Motor Home | 1.2 | 0.0 | 83.3 | 16.7 |

Travel Conditions

| | Residential | | | Commercial | | |
|---|---|---|---|---|---|---|
| | Home-Work | Home-Shop | Home-Other | Commute | Non-Work | Customer |
| Urban Trip Length (miles) | 10.8 | 7.3 | 7.5 | 9.5 | 7.4 | 7.4 |
| Rural Trip Length (miles) | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 |
| Trip speeds (mph) | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 |
| % of Trips - Residential | 32.9 | 18.0 | 49.1 | | | |
| % of Trips - Commercial (by land use) | | | | | | |
| City park | | | | 5.0 | 2.5 | 92.5 |
| General office building | | | | 35.0 | 17.5 | 47.5 |
| Office park | | | | 48.0 | 24.0 | 28.0 |
| General light industry | | | | 50.0 | 25.0 | 25.0 |

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Home-based work rural trip length changed from 16.8 miles to 10.9 miles

Home-based shop rural trip length changed from 7.1 miles to 10.9 miles

Operational Changes to Defaults

Home-based other rural trip length changed from 7.9 miles to 10.9 miles

Commercial-based commute rural trip length changed from 14.7 miles to 10.9 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 10.9 miles

Commercial-based customer rural trip length changed from 6.6 miles to 10.9 miles

**Sutter County**
**Emissions by Source**
**2020**
**Business As Usual (BAU) Inventory**
**By Source**

| Transportation | | |
|---|---|---|
| | **Source:** | **Metric tons of $CO_2e$** |
| 1 | On-Road Vehicles | 479,486 |
| 2 | Airport Operations | 155 |
| | **Total** | **479,641** |

| Energy | | |
|---|---|---|
| | **Sources:** | **Metric tons of $CO_2e$** |
| 1 | Electric | 83,234 |
| 2 | Natural Gas | 150,392 |
| | **Total** | **233,626** |

| Solid Waste | | |
|---|---|---|
| | **Source** | **Metric tons of $CO_2e$** |
| 1 | Solid Waste Disposal | 12,006 |
| 2 | Green Waste Recycling | Data Not Available |
| 3 | Materials Recycling | Data Not Available |
| | **Total** | **12,006** |

| Landscape Emissions | | |
|---|---|---|
| | **Sources:** | **Metric tons of $CO_2e$** |
| 1 | Landscape Emissions | 36 |
| 2 | Carbon sink from $CO_2$ sequestration | Data Not Available |
| | **Total** | **36** |

| Agriculture | | |
|---|---|---|
| | **Sources:** | **Metric tons of $CO_2e$** |
| 1 | Enteric Fermentation | 24,248 |
| 2 | Manure Management | 29,780 |
| 3 | Rice Cultivation | 177,933 |
| 4 | Agricultural Residue Burning | 3,011 |
| 5 | Crop Growth | 378,097 |
| 6 | Animals and Runoff | 77,806 |
| 7 | Fertilizer Use | 101,392 |
| | **Total** | **792,267** |

| Net Total Emissions | |
|---|---|
| **Category** | **Metric tons of $CO_2e$** |
| Energy | 233,626 |
| Solid Waste | 12,006 |
| Landscape Emissions | 36 |
| Agriculture | 792,267 |
| Transportation | 479,641 |
| **Total** | **1,517,575** |

**Sutter County**
**Emissions by Land Use**
**2020**
**Business As Usual (BAU) Inventory**
**By Land Use Category**

| Source Type | | $CO_2e$ MT/yr | | | |
|---|---|---|---|---|---|
| | | $CO_2$ | $CH_4$ | $N_2O$ | combined $CO_2e$ |
| Residential | AG/RAN/ER | 219,378.12 | 6,099.99 | 7,589.19 | 233,067 |
| | Low Density Residential | 116,520.47 | 3,239.93 | 4,030.90 | 123,791 |
| | Medium Density Residential | 41,563.80 | 1,155.81 | 1,430.05 | 44,150 |
| | High Density Residential | 16,865.03 | 469.00 | 580.28 | 17,914 |
| | **Total Residential** | **394,327.41** | **10,964.73** | **13,630.43** | **418,923** |
| Commercial | Park | 125.32 | 2.15 | 2.67 | 130 |
| | Commercial | 82,333.87 | 1,430.43 | 1,776.54 | 85,541 |
| | Mixed Use | 12,863.58 | 223.46 | 277.54 | 13,365 |
| | **Total Commercial** | **95,322.76** | **1,656.04** | **2,056.75** | **99,036** |
| Industrial | Industrial | 199,673.58 | 3,367.89 | 4,308.44 | 207,350 |
| | **Total Industrial** | **199,673.58** | **3,367.89** | **4,308.44** | **207,350** |
| Agriculture | | 0.00 | 232,326.97 | 559,940.39 | 792,267 |
| | **Total** | **689,323.76** | **248,315.64** | **579,936.01** | **1,517,575** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020 Inventory**

| Land Use Type (units) | Total Trips | Total VMT | Total Trips | Total VMT | 2020 Unit Totals | Unit Type |
|---|---|---|---|---|---|---|
| AG/RAN/ER | **53,628.96** | **584555.63** | **53628.96** | **584555.63** | **5804** | **du** |
| Low Density Residential | **57703.8** | **628971.38** | **57703.8** | **628971.38** | **6245** | **du** |
| Medium Density Residential | **20586.72** | **224395.23** | **20586.72** | **224395.23** | **2228** | **du** |
| High Density Residential | **8352.96** | **91047.26** | **8352.96** | **91047.26** | **904** | **du** |
| Park | **6.41** | **69.87** | **6.41** | **69.87** | **27,921,960.00** | **Sq/ft** |
| Commercial | **72491.62** | **790158.58** | **72491.62** | **790158.58** | **3,278,683.00** | **Sq/ft** |
| Mixed Use | **11327.62** | **123471.02** | **11327.62** | **123471.02** | **512,333.00** | **Sq/ft** |
| Industrial | **27749.76** | **302472.36** | **27749.76** | **302472.36** | **7,951,216.00** | **Sq/ft** |
| **Total** | 251847.85 | 2745141.33 | 251847.85 | 2745141.33 | | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020 Inventory**

| Land Use Type (units) | Natural gas usage rate (MMBTU/yr) | Electricity (kWh/yr) | Potable Water Usage (gallons/year) | Solid Waste (lbs/year) | % Total Square Foot - SFR/MFR/Non-Res | % Total Square Foot - Res/Non-Res | % Total Square Foot |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 399,431 | 67,615,633 | 28,235,012 | 94,469,228 | 100.00% | 55.63% | 38.40% |
| Low Density Residential | 212,147 | 35,912,260 | 14,996,281 | 50,176,090 | 66.60% | 29.55% | 20.39% |
| Medium Density Residential | 75,689 | 12,812,611 | 5,350,305 | 17,899,821 | 23.76% | 10.54% | 7.28% |
| High Density Residential | 30,708 | 5,198,211 | 2,170,675 | 7,263,268 | 9.64% | 4.28% | 2.95% |
| Park | 765 | 97,340 | 1,240 | 31,986 | 0.04% | 0.04% | 0.01% |
| Commercial | 496,573 | 63,180,195 | 804,827 | 21,278,028 | 27.91% | 27.91% | 8.65% |
| Mixed Use | 77,591 | 9,872,047 | 125,756 | 3,324,077 | 4.36% | 4.36% | 1.35% |
| Industrial | 1,204,266 | 153,221,593 | 1,951,829 | 51,603,155 | 67.69% | 67.69% | 20.97% |
| **Total** | 2,497,170 | 347,909,889 | 53,635,924 | 246,045,652 | | | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020 Inventory**

**City Parks**

| Year | # of City Parks | Estimated SQ / "building" | Estimated Buildings per |
|---|---|---|---|
| 2020 | 10 | 500 | 1 |
| 2009 | 10 | 500 | 1 |

**Airport**

| Year | # of planes | Gallons fuel per day | Annual days of operation | Annual Fuel Usage (g/yr) |
|---|---|---|---|---|
| 2020 | 77 | 50.00 | 365 | 18,250 |
| 2009 | 77 | 50 | 365 | 18,250 |

| Operational(*2a,b) / Area Scenario(*3a,b) | Vehicle | | | Natural Gas | | | Total Vehicle + Natural Gas |
|---|---|---|---|---|---|---|---|
| | Summer | Winter | tons/Year | Summer | Winter | Year | |
| 2020 | 2,882,591.94 | 2,519,716.84 | 503,998.13 | 0.00 | 0.00 | 0.00 | 503,998.13 |
| 2009 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| Area Scenario(*3b,c) | Landscaping | | | Hearth | | |
|---|---|---|---|---|---|---|
| | Summer | Winter | Year | Summer | Winter | Year |
| 2020 | 435.67 | 422,386.44 | 39.21 | 0.00 | 0.00 | 17,317.84 |
| 2009 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| Vehicle Type | Fleet % | | Non-Catalyst | | Catalyst | | Diesel | |
|---|---|---|---|---|---|---|---|---|
| Light Auto | 39.60 | 0.3960 | 0.00 | 0.0000 | 100.00 | 1.0000 | 0.00 | 0.0000 |
| Light Truck <3,750 lbs | 19.30 | 0.1930 | 0.00 | 0.0000 | 95.90 | 0.9590 | 4.10 | 0.0410 |
| Light Truck 3,751-5,750 lbs | 19.70 | 0.1970 | 0.00 | 0.0000 | 100.00 | 1.0000 | 0.00 | 0.0000 |
| Med Truck 5,751-8,500 lbs | 9.30 | 0.0930 | 0.00 | 0.0000 | 100.00 | 1.0000 | 0.00 | 0.0000 |
| Lite-Heavy Truck 8,501-10,000 lbs | 2.50 | 0.0250 | 0.00 | 0.0000 | 72.00 | 0.7200 | 28.00 | 0.2800 |
| Lite-Heavy Truck 10,001-14,000 lbs | 0.90 | 0.0090 | 0.00 | 0.0000 | 55.60 | 0.5560 | 44.40 | 0.4440 |
| Med-Heavy Truck 14,001 - 33,000 lbs | 1.60 | 0.0160 | 0.00 | 0.0000 | 18.80 | 0.1880 | 81.20 | 0.8120 |
| Heavy-Heavy Truck 33,001-60,000 lbs | 1.70 | 0.0170 | 0.00 | 0.0000 | 0.00 | 0.0000 | 100.00 | 1.0000 |
| Other bus | 0.10 | 0.0010 | 0.00 | 0.0000 | 0.00 | 0.0000 | 100.00 | 1.0000 |
| Urban bus | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 100.00 | 1.0000 |
| Motorcycle | 4.00 | 0.0400 | 40.00 | 0.4000 | 60.00 | 0.6000 | 0.00 | 0.0000 |
| School Bus | 0.10 | 0.0010 | 0.00 | 0.0000 | 0.00 | 0.0000 | 100.00 | 1.0000 |
| Motor Home | 1.20 | 0.0120 | 0.00 | 0.0000 | 83.30 | 0.8330 | 16.70 | 0.1670 |

| Disposal Facility | Jurisdiction? | No | | Type of Facility: | Landfill w/ Combination | | year began: | 2009 |
|---|---|---|---|---|---|---|---|---|
| Landfill | Landfill Total | City's % of | Daily Hours of | Hours | Days per year | % Waste | Distance (one | Round Trip |
| Recology Landfill | 123,022.83 | 30.06% | 9 | 2.71 | 313.00 | 100 | 4.81 | 9.62 |
| | | 0.00% | | 0.00 | | 0 | | |
| | | 0.00% | | 0.00 | | 0 | | |
| | | 0.00% | | 0.00 | | 0 | | |
| | | | | 2.71 | 313.00 | **Total** | | **9.62** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020 Inventory**

**Electrical Usage**

**121,538,715** Total 2020 Residential Electrical Usage
**226,371,174** Total 2020 Non-Residential Electrical Usage

| | total 2020 | 2020 total growth | % total growth | GP area 2030 | 2008 | |
|---|---|---|---|---|---|---|
| | | | | | 37,634 | County facilities located in Yuba City |
| | | | | | 214 | County facilities located in Live Oak City |
| | | | | | 25,475 | County facilities located in Unincorporated Sutte |
| | | | | | 83,676,413 | Residential in Unincorporated Sutter County |
| | **121,538,715** | **37,798,979** | **40.35%** | **93,676,945** | **83,739,736** | **Total Residential** |
| | | | | | 6,062,361 | County facilities located in Yuba City |
| | | | | | 88,361 | County facilities located in Live Oak City |
| | | | | | 793,010 | County facilities located in Unincorporated Sutte |
| | | | | | 38,211,643 | Commercial in Unincorporated Sutter County |
| | | | | | 89,160,499 | Industrial in Unincorporated Sutter County |
| | **226,371,174** | **92,055,300** | **40.12%** | **229,436,077** | **134,315,874** | **Total commercial/industrail** |

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**Water Usage**

| | total 2020 | 2020 total growth | % total growth | GP area 2030 | 2008 | gallons/year |
|---|---|---|---|---|---|---|
| **50,752,272** | 50,752,272 | 8,710,982 | | | 42,041,290 | Residential (gallons per year) |
| **2,883,652** | 2,883,652 | 494,942 | | | 2,388,710 | Commercial/Institutional/Industrial (gallons/year) |
| | | 9,205,924 | **40.24%** | **22,879,600** | **44,430,000** | total water usage |

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**Solid Waste for Unincorporated Sutter County**

| | total 2020 | 2020 total growth | % total growth | 2030 County | 2008 | |
|---|---|---|---|---|---|---|
| **246,045,652** | | | | | **39,837,195** | **lbs/year** |
| | 49,932,599 | 41,566,788 | 40.35% | 103,014,680 | 8,365,811 | Residential in Unincorporated Sutter County |
| | 196,113,053 | 164,641,669 | 40.12% | 410,348,330 | 31,471,384 | Non-Residential in Unincorporated Sutter Count |

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**Natural Gas Data**

**717,975** Total Residential Natural gas usage rate (MMBTU/yr)
**1,779,195** Total Non-Residential Natural gas usage rate (MMBTU/yr)

| | total 2020 | 2020 total growth | % total growth | 2030 GP area | 2008 | MMBTU |
|---|---|---|---|---|---|---|
| | | | | | 13.50 | County facilities located in Yuba City |
| | | | | | 0.20 | County facilities located in Live Oak City |
| | | | | | 0.00 | County facilities located in Unincorporated Sutte |
| | | | | | 268,658.68 | Residential in Unincorporated Sutter County |
| | **717,975** | **449,302** | **40.35%** | **1,113,502** | **268,672** | **Total Residential** |
| | | | | | 14,853 | County facilities located in Yuba City |
| | | | | | 312 | County facilities located in Live Oak City |
| | | | | | 501 | County facilities located in Unincorporated Sutte |
| | | | | | 1,504,713 | Commercial in Unincorporated Sutter County |
| | **1,779,195** | **258,817** | **40.12%** | **645,067** | **1,520,379** | **Total Commercial** |

**Sutter County**
**Input data for Agriculture**
**2020**

| | Enteric Fermentation Emission Factor ($EF_{MEF}$) | Typical Animal Mass - kg- (TAM) | Volatile Solids -kg VS/1000kg mass/day- | Max $CH_4$ Capacity - $m^3CH_4$/kg VS- ($B_O$) | K-Nitrogen - kg/day/1000kg animal mass- ($K_N$) | Number of Head |
|---|---|---|---|---|---|---|
| | EF used | EF used | EF used | EF used | EF used | |
| ***Dairy Cow*** | | | | | | |
| Dairy Cows | 123.4 | 604.0 | 9.0 | 0.2 | 0.4 | **8,293** |
| **Other** | | | | | | |
| Sheep on Feed | 8.0 | 27.0 | 9.2 | 0.4 | 0.4 | 16,397 |

**Sutter County**
**Input data for Agriculture**
**2020**

| | Residue/Crop Ratio ($R_{RC}$) | Fraction Residue Burned ($F_{RB}$) | Fraction Dry Matter ($F_{DM}$) | Burning Efficiency (BE) | Combustion Efficiency (CE) | Carbon Content (CC) | Fraction of Residue Applied ($F_{RA}$) | Nitrogen Content of Residue (NC) |
|---|---|---|---|---|---|---|---|---|
| | EF used | EF used | EF used | EF used | EF used | EF used | EF used | EF used |
| Hay (inc Alfalfa) | 0.0 | 0.00 | 0.85 | 0.00 | 0.00 | 0.00 | 0.00 | N/A |
| Barley | 1.2 | 0.03 | 0.93 | 0.93 | 0.88 | 0.45 | 0.90 | 0.01 |
| Dry Edible Beans | 2.1 | 0.00 | 0.87 | 0.00 | 0.00 | 0.00 | 1.60 | 0.02 |
| Corn | 1.0 | 0.03 | 0.91 | 0.93 | 0.88 | 0.45 | 0.90 | 0.01 |
| Corn for Grain | 1.0 | 0.00 | 0.91 | 0.00 | 0.00 | 0.00 | 0.90 | 0.01 |
| Oats | 1.3 | 0.00 | 0.92 | 0.00 | 0.00 | 0.00 | 0.90 | 0.01 |
| Rice | 1.4 | 0.10 | 0.91 | 0.93 | 0.88 | 0.38 | 1.00 | 0.01 |
| Sorghum | 1.4 | 0.00 | 0.91 | 0.00 | 0.00 | 0.00 | 0.90 | 0.01 |
| All Wheat | 1.3 | 0.03 | 0.93 | 0.93 | 0.88 | 0.44 | 0.90 | 0.01 |
| Potatoes (inc Sweet) | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cotton | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sugar Beet | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vegetable Crops & Fruit Trees | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Safflower & Sunflower | 0.0 | 0.03 | 0.87 | 0.93 | 0.88 | 0.45 | 0.90 | 0.02 |

**Sutter County**
**Input data for Agriculture**
**2020**

| | | Growing Season Emission Factor | | |
|---|---|---|---|---|
| Primary | | **EF used** | **Entered** | **Default** |
| | | 210 | | 210 |
| Rattoon | | 780 | | 780 |
| | | ***State*** | ***Project*** | ***% of State ($\%_P$)*** |
| Total acres | 2020 | 7,667,570 | 218,282.00 | 0.0284682 |
| Total acres | 2021 | 7,667,570 | 218,282.00 | 0.0284682 |
| Climate Zone | Temperate | Yes | Sub Tropic | No |

| | 2020 | | | | | 2021 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Primary (Acres Harvested)** | **Annual Yield** | **Unit of Yield** | **Annual Yield (MT/yr)** | **State Acres Harvested** | **Primary (Acres Harvested)** | **Annual Yield** | **Unit of Yield** | **Annual Yield (MT/yr)** | **State Acres Harvested** |
| Hay (inc Alfalfa) | 11,138 | 66,983 | tons | 60,766 | 1,610,000 | 11,138 | 66,983 | tons | 60,766 | 1,610,000 |
| Barley | | | tons | | 60,000 | 0 | 0 | tons | | 60,000 |
| Dry Edible Beans | 8,446 | 8,459 | tons | 7,674 | 51,900 | 8,446 | 8,459 | tons | 7,674 | 51,900 |
| Corn | | | tons | 0 | 495,000 | 0 | 0 | tons | 0 | 495,000 |
| Corn for Grain | 7,720 | 47,941 | tons | 43,491 | 170,000 | 7,720 | 47,941 | tons | 43,491 | 170,000 |
| Oats | 2,035 | 24,223 | tons | 21,975 | 25,000 | 2,035 | 24,223 | tons | 21,975 | 25,000 |
| Rice | 99,699 | 409,137 | tons | 371,163 | 517,000 | 99,699 | 409,137 | tons | 371,163 | 517,000 |
| Sorghum | 572 | 2,168 | tons | 1,967 | 9,000 | 572 | 2,168 | tons | 1,967 | 9,000 |
| All Wheat | 7,631 | 48,493 | tons | 43,992 | 545,000 | 7,631 | 48,493 | tons | 43,992 | 545,000 |
| Potatoes (inc Sweet) | | | tons | 0 | 53,200 | 0 | 0 | tons | 0 | 53,200 |
| Cotton | | | bales | | 268,000 | 0 | 0 | bales | | 268,000 |
| Sugar Beet | | | | | 25,300 | 0 | 0 | | | 25,300 |
| Vegetable Crops & Fruit T | 66,815 | 511,775 | tons | 464,274 | 3,734,170 | 66,815 | 511,775 | tons | 464,274 | 3,734,170 |
| Safflower & Sunflower | 14,226 | 12,673 | tons | 11,497 | 104,000 | 14,226 | 12,673 | tons | 11,497 | 104,000 |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Carbon Dioxide**

## A. Direct Sources

### A1-3. Mobile (Construction Equipment, Motor Vehicles, and Landscape Equipment)

| Con (MT/yr) | Motor Vehicles (MT/yr) | Landscape (MT/yr) ($E_{Cls}$) | Hearth (MT/yr) ($E_{Cwood}$) | MT/yr |
|---|---|---|---|---|
| 0.00 | 457,219.54 | 35.57 | 15,710.48 | **472,965.60** |
| 0.00 | 0.97 | 0.00 | | |

***Fuel emissions from Airports***

| Annual Fuel Usage ($U_{AAF}$) | kg/gallon ($EF_{CAF}$) | kg/MT ($C_3$) | MT/yr ($E_{CAF}$) |
|---|---|---|---|
| 18,250.00 | 8.32 | 1,000.00 | **151.84** |

### A4. Stationary Sources (Natural Gas)

| Unit Type | MMBTU/yr ($U_{Ang}$) | kg/MMBTU ($EF_{Cng}$) | kg/MT ($C_3$) | MT/yr ($E_{Cng}$) |
|---|---|---|---|---|
| AG/RAN/ER | 399,431 | 53.07 | 1,000.00 | 21,197.8 |
| Low Density Residential | 212,147 | 53.07 | 1,000.00 | 11,258.6 |
| Medium Density Residential | 75,689 | 53.07 | 1,000.00 | 4,016.8 |
| High Density Residential | 30,708 | 53.07 | 1,000.00 | 1,629.7 |
| Park | 765 | 53.07 | 1,000.00 | 40.6 |
| Commercial | 496,573 | 53.07 | 1,000.00 | 26,353.2 |
| Mixed Use | 77,591 | 53.07 | 1,000.00 | 4,117.7 |
| Industrial | 1,204,266 | 53.07 | 1,000.00 | 63,910.4 |
| | | | **Total (MT/year)** | **132,524.8** |

## B. Indirect Sources

### B1. Electricity

| Unit Type | kWh/yr | Unit | Unit type | MWh/yr ($U_{Ae}$) | lbs/MWh ($EF_{Cele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Cele}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 67615633 | 5,804 | du | 67,616 | 524.00 | 2,204.62 | 16,071.06 |
| Low Density Residential | 35912260 | 6,245 | du | 35,912 | 524.00 | 2,204.62 | 8,535.72 |
| Medium Density Residential | 12812611 | 2,228 | du | 12,813 | 524.00 | 2,204.62 | 3,045.34 |
| High Density Residential | 5198210.8 | 904 | du | 5,198 | 524.00 | 2,204.62 | 1,235.52 |
| Park | 97339.605 | 27,921,960 | Sq/ft | 97 | 524.00 | 2,204.62 | 23.14 |
| Commercial | 63180195 | 3,278,683 | Sq/ft | 63,180 | 524.00 | 2,204.62 | 15,016.84 |
| Mixed Use | 9872046.9 | 512,333 | Sq/ft | 9,872 | 524.00 | 2,204.62 | 2,346.42 |
| Industrial | 153221593 | 7,951,216 | Sq/ft | 153,222 | 524.00 | 2,204.62 | 36,418.12 |
| | | | | | | **Total (MT/year)** | **82,692.16** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Carbon Dioxide**

**B2. Potable Water**

| Unit Type | unit type | unit number | MG/yr ($U_{Apot}$) | MWh/MG ($C_4$) | MWh/yr ($U_{epot}$) | lbs/MWh ($EF_{Cele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Cpot}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 5,804 | 28.2350 | 3.50 | 98.82 | 524.00 | 2,204.62 | 23.49 |
| Low Density Residential | du | 6,245 | 14.9963 | 3.50 | 52.49 | 524.00 | 2,204.62 | 12.48 |
| Medium Density Residential | du | 2,228 | 5.3503 | 0.01 | 0.05 | 804.54 | 2,000 | 0.02 |
| High Density Residential | du | 904 | 2.1707 | 0.01 | 0.02 | 804.54 | 2,000 | 0.01 |
| Park | Sq/ft | 27,921,960 | 0.0012 | 3.50 | 0.00 | 524.00 | 2,204.62 | 0.00 |
| Commercial | Sq/ft | 3,278,683 | 0.8048 | 3.50 | 2.82 | 524.00 | 2,204.62 | 0.67 |
| Mixed Use | Sq/ft | 512,333 | 0.1258 | 3.50 | 0.44 | 524.00 | 2,204.62 | 0.10 |
| Industrial | Sq/ft | 7,951,216 | 1.9518 | 3.50 | 6.83 | 524.00 | 2,204.62 | 1.62 |
| | | | | | | | **Total (MT/year)** | **38.39** |

**B3. Solid Waste**

**B3a. Anthropogenic Carbon**
***$CO_2$ emissions are considered anthropogenic and are not counted in this inventory.***
**B3b. Exhaust Emissions (Hauling Trucks)**

| Unit Type | tons/yr ($U_{SW}$) | tons/cuyd (d) | cuyd/trip ($C_T$) | miles/trip (M) | gr/mile ($EF_{CWT}$) | g/MT ($C_6$) | tons/yr ($E_{CWT}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 47,234.61 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 424.00 |
| Low Density Residential | 25,088.04 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 225.20 |
| Medium Density Residential | 8,949.91 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 80.34 |
| High Density Residential | 3,631.63 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 32.60 |
| Park | 15.99 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 0.07 |
| Commercial | 10,639.01 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 47.75 |
| Mixed Use | 1,662.04 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 7.46 |
| Industrial | 25,801.58 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 115.80 |
| | | | | | | **Total (MT/year)** | **933.22** |

**B3c. Exhaust Emissions (Disposal Equipment)**

| Vehicle Type | # of equip | lbs/hr ($EF_{CWD}$) | hrs/day (h) | days/yr (n) | lbs/MT ($C_1$) | MT/yr ($E_{CWD}$) |
|---|---|---|---|---|---|---|
| Excavator | 0 | 119.60 | 2.71 | 313 | 2,205 | 0.00 |
| Grader | 0 | 132.70 | 2.71 | 313 | 2,205 | 0.00 |
| Off-Highway Tractor | 0 | 151.50 | 2.71 | 313 | 2,205 | 0.00 |
| Off-Highway Truck | 0 | 260.10 | 2.71 | 313 | 2,205 | 0.00 |
| Rubber Tired Dozer | 0 | 239.00 | 2.71 | 313 | 2,205 | 0.00 |
| Disposal Facility run by City? | | | | | No | 0.00 |
| | | | | | **Total (MT/year)** | **0.00** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Carbon Dioxide**

**B4. Wastewater**

| Unit Type | MG/yr Potable ($U_{Apot}$) | % used indoors ($\%_{in}$) | MG/yr ww generated ($U_{AWW}$) | MWh/MG | MWh/yr ($U_{eWW}$) | lbs/MWh ($EF_{Cele}$) | lbs/MT ($C_1$) | MT/yr ($E_{CWW}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 28.2350 | 0.65 | 18.35275 | 1.911 | 35.072105 | 524.00 | 2,205 | 8.34 |
| Low Density Residential | 14.9963 | 0.82 | 12.296966 | 1.911 | 23.499502 | 524.00 | 2,205 | 5.59 |
| Medium Density Residential | 5.3503 | 0.82 | 4.387246 | 1.911 | 8.3840271 | 524.00 | 2,205 | 1.99 |
| High Density Residential | 2.1707 | 0.82 | 1.779974 | 1.911 | 3.4015303 | 524.00 | 2,205 | 0.81 |
| Park | 0.0012 | 0.71 | 0.000852 | 1.911 | 0.0016282 | 524.00 | 2,205 | 0.00 |
| Commercial | 0.8048 | 0.71 | 0.571408 | 1.911 | 1.0919607 | 524.00 | 2,205 | 0.26 |
| Mixed Use | 0.1258 | 0.71 | 0.089318 | 1.911 | 0.1706867 | 524.00 | 2,205 | 0.04 |
| Industrial | 1.9518 | 0.8 | 1.56144 | 1.911 | 2.9839118 | 524.00 | 2,205 | 0.71 |
| | | | | | | | **Total (MT/year)** | 17.73 |

**C. Reserved for AG emissions for $CH_4$ and $N_2O$, not applicable for $CO_2$.**

**D. Summary Table**

| Source Type | | Emissions, MT /yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Direct | Construction equipment | 0.00 | 0.00 |
| | Motor vehicles & Aircraft | 457371.38 | 457,371.38 |
| | Landscape equipment | 35.57 | 35.57 |
| | Cooling and heating | 148235.30 | 148,235.30 |
| **Total direct, tons/yr** | | **605642.25** | **605642.25** |
| Indirect | Electricity | 82692.16 | 82,692.16 |
| | Potable water | 38.39 | 38.39 |
| | Solid waste | 933.22 | 933.22 |
| | Wastewater | 17.73 | 17.73 |
| **Total indirect, tons/yr** | | **83,681.50** | **83,681.50** |
| **Total, tons/yr** | | **689,323.76** | **689,323.76** |
| **Global warming potential index** | | **1** | |

| Source Type | | Emissions, MT/yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Residential | AG/RAN/ER | 219,378.12 | 219,378.12 |
| | Low Density Residential | 116,520.47 | 116,520.47 |
| | Medium Density Residential | 41,563.80 | 41,563.80 |
| | High Density Residential | 16,865.03 | 16,865.03 |
| | **Total Residential** | **394,327.41** | **394,327.41** |
| Commercial | Park | 125.32 | 125.32 |
| | Commercial | 82,333.87 | 82,333.87 |
| | Mixed Use | 12,863.58 | 12,863.58 |
| | **Total Commercial** | **95,322.76** | **95,322.76** |
| Industrial | Industrial | 199,673.58 | 199,673.58 |
| | **Total Industrial** | **199,673.58** | **199,673.58** |
| **Total, tons/yr** | | **689,323.76** | **689,323.76** |
| **Global warming potential index** | | 1 | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Methane**

**A. Direct Sources**

**A1. Mobile Source (Construction Equipment)**

| Unit Type | gallons/yr ($U_{AG}$) | gr/gallon ($EF_{MHDV}$) | gr/MT ($C_6$) | MT/yr ($E_{MCON}$) |
|---|---|---|---|---|
| Construction Equipment | 0.00 | 0.0580 | 1,000,000 | **0.00** |

**A2. Mobile Source (Motor Vehicles)**

| Unit Type | miles/yr (M) | gr/mile ($EF_{MMV}$) | gr/MT ($C_6$) | tons/yr ($E_{MMV}$) |
|---|---|---|---|---|
| Non Cat passenger Car | 0.00 | 0.1696 | 1,000,000 | 0.00 |
| Cat passenger Car | 396782727.66 | 0.1355 | 1,000,000 | 53.76 |
| Diesel Passenger Car | 0.00 | 0.0006 | 1,000,000 | 0.00 |
| Non cat light-duty truck | 0.00 | 0.1908 | 1,000,000 | 0.00 |
| Cat light duty truck | 185452840.19 | 0.1516 | 1,000,000 | 28.11 |
| Diesel Light duty Truck | 7928640.72 | 0.0011 | 1,000,000 | 0.01 |
| Non Cat light-duty truck 2 | 0.00 | 0.1908 | 1,000,000 | 0.00 |
| Cat light duty truck 2 | 197389387.25 | 0.1516 | 1,000,000 | 29.92 |
| Diesel Light duty truck 2 | 0.00 | 0.0011 | 1,000,000 | 0.00 |
| Non Cat Medium duty Truck | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat med duty truck | 93183822.41 | 0.2356 | 1,000,000 | 21.95 |
| Diesel Med duty truck | 0.00 | 0.0051 | 1,000,000 | 0.00 |
| Non Cat lite-heavy duty truck | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat Light-heavy duty truck | 18035578.53 | 0.2356 | 1,000,000 | 4.25 |
| Diesel Lite-heavy duty truck | 7013836.10 | 0.0051 | 1,000,000 | 0.04 |
| Non Cat lite-heavy duty truck 2 | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat Light-heavy duty truck 2 | 5013890.83 | 0.2356 | 1,000,000 | 1.18 |
| Diesel Lite-heavy duty truck 2 | 4003898.43 | 0.0051 | 1,000,000 | 0.02 |
| Non Cat med-heavy duty truck | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat med-heavy duty truck | 3013945.57 | 0.2356 | 1,000,000 | 0.71 |
| Diesel med-heavy duty truck | 13017679.79 | 0.0051 | 1,000,000 | 0.07 |
| Non cat Heavy Duty truck | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat heavy duty truck | 0.00 | 0.2356 | 1,000,000 | 0.00 |
| Diesel heavy duty truck | 17033601.95 | 0.0051 | 1,000,000 | 0.09 |
| Non Cat Other Bus | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat other bus | 0.00 | 0.2356 | 1,000,000 | 0.00 |
| Diesel Other Bus | 1001976.59 | 0.0051 | 1,000,000 | 0.01 |
| Non Cat Urban Bus | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat Urban Bus | 0.00 | 0.2356 | 1,000,000 | 0.00 |
| Diesel Urban Bus | 0.00 | 0.0051 | 1,000,000 | 0.00 |
| Non cat motorcycle | 16031625.36 | 0.0672 | 1,000,000 | 1.08 |
| Cat motorcycle | 24047438.04 | 0.0672 | 1,000,000 | 1.62 |
| Diesel Motorcycle | 0.00 | 0.0000 | 1,000,000 | 0.00 |
| Non Cat School Bus | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat School Bus | 0.00 | 0.2356 | 1,000,000 | 0.00 |
| Diesel School Bus | 1001976.59 | 0.0051 | 1,000,000 | 0.01 |
| Non Cat Motor home | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat Motor home | 10015757.94 | 0.2356 | 1,000,000 | 2.36 |
| Diesel Motor home | 2007961.08 | 0.0051 | 1,000,000 | 0.01 |
| | | | **Total (MT/yr)** | **145.20** |

***Emissions from Aviation Fuel***

| Gasoline gallons/ year ($U_{AAF}$) | gr/gallon ($EF_{Maf}$) | gr/MT ($C_6$) | MT/yr ($E_{Maf}$) |
|---|---|---|---|
| 18,250.00 | 7.04 | 1,000,000 | **0.13** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Methane**

**A3. Mobile Source (Landscape Equipment)**

| Gasoline gallons/ year ($G_F$) | gr/gallon ($EF_{MF}$) | gr/MT ($C_6$) | MT/yr ($E_{MIs}$) |
|---|---|---|---|
| 4,042.26 | 0.50 | 1,000,000 | **0.00** |

**A4. Wood burning Hearth**

| MMBtu | kg/MMBtu ($EF_{Mwood}$) | kg/MT ($C_3$) | MT/yr ($E_{MIs}$) |
|---|---|---|---|
| 241,627.25 | 0.32 | 1,000 | **76.35** |

**A5. Stationary Source (Cooling and Heating) - Natural Gas**

| Land Use Type | Unit Type | Units | MMBTUs/yr ($U_{Ang}$) | kg/MMBTU ($EF_{Mng}$) | kg/MT ($C_3$) | MT/yr ($E_{Mng}$) |
|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 5,804 | 399,431 | 0.005 | 1,000 | 1.9972 |
| Low Density Residential | du | 6,245 | 212,147 | 0.005 | 1,000 | 1.0607 |
| Medium Density Residential | du | 2,228 | 75,689 | 0.005 | 1,000 | 0.3784 |
| High Density Residential | du | 904 | 30,708 | 0.005 | 1,000 | 0.1535 |
| Park | Sq/ft | 27,921,960 | 765 | 0.005 | 1,000 | 0.0038 |
| Commercial | Sq/ft | 3,278,683 | 496,573 | 0.005 | 1,000 | 2.4829 |
| Mixed Use | Sq/ft | 512,333 | 77,591 | 0.005 | 1,000 | 0.3880 |
| Industrial | Sq/ft | 7,951,216 | 1,204,266 | 0.001 | 1,000 | 1.2043 |
| | | | | | **Total (MT/yr)** | **7.67** |

**B. Indirect Sources**

**B1. Electricity**

| Land Use Type | Unit Type | Units | kWh/year | MWh/yr ($U_{Ae}$) | lbs/MWh ($EF_{Mele}$) | lbs/MT ($C_1$) | tons/yr ($E_{Mele}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 5,804 | 67,615,633 | 67,616 | 0.0302 | 2,205 | 0.926 |
| Low Density Residential | du | 6,245 | 35,912,260 | 35,912 | 0.0302 | 2,205 | 0.492 |
| Medium Density Residential | du | 2,228 | 12,812,611 | 12,813 | 0.0302 | 2,205 | 0.176 |
| High Density Residential | du | 904 | 5,198,211 | 5,198 | 0.0302 | 2,205 | 0.071 |
| Park | Sq/ft | 27,921,960 | 97,340 | 97 | 0.0302 | 2,205 | 0.001 |
| Commercial | Sq/ft | 3,278,683 | 63,180,195 | 63,180 | 0.0302 | 2,205 | 0.865 |
| Mixed Use | Sq/ft | 512,333 | 9,872,047 | 9,872 | 0.0302 | 2,205 | 0.135 |
| Industrial | Sq/ft | 7,951,216 | 153,221,593 | 153,222 | 0.0302 | 2,205 | 2.099 |
| | | | | | | **Total (MT/yr)** | **4.766** |

**B2. Potable Water**

| Unit Type | unit type | unit number | MG/yr ($U_{Apot}$) | MWh/MG ($C_4$) | MWH/yr ($U_{epot}$) | lbs/MWh ($EF_{Mele}$) | lbs/MT ($C_1$) | tons/yr ($E_{Mpot}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 5,804 | 28.23501 | 3.50 | 98.82 | 0.0302 | 2,205 | 0.00135 |
| Low Density Residential | du | 6,245 | 14.99628 | 3.50 | 52.49 | 0.0302 | 2,205 | 0.00072 |
| Medium Density Residential | du | 2,228 | 5.35030 | 3.50 | 18.73 | 0.0302 | 2,205 | 0.00026 |
| High Density Residential | du | 904 | 2.17067 | 3.50 | 7.60 | 0.0302 | 2,205 | 0.00010 |
| Park | Sq/ft | 27,921,960 | 0.00124 | 3.50 | 0.00 | 0.0302 | 2,205 | 0.00000 |
| Commercial | Sq/ft | 3,278,683 | 0.80483 | 3.50 | 2.82 | 0.0302 | 2,205 | 0.00004 |
| Mixed Use | Sq/ft | 512,333 | 0.12576 | 3.50 | 0.44 | 0.0302 | 2,205 | 0.00001 |
| Industrial | Sq/ft | 7,951,216 | 1.95183 | 3.50 | 6.83 | 0.0302 | 2,205 | 0.00009 |
| | | | | | | | **Total (MT/yr)** | **0.00257** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Methane**

**B3. Solid Waste**

**B3a. Fugitive Emissions**

| Unit Type | Unit Type | unit | tons/yr ($U_{SW}$) | MT $CO_2e$/ton ($EF_{MWF}$) | MT $CO_2e$/yr ($E_{MWF}$) |
|---|---|---|---|---|---|
| AG/RAN/ER | du | 5,804 | 47,235 | 0.09 | 4,251.12 |
| Low Density Residential | du | 6,245 | 25,088 | 0.09 | 2,257.92 |
| Medium Density Residential | du | 2,228 | 8,950 | 0.09 | 805.49 |
| High Density Residential | du | 904 | 3,632 | 0.09 | 326.85 |
| Park | Sq/ft | 27,921,960 | 16 | 0.09 | 1.44 |
| Commercial | Sq/ft | 3,278,683 | 10,639 | 0.09 | 957.51 |
| Mixed Use | Sq/ft | 512,333 | 1,662 | 0.09 | 149.58 |
| Industrial | Sq/ft | 7,951,216 | 25,802 | 0.09 | 2,322.14 |
| | | | | **Total (MT/yr)** | **11,072.05** |

**B3b. Exhaust Emissions (Hauling Trucks)**

| Unit Type | tons/yr ($U_{SW}$) | tons/cuyd (d) | cuyd/trip ($C_T$) | miles/trip (M) | gr/mile ($EF_{MWT}$) | gr/MT ($C_6$) | tons/yr ($E_{MWT}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 47,234.6140 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000624 |
| Low Density Residential | 25,088.0449 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000332 |
| Medium Density Residential | 8,949.9106 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000118 |
| High Density Residential | 3,631.6338 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000048 |
| Park | 15.9930 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000000 |
| Commercial | 10,639.0140 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000070 |
| Mixed Use | 1,662.0384 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000011 |
| Industrial | 25,801.5773 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000170 |
| | | | | | | **Total (MT/yr)** | **0.001373** |

**B3c. Exhaust Emissions (Disposal Equipment)**

| Vehicle Type | # of equip | lbs/hr ($EF_{MWD}$) | hrs/day (h) | days/yr (n) | lbs/MT ($C_1$) | MT/yr ($E_{MWD}$) |
|---|---|---|---|---|---|---|
| Excavator | 0 | 0.0164 | 2.71 | 313 | 2,205 | 0.00 |
| Grader | 0 | 0.0185 | 2.71 | 313 | 2,205 | 0.00 |
| Off-Highway Tractor | 0 | 0.0243 | 2.71 | 313 | 2,205 | 0.00 |
| Off-Highway Truck | 0 | 0.0260 | 2.71 | 313 | 2,205 | 0.00 |
| Rubber Tired Dozer | 0 | 0.0342 | 2.71 | 313 | 2,205 | 0.00 |
| Disposal Facility run by City? | | | | | No | 0.00 |
| | | | | | **Total (MT/yr)** | **0.00** |

**B4. Wastewater**

| Land Use Type | MG/yr Potable ($U_{Apot}$) | % used indoors ($\%_{in}$) | MG/yr ww generated ($U_{AWW}$) | MWh/MG ($C_5$) | MWh/yr ($U_{eWW}$) | lbs/MWh ($EF_{Mele}$) | lbs/MT ($C_1$) | MT/yr ($E_{MWW}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 28.23501 | 65 | 18.35 | 1.91 | 35.07 | 0.0302 | 2,205 | 0.000480 |
| Low Density Residential | 14.99628 | 82 | 12.30 | 1.91 | 23.50 | 0.0302 | 2,205 | 0.000322 |
| Medium Density Residential | 5.35030 | 82 | 4.39 | 1.91 | 8.38 | 0.0302 | 2,205 | 0.000115 |
| High Density Residential | 2.17067 | 82 | 1.78 | 1.91 | 3.40 | 0.0302 | 2,205 | 0.000047 |
| Park | 0.00124 | 71 | 0.00 | 1.91 | 0.00 | 0.0302 | 2,205 | 0.000000 |
| Commercial | 0.80483 | 71 | 0.57 | 1.91 | 1.09 | 0.0302 | 2,205 | 0.000015 |
| Mixed Use | 0.12576 | 71 | 0.09 | 1.91 | 0.17 | 0.0302 | 2,205 | 0.000002 |
| Industrial | 1.95183 | 80 | 1.56 | 1.91 | 2.98 | 0.0302 | 2,205 | 0.000041 |
| | | | | | | | **Total (MT/yr)** | **0.001022** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Methane**

**C. See Methane Emissions from AG Formula Spreadsheet (entered into table below under commercial AG)**
**D. Summary Table**

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Direct | Construction equipment | 0.00 | 0.00 |
| | Motor vehicles & Aviation Fuel | 145.33 | 3,051.90 |
| | Landscape equipment | 0.00 | 0.04 |
| | Cooling and heating | 84.02 | 1,764.48 |
| | **Total direct, tons/yr** | **229.35** | **4,816.42** |
| Indirect | Electricity | 4.77 | 100.08 |
| | Potable water | 0.00 | 0.05 |
| | Solid waste | 11,072.06 | 11,072.08 |
| | Wastewater | 0.00 | 0.02 |
| | **Total indirect, tons/yr** | **11,076.83** | **11,172.24** |
| | **Total from Agriculture** | **11,063.19** | **232,326.97** |
| | ***Total, tons/yr*** | ***22,369.37*** | ***248,315.64*** |
| | **Global warming potential index** | **21** | |

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Residential | AG/RAN/ER | 4,339.1076 | 6,099.99 |
| | Low Density Residential | 2,304.6601 | 3,239.93 |
| | Medium Density Residential | 822.1646 | 1,155.81 |
| | High Density Residential | 333.6123 | 469.00 |
| | **Total Residential** | **7,799.54** | **10,964.73** |
| Commercial | Park | 1.4733 | 2.15 |
| | Commercial | 980.0199 | 1,430.43 |
| | Mixed Use | 153.0999 | 223.46 |
| | **Total Commercial** | **1,134.59** | **1,656.04** |
| Industrial | Industrial | 2,371.9124 | 3,367.89 |
| | **Total Industrial** | **2,371.9124** | **3,367.89** |
| | **Total from Agriculture** | **11,063.19** | **232,326.97** |
| | ***Total, tons/yr*** | ***22,369.24*** | ***248,315.64*** |
| | **Global warming potential index** | 21 | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Nitrous Oxide**

**A. Direct Sources**

**A1. Mobile Source (Construction Equipment)**

| Unit Type | gallons/yr ($U_{AG}$) | gr/gallon ($EF_{NHDV}$) | gr/MT ($C_6$) | MT/yr ($E_{NCON}$) |
|---|---|---|---|---|
| Non cat heavy-duty truck | 0.00 | 0.0260 | 1,000,000 | **0.00000** |

**A2. Mobile Source (Motor Vehicles)**

| Unit Type | miles/yr (M) | gr/mile ($EF_{NMV}$) | gr/MT ($C_6$) | MT/yr ($E_{NMV}$) |
|---|---|---|---|---|
| Non Cat passenger Car | 0 | 0.0197 | 1,000,000 | 0.00000 |
| Cat passenger Car | 396,782,728 | 0.0504 | 1,000,000 | 19.99785 |
| Diesel Passenger Car | 0 | 0.0012 | 1,000,000 | 0.00000 |
| Non cat light-duty truck | 0 | 0.0218 | 1,000,000 | 0.00000 |
| Cat light duty truck | 185,452,840 | 0.0639 | 1,000,000 | 11.85044 |
| Diesel Light duty Truck | 7,928,641 | 0.0017 | 1,000,000 | 0.01348 |
| Non Cat light-duty truck 2 | 0 | 0.0218 | 1,000,000 | 0.00000 |
| Cat light duty truck 2 | 197,389,387 | 0.0639 | 1,000,000 | 12.61318 |
| Diesel Light duty truck 2 | 0 | 0.0017 | 1,000,000 | 0.00000 |
| Non Cat Medium duty Truck | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat med duty truck | 93,183,822 | 0.1317 | 1,000,000 | 12.27231 |
| Diesel Med duty truck | 0 | 0.0048 | 1,000,000 | 0.00000 |
| Non Cat lite-heavy duty truck | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat Light-heavy duty truck | 18,035,579 | 0.1317 | 1,000,000 | 2.37529 |
| Diesel Lite-heavy duty truck | 7,013,836 | 0.0048 | 1,000,000 | 0.03367 |
| Non Cat lite-heavy duty truck 2 | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat Light-heavy duty truck 2 | 5,013,891 | 0.1317 | 1,000,000 | 0.66033 |
| Diesel Lite-heavy duty truck 2 | 4,003,898 | 0.0048 | 1,000,000 | 0.01922 |
| Non Cat med-heavy duty truck | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat med-heavy duty truck | 3,013,946 | 0.1317 | 1,000,000 | 0.39694 |
| Diesel med-heavy duty truck | 13,017,680 | 0.0048 | 1,000,000 | 0.06248 |
| Non cat Heavy Duty truck | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat heavy duty truck | 0 | 0.1317 | 1,000,000 | 0.00000 |
| Diesel heavy duty truck | 17,033,602 | 0.0048 | 1,000,000 | 0.08176 |
| Non Cat Other Bus | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat other bus | 0 | 0.1317 | 1,000,000 | 0.00000 |
| Diesel Other Bus | 1,001,977 | 0.0048 | 1,000,000 | 0.00481 |
| Non Cat Urban Bus | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat Urban Bus | 0 | 0.1317 | 1,000,000 | 0.00000 |
| Diesel Urban Bus | 0 | 0.0048 | 1,000,000 | 0.00000 |
| Non cat motorcycle | 16,031,625 | 0.0069 | 1,000,000 | 0.11062 |
| Cat motorcycle | 24,047,438 | 0.0069 | 1,000,000 | 0.16593 |
| Diesel Motorcycle | 0 | 0.0000 | 1,000,000 | 0.00000 |
| Non Cat School Bus | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat School Bus | 0 | 0.1317 | 1,000,000 | 0.00000 |
| Diesel School Bus | 1,001,977 | 0.0048 | 1,000,000 | 0.00481 |
| Non Cat Motor home | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat Motor home | 10,015,758 | 0.1317 | 1,000,000 | 1.31908 |
| Diesel Motor home | 2,007,961 | 0.0048 | 1,000,000 | 0.00964 |
| | | | **Total (MT/yr)** | **61.99** |

***Emissions from Aviation Fuel***

| Gasoline gallons/ year ($U_{Aaf}$) | gr/gallon ($EF_{Naf}$) | gr/lbs ($C_6$) | MT/yr ($E_{NIs}$) |
|---|---|---|---|
| 18,250.00 | 0.11000 | 1000000 | **0.002008** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Nitrous Oxide**

**A3. Mobile Source (Landscape Equipment)**

| Gasoline gallons/ year | gr/gallon ($EF_{Nls}$) | gr/lbs ($C_6$) | MT/yr ($E_{Nls}$) |
|---|---|---|---|
| 4,042.26 | 0.22000 | 1000000 | **0.000889** |

**A4. Wood burning Hearth**

| MMBtu | kg/MMBtu ($EF_{Mwood}$) | kg/MT ($C_3$) | MT/yr ($E_{Mls}$) |
|---|---|---|---|
| 241,627.25 | 0.00420 | 1000 | **1.014834** |

**A5. Stationary Source (Cooling and Heating)**

| Land Use Type | Unit Type | Units | MMBTUs/yr ($U_{Ang}$) | kg/MMBTU ($EF_{Nng}$) | kg/MT ($C_3$) | MT/yr ($E_{Nng}$) |
|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 5,804 | 399,431 | 0.0001 | 1,000 | 0.039943 |
| Low Density Residential | du | 6,245 | 212,147 | 0.0001 | 1,000 | 0.021215 |
| Medium Density Residential | du | 2,228 | 75,689 | 0.0001 | 1,000 | 0.007569 |
| High Density Residential | du | 904 | 30,708 | 0.0001 | 1,000 | 0.003071 |
| Park | Sq/ft | 27,921,960 | 765 | 0.0001 | 1,000 | 0.000077 |
| Commercial | Sq/ft | 3,278,683 | 496,573 | 0.0001 | 1,000 | 0.049657 |
| Mixed Use | Sq/ft | 512,333 | 77,591 | 0.0001 | 1,000 | 0.007759 |
| Industrial | Sq/ft | 7,951,216 | 1,204,266 | 0.0001 | 1,000 | 0.120427 |
| | | | | | **Total (MT/yr)** | **0.249718** |

**B. Indirect Sources**

**B1. Electricity**

| Land Use Type | Unit Type | Units | kWh/yr | MWh/yr ($U_{Ae}$) | lbs/MWh ($EF_{Nele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Nele}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 5,804 | 67,615,633 | 67,616 | 0.0081 | 2,205 | 0.24843 |
| Low Density Residential | du | 6,245 | 35,912,260 | 35,912 | 0.0081 | 2,205 | 0.13195 |
| Medium Density Residential | du | 2,228 | 12,812,611 | 12,813 | 0.0037 | 2,205 | 0.02150 |
| High Density Residential | du | 904 | 5,198,211 | 5,198 | 0.0037 | 2,205 | 0.00872 |
| Park | Sq/ft | 27,921,960 | 97,340 | 97 | 0.0081 | 2,205 | 0.00036 |
| Commercial | Sq/ft | 3,278,683 | 63,180,195 | 63,180 | 0.0081 | 2,205 | 0.23213 |
| Mixed Use | Sq/ft | 512,333 | 9,872,047 | 9,872 | 0.0081 | 2,205 | 0.03627 |
| Industrial | Sq/ft | 7,951,216 | 153,221,593 | 153,222 | 0.0081 | 2,205 | 0.56295 |
| | | | | | | **Total (MT/yr)** | **1.24231** |

**B2. Potable Water**

| Unit Type | unit type | unit number | MG/yr ($U_{Apot}$) | MWh/MG ($C_4$) | MWH/yr ($U_{epot}$) | lbs/MWh ($EF_{Nele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Npot}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 5,804 | 28.2350117 | 3.50 | 98.82 | 0.0081 | 2,205 | 0.000363 |
| Low Density Residential | du | 6,245 | 14.9962814 | 3.50 | 52.49 | 0.0081 | 2,205 | 0.000193 |
| Medium Density Residential | du | 2,228 | 5.3503046 | 3.50 | 18.73 | 0.0081 | 2,205 | 0.000069 |
| High Density Residential | du | 904 | 2.1706747 | 3.50 | 7.60 | 0.0081 | 2,205 | 0.000028 |
| Park | Sq/ft | 27,921,960 | 0.0012400 | 3.50 | 0.00 | 0.0081 | 2,205 | 0.000000 |
| Commercial | Sq/ft | 3,278,683 | 0.8048272 | 3.50 | 2.82 | 0.0081 | 2,205 | 0.000010 |
| Mixed Use | Sq/ft | 512,333 | 0.1257561 | 3.50 | 0.44 | 0.0081 | 2,205 | 0.000002 |
| Industrial | Sq/ft | 7,951,216 | 1.9518286 | 3.50 | 6.83 | 0.0081 | 2,205 | 0.000025 |
| | | | | | | | **Total (MT/yr)** | **0.000690** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Nitrous Oxide**

**B3. Solid Waste**

**B3a. Fugitive Emissions** No Fugitive Nitrous Oxide Emissions

**B3b. Exhaust Emissions (Hauling Trucks)**

| Unit Type | tons/yr ($U_{SW}$) | tons/cuyd (d) | cuyd/trip ($C_T$) | miles/trip (M) | gr/mile ($EF_{NWT}$) | gr/MT ($C_6$) | MT/yr ($E_{NWT}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 47,234.61 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00058750 |
| Low Density Residential | 25,088.04 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00031204 |
| Medium Density Residential | 8,949.91 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00011132 |
| High Density Residential | 3,631.63 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00004517 |
| Park | 15.99 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00000010 |
| Commercial | 10,639.01 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00006616 |
| Mixed Use | 1,662.04 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00001034 |
| Industrial | 25,801.58 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00016046 |
| | | | | | | **Total (MT/yr)** | **0.001293** |

**B3c. Exhaust Emissions (Disposal Equipment)**

| Vehicle Type | # of equip. | lbs/hr ($EF_{NWD}$) | hrs/day (h) | days/yr (n) | lbs/MT ($C_1$) | tons/yr ($E_{NWD}$) |
|---|---|---|---|---|---|---|
| Excavator | 0 | 0.0074 | 2.71 | 313 | 2,205 | 0.00 |
| Grader | 0 | 0.0083 | 2.71 | 313 | 2,205 | 0.00 |
| Off-Highway Tractor | 0 | 0.0109 | 2.71 | 313 | 2,205 | 0.00 |
| Off-Highway Truck | 0 | 0.0117 | 2.71 | 313 | 2,205 | 0.00 |
| Rubber Tired Dozer | 0 | 0.0153 | 2.71 | 313 | 2,205 | 0.00 |
| Disposal Facility run by City? | | | | | No | 0.00 |
| | | | | | **Total, tons/yr** | **0.00** |

**B4. Wastewater**

| AG/RAN/ER | MG/yr Potable ($U_{Apot}$) | % used indoors ($\%_{in}$) | MG/yr ww generated ($U_{AWW}$) | MWh/MG ($C_5$) | MWh/yr ($U_{eWW}$) | lbs/MWh ($EF_{Nele}$) | lbs/MT ($C_1$) | MT/yr ($E_{NWW}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 28.24 | 65 | 18.35 | 1.91 | 35.0721 | 0.0081 | 2204.62 | 0.00012886 |
| Low Density Residential | 15.00 | 82 | 12.30 | 1.91 | 23.4995 | 0.0081 | 2204.62 | 0.00008634 |
| Medium Density Residential | 5.35 | 82 | 4.39 | 1.91 | 8.3840 | 0.0037 | 2204.62 | 0.00001407 |
| High Density Residential | 2.17 | 82 | 1.78 | 1.91 | 3.4015 | 0.0037 | 2204.62 | 0.00000571 |
| Park | 0.00 | 71 | 0.00 | 1.91 | 0.0017 | 0.0081 | 2204.62 | 0.00000001 |
| Commercial | 0.80 | 71 | 0.57 | 1.91 | 1.0920 | 0.0081 | 2204.62 | 0.00000401 |
| Mixed Use | 0.13 | 71 | 0.09 | 1.91 | 0.1706 | 0.0081 | 2204.62 | 0.00000063 |
| Industrial | 1.95 | 80 | 1.56 | 1.91 | 2.9840 | 0.0081 | 2204.62 | 0.00001096 |
| | | | | | | | **Total (MT/yr)** | **0.00025059** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Nitrous Oxide**

**C. See Nitrous Emissions from AG Formula Spreadsheet (entered into table below under commercial AG)**
**D. Summary Table**

| Source Type | | Emissions, tons/yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Direct | Construction equipment | 0.00000 | 0.00 |
| | Motor vehicles + aviation fuel | 61.9920 | 19,217.52 |
| | Landscape equipment | 0.0009 | 0.28 |
| | Cooling and heating | 1.2646 | 392.01 |
| **Total direct, tons/yr** | | **63.2574** | **19,609.81** |
| Indirect | Electricity | 1.2423 | 385.12 |
| | Potable water | 0.0007 | 0.21 |
| | Solid waste | 0.0013 | 0.40 |
| | Wastewater | 0.0003 | 0.08 |
| **Total indirect, tons/yr** | | **1.2445** | **385.81** |
| **Total From Agriculture** | | **1,806.26** | **559,940.39** |
| ***Total, tons/yr*** | | ***1,870.76*** | ***579,936.01*** |
| **Global warming potential index** | | **310** | |

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Residential | AG/RAN/ER | 24.4805 | 7,589.19 |
| | Low Density Residential | 13.0025 | 4,030.90 |
| | Medium Density Residential | 4.6129 | 1,430.05 |
| | High Density Residential | 1.8718 | 580.28 |
| | **Total Residential** | **43.9677** | **13,630.43** |
| Commercial | Park | 0.0086 | 2.67 |
| | Commercial | 5.7306 | 1,776.54 |
| | Mixed Use | 0.8952 | 277.54 |
| | **Total Commercial** | **6.6345** | **2,056.75** |
| Industrial | Industrial | 13.8978 | 4,308.44 |
| | **Total Industrial** | **13.8978** | **4,308.44** |
| **Total from Agriculture** | | **1,806.26** | **559,940.39** |
| **Total, tons/yr** | | **1,870.76** | **579,936.01** |
| **Global warming potential index** | | 310 | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Agricultural Emissions**

## CM. Methane

### CM1. Enteric Fermentation

| Source | Number - Head/year ($U_{Aani}$) | Emission Factor kg $CH_4$/head ($EF_{MEF}$) | Conversion factor kg to MT ($C_3$) | MT $CH_4$/year ($E_{MEF}$) |
|---|---|---|---|---|
| ***Dairy Cow*** | | | | |
| Dairy Cows | 8,293.00 | 123.42 | 1000.0 | 1,023.51 |
| ***Others*** | | | | |
| Sheep | 16,397.00 | 8.00 | 1000.0 | 131.18 |
| | | | **Total** | **1,154.68** |

### CM2. Manure Management

| Source | Number - 1000s Head/year ($U_{Aani}$) | Typical Animal Mass kg/head (TAM) | Volatile Solids Produced kgVS/1000kg/year (VS) | Max $CH_4$ capacity $m^3CH_4$/kgVS ($B_O$) | Extent Capacity Realized (MCF) | Density of Methane ($C_8$) | MT $CH_4$/year ($E_{MMM}$) |
|---|---|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | | | |
| Dairy Cows | 8.293 | 604.0 | 3278.5 | 0.24 | 0.499 | 0.678 | 1,332.76 |
| **Other** | | | | | | | |
| Sheep on Feed | 16.397 | 27.0 | 3361.7 | 0.36 | 0.012 | 0.678 | 4.359072539 |
| | | | | | | **Total** | **1,337.11** |

### CM3. Rice Cultivation

| Season | Acres ($U_{AC}$) | Conversion hectares/acre ($C_{11}$) | Emission Factor ($EF_{PS}$) | Conversion kg/MT ($C_3$) | MT/year ($E_{MRC}$) |
|---|---|---|---|---|---|
| Primary | 99,699 | 0.40 | 210 | 1,000 | 8,473.00 |
| Rattoon | 0 | 0.40 | 780 | 1,000 | 0.00 |
| | | | | **Total** | **8,473.00** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Agricultural Emissions**

**CM4. Agricultural Residue Burning**

| Source | Production - Tons ($U_C$) | Residue/Crop Ratio ($R_{RC}$) | Fraction Burned ($F_{RB}$) | Fraction Dry ($F_{DM}$) | Burning Efficiency (BE) | Combustion Efficiency (CE) | Carbon Content (CC) | Ratio $CH_4$-C ($R_{CH4-C}$) | Conversion $CH_4$- to Mol.Wt. ($C_{11}$) | Emissions Tons/year ($E_{MARB}$) |
|---|---|---|---|---|---|---|---|---|---|---|
| Hay (inc Alfalfa) | 60,765.97 | 0 | 0.000 | 0.85 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Dry Edible Beans | 7,673.75 | 2.1 | 0.000 | 0.87 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Corn for Grain | 43,491.36 | 1 | 0.000 | 0.91 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Oats | 21,974.74 | 1.3 | 0.000 | 0.92 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Rice | 371,163.14 | 1.4 | 0.097 | 0.91 | 0.93 | 0.88 | 0.38 | 0.005 | 1.33 | 94.54 |
| Sorghum | 1,966.78 | 1.4 | 0.000 | 0.91 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| All Wheat | 43,991.75 | 1.3 | 0.030 | 0.93 | 0.93 | 0.88 | 0.44 | 0.005 | 1.33 | 3.85 |
| Vegetable Crops & Fruit Trees | 464,274.43 | 0 | 0.030 | 0.87 | 0.93 | 0.88 | 0.45 | 0.005 | 1.33 | 0.00 |
| Safflower & Sunflower | 11,496.73 | 0 | 0.000 | 0.00 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| | | | | | | | | | **Total** | **98.39** |

**CN. Nitrous Oxide**

**CN1. Manure Management**

| Source | Total Nitrogen Excreted ($N_T$) | Manure Anaerobic Lagoons ($\%_{AL}$) | Manure Liquid/Slurry ($\%_S$) | Manure Deep Pit ($\%_{DP}$) | Emission Factor for Liquid System ($EF_{NML}$) | $N_2O$ Emissions from Liquid System Mgt. | Manure Solid Storage/ Managed ($\%_{SS}$) | Manure Deep Pit / DryLot ($\%_{DP}$) | Manure Pasture / Poultry ($\%_P$) | Emission Factor for Solid System ($EF_{NMS}$) | $N_2O$ Emissions from solid system Mgt. | Total $N_2OMT/yr$ ($E_{NMM}$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | | | | | | | | |
| Dairy Cows | 804,440.90 | 467,234 | 166,683 | *N/A* | 0.001 | *996.16* | 74,355 | 1,830 | *N/A* | 0.02 | *2,394.41* | 3.39 |
| ***Other*** | | | | | | | | | | | | |
| Sheep on Feed | 67,868.82 | *N/A* | *N/A* | *N/A* | *N/A* | *N/A* | 66,678 | *N/A* | *N/A* | 0.02 | *2,095.60* | 2.10 |
| | | | | | | | | | | | **Total** | **5.49** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Agricultural Emissions**

## CN2. Emissions from Animals and Runoff

Indirect emissions from animals

| Source | Total Nitrogen Excreted ($N_T$) | % of Indirect Volitazition ($\%_{VI}$) | Rate of conversion from $NH_3$ to $NO_X$ ($EF_{NH3-NOX}$) | Conversion factor for kg to MT ($C_3$) | Tons/year ($E_{NIA}$) |
|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | |
| Dairy Cows | 804,440.90 | 0.20 | 0.01 | 1,000 | 2.53 |
| ***Other*** | | | | | |
| Sheep on Feed | 67,868.82 | 0.20 | 0.01 | 1,000 | 0.21 |
| | | | | **Total** | **2.74** |

Direct emissions from animals

| Source | Unmanaged Nitrogen ($N_{UM}$) | Emission Factor for Pastures, Ranges and Paddocks ($EF_{PRP}$) | Conversion factor for kg to MT ($C_3$) | Manure for Pasture, Range and Paddock ($M_{PRP}$) | Managed Nitrogen ($N_M$) | Unmanaged Daily Spread ($N_{DS}$) | % of Indirect Volitazition ($\%_{VI}$) | Emission Factor for ground Applications ($EF_{NV}$) | Manure applied to Soils ($M_{AS}$) | MT/year ($E_{NDA}$) |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | | | | | | |
| Dairy Cows | 7,442.98 | 0.02 | 1,000 | 0.149 | 710,103 | 86,895.10 | 0.20 | 0.0125 | 7.970 | 12.992 |
| ***Other*** | | | | | | | | | | |
| Sheep on Feed | 66,678.14 | 0.02 | 1,000 | 1.334 | 1,191 | *N/A* | 0.20 | 0.0125 | 0.012 | 4.210 |
| | | | | | | | | | **Total** | **17.202** |

Emissions from Leaching

| Source | Unvolatized Synthetic Nitrogen ($N_{UVS}$) | Unvolatized Non-Manure Organic Nitrogen ($N_{UVO}$) | Conversion factor for kg to MT ($C_3$) | Leaching % of Soil ($\%_{Leach}$) | Leaching Factor - kg N2O-N / kg N ($F_{Leach}$) | Molecular Weight Ratio $N_2O:N_2$ ($C_{10}$) | Total Leaching from non-manure Fertilizer ($L_{fert}$) | Total Nitrogen Excreted ($N_T$) | % of Volitazation from Manure ($\%_{VM}$) | Total Leaching from Manure ($L_{man}$) | Total Emissions from Leaching MT/yr ($E_{NL}$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total emissions of $N_2O$ from Leaching | 18,723,437 | 7853.35 | 1,000 | 0.3000 | 0.025 | 1.57 | 220.76 | 872,310 | 0.00 | 10.28 | **231.04** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Agricultural Emissions**

**CN3: Nitrous Oxide from Crop Growth:**

| Source | Crop Production MTs | Conversion factor for kg to tons ($C_3$) | Residue/Crop Ratio ($R_{RC}$) | Fraction Dry ($F_{DM}$) | Nitrogen Content of Abovegroound biomass | Nitrogen Fixed by Crops (FN) | Fraction of Residue Applied ($F_{RA}$) | Nitrogen Content of Residue ($N_{CR}$) | Nitrogen Returned to Soil ($N_{RS}$) |
|---|---|---|---|---|---|---|---|---|---|
| Hay (inc Alfalfa) | 60,765.97 | 1,000 | 0.0 | 0.8500 | 0.03 | 1,549,532 | 0.00 | *N/A* | *0* |
| Dry Edible Beans | 7,673.75 | 1,000 | 2.1 | 0.8700 | 0.03 | 620,883 | 1.60 | 0.02 | 376,856 |
| Corn for Grain | 43,491.36 | 1,000 | 1.0 | 0.9100 | *N/A* | *0* | 0.90 | 0.01 | 206,593 |
| Oats | 21,974.74 | 1,000 | 1.3 | 0.9200 | *N/A* | *0* | 0.90 | 0.01 | 165,575 |
| Rice | 371,163.14 | 1,000 | 1.4 | 0.9100 | *N/A* | *0* | 1.00 | 0.01 | 3,404,605 |
| Sorghum | 1,966.78 | 1,000 | 1.4 | 0.9100 | *N/A* | *0* | 0.90 | 0.01 | 24,355 |
| All Wheat | 43,991.75 | 1,000 | 1.3 | 0.9300 | *N/A* | *0* | 0.90 | 0.01 | 296,778 |
| Vegetable Crops & Fruit Trees | 464,274.43 | 1,000 | 0.0 | 0.0000 | 0.03 | 0 | 0.00 | 0.00 | 0 |
| Safflower & Sunflower | 11,496.73 | 1,000 | 0.0 | 0.8700 | 0.03 | 300,065 | 0.90 | 0.02 | 0 |
| Total | | | | | | 2,470,480 | | | 4,474,762 |

| Source | Crop Production (Hectares) | Nitrogen Fixed by Crops ($FN_T$) | Nitrogen Returned to Soil ($N_{RST}$) | Conversion factor for kg to tons ($C_3$) | Emission factor for soils (kg N2O-N/kgN) ($EF_{DIR}$) | Molecular Weight Ratio $N_2O:N_2$ ($C_{10}$) | Emission factor kg $N_2O$-N / ha_yr | Emissions in MT ($N_{CG}$) |
|---|---|---|---|---|---|---|---|---|
| N2O emissions from Legumes | - | 2,470,480.38 | - | 1,000 | 0.0100 | 1.57 | - | 38.82 |
| N2O emissions from Residues | - | - | 4,474,762 | 1,000 | 0.0100 | 1.57 | - | 70.32 |
| $N_2O$ from Histols (Temperate Zone) | 88,337.52 | - | - | 1,000 | - | 1.57 | 8 | 1,110.53 |
| $N_2O$ from Histols (Sub tropic Zone) | 0.00 | - | - | 1,000 | - | 1.57 | 12 | 0.00 |
| | | | | | | | **Total** | **1,219.67** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Agricultural Emissions**

## CN4. Emissions from Fertilizers

| Source | Total Fertilizer Use (kg N) | Year Total Fertilizer Use (kg N) | Fertilizers (Calendar Year) | Unvolatized N (kg) (NUV) | Volatized N (kg) (NV) | Emissions (metric tons) | $N_2O$ Emissions (metric | Total Emissions from |
|---|---|---|---|---|---|---|---|---|
| **Synthetic** | 20,803,819 | 20,803,819 | 20,803,819 | 18,723,437 | 2,080,382 | 294.35 | 32.72 | **327.07** |
| **Organic** | 240,651 | 240,651 | 240,651 | 7,853 | 1,963.34 | | | |
| Dried Manure | 1,220 | 1,220 | 1,220 | | | | | |
| Activated Sewage Sludge | 208,212 | 208,212 | 208,212 | | | | | |
| Other | 31,219 | 31,219 | 31,219 | | | | | |
| *Dried Manure %* | 1% | 1% | 1% | | | | | |
| *Non-Manure Organics* | 239,432 | 239,432 | 239,432 | | | | | |

## CN5. Emissions on $N_2O$ from agricultural residue burning

| Source | Production - MTTons ($U_C$) | Residue/Crop Ratio ($R_{RC}$) | Fraction Burned ($F_{RB}$) | Fraction Dry ($F_{DM}$) | Burning Efficiency (BE) | Combustion Efficiency (CE) | Nitrogen Content (NC) | Ratio N2O-N ($R_{N2O-N}$) | Conversion to Mol.Wt. ($C_{10}$) | Emissions MT/year ($E_{NARB}$) |
|---|---|---|---|---|---|---|---|---|---|---|
| Hay (inc Alfalfa) | 60,765.97 | 0.0000 | 0.000 | 0.85 | 0.000 | 0.00 | *N/A* | 0.007 | 1.57 | *0.00* |
| Dry Edible Beans | 7,673.75 | 2.1000 | 0.000 | 0.87 | 0.000 | 0.00 | 0.017 | 0.007 | 1.57 | 0.00 |
| Corn for Grain | 43,491.36 | 1.0000 | 0.000 | 0.91 | 0.000 | 0.00 | 0.006 | 0.007 | 1.57 | 0.00 |
| Oats | 21,974.74 | 1.3000 | 0.000 | 0.92 | 0.000 | 0.00 | 0.007 | 0.007 | 1.57 | 0.00 |
| Rice | 371,163.14 | 1.4000 | 0.097 | 0.91 | 0.930 | 0.88 | 0.007 | 0.007 | 1.57 | 2.96 |
| Sorghum | 1,966.78 | 1.4000 | 0.000 | 0.91 | 0.000 | 0.00 | 0.011 | 0.007 | 1.57 | 0.00 |
| All Wheat | 43,991.75 | 1.3000 | 0.030 | 0.93 | 0.930 | 0.88 | 0.006 | 0.007 | 1.57 | 0.09 |
| Vegetable Crops & Fruit Trees | 464,274.43 | 0.0000 | 0.000 | 0.00 | 0.000 | 0.00 | 0.000 | 0.007 | 1.57 | 0.00 |
| Safflower & Sunflower | 11,496.73 | 0.0000 | 0.030 | 0.87 | 0.930 | 0.88 | 0.023 | 0.007 | 1.57 | 0.00 |
| | | | | | | | | | **Total** | **3.05** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Business As Usual (BAU) Inventory**
**Agricultural Emissions**

**D. Summary Table**

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Methane | Enteric Fermentation | 1,154.68 | 24,248.37 |
| | Manure Management | 1,337.11 | 28,079.41 |
| | Rice Cultivation | 8,473.00 | 177,933.06 |
| | Agricultural Residue Burning | 98.39 | 2,066.13 |
| **Total Methane** | | 11,063.19 | **232,326.97** |
| Nitrous Oxide | Manure Management | 5.49 | 1,700.71 |
| | Animals and Runoff | 250.99 | 77,805.65 |
| | Crop Growth | 1,219.67 | 378,097.17 |
| | Fertilizer Use | 327.07 | 101,392.14 |
| | Agricultural Residue Burning | 3.05 | 944.72 |
| **Total Nitrous Oxide** | | 1,806.26 | **559,940.39** |
| **Total emissions from Agriculture** | | | **792,267.36** |

# Appendix F: 2030 BAU URBEMIS Output and GHG Calculations

**6/24/2010 1:36:53 PM**

Urbemis 2007 Version 9.2.4

Detail Report for Summer Area Source Unmitigated Emissions (Pounds/Day)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\2030 GP Buildout\2030 GP Build out 6-23-2010-2.urb924

Project Name: Sutter County 2030 General Plan Build out

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

| Source | CO2 |
|---|---|
| Natural Gas | |
| Hearth - No Summer Emissions | |
| Landscape | 481.62 |
| Consumer Products | |
| Architectural Coatings | |
| TOTALS (lbs/day, unmitigated) | 481.62 |

Area Source Changes to Defaults

Percentage of residences with natural gas fireplaces changed from 55% to 0%

**6/24/2010 1:37:32 PM**

Urbemis 2007 Version 9.2.4

Detail Report for Winter Area Source Unmitigated Emissions (Pounds/Day)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\2030 GP Buildout\2030 GP Build out 6-23-2010-2.urb924

Project Name: Sutter County 2030 General Plan Build out

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Winter Pounds Per Day, Unmitigated)

| Source | CO2 |
|---|---|
| Natural Gas | |
| Hearth | 645,028.98 |
| Landscaping - No Winter Emissions | |
| Consumer Products | |
| Architectural Coatings | |
| TOTALS (lbs/day, unmitigated) | 645,028.98 |

Area Source Changes to Defaults

Percentage of residences with natural gas fireplaces changed from 55% to 0%

**6/24/2010 1:38:09 PM**

Urbemis 2007 Version 9.2.4

Detail Report for Annual Area Source Unmitigated Emissions (Tons/Year)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\2030 GP Buildout\2030 GP Build out 6-23-2010-2.urb924

Project Name: Sutter County 2030 General Plan Build out

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

| Source | CO2 |
|---|---|
| Natural Gas | |
| Hearth | 26,446.19 |
| Landscape | 43.35 |
| Consumer Products | |
| Architectural Coatings | |
| TOTALS (tons/year, unmitigated) | 26,489.54 |

Area Source Changes to Defaults

Percentage of residences with natural gas fireplaces changed from 55% to 0%

**6/24/2010 1:37:19 PM**

Urbemis 2007 Version 9.2.4

Detail Report for Summer Operational Unmitigated Emissions (Pounds/Day)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\2030 GP Buildout\2030 GP Build out 6-23-2010-2.urb924

Project Name: Sutter County 2030 General Plan Build out

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

| Source | CO2 |
|---|---|
| Single family housing | 579,625.04 |
| Apartments low rise | 784,135.11 |
| Apartments mid rise | 497,605.18 |
| Apartments high rise | 223,576.08 |
| City park | 11,284.10 |
| General office building | 1,227,102.21 |
| Office park | 332,390.48 |
| General light industry | 515,842.50 |
| TOTALS (lbs/day, unmitigated) | 4,171,560.70 |

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2030 Temperature (F): 85 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

**6/24/2010 1:37:19 PM**

Summary of Land Uses

| Land Use Type | Acreage | Trip Rate | Unit Type | No. Units | Total Trips | Total VMT |
|---|---|---|---|---|---|---|
| Single family housing | 2,148.33 | 9.24 | dwelling units | 6,445.00 | 59,551.80 | 550,907.73 |
| Apartments low rise | 544.94 | 9.24 | dwelling units | 8,719.00 | 80,563.56 | 745,285.42 |
| Apartments mid rise | 145.61 | 9.24 | dwelling units | 5,533.00 | 51,124.92 | 472,951.51 |
| Apartments high rise | 40.10 | 9.24 | dwelling units | 2,486.00 | 22,970.64 | 212,499.09 |
| City park | | 1.59 | acres | 740.00 | 1,176.60 | 10,839.43 |
| General office building | | 22.11 | 1000 sq ft | 5,707.85 | 126,200.57 | 1,172,087.78 |
| Office park | | 22.11 | 1000 sq ft | 1,537.00 | 33,983.07 | 316,722.22 |
| General light industry | | 3.49 | 1000 sq ft | 15,097.75 | 52,691.15 | 491,344.95 |
| | | | | | 428,262.31 | 3,972,638.13 |

Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Light Auto | 39.9 | 0.0 | 100.0 | 0.0 |
| Light Truck < 3750 lbs | 19.1 | 0.0 | 99.0 | 1.0 |
| Light Truck 3751-5750 lbs | 19.7 | 0.0 | 100.0 | 0.0 |
| Med Truck 5751-8500 lbs | 9.3 | 0.0 | 100.0 | 0.0 |
| Lite-Heavy Truck 8501-10,000 lbs | 2.5 | 0.0 | 80.0 | 20.0 |
| Lite-Heavy Truck 10,001-14,000 lbs | 0.9 | 0.0 | 55.6 | 44.4 |
| Med-Heavy Truck 14,001-33,000 lbs | 1.6 | 0.0 | 18.8 | 81.2 |
| Heavy-Heavy Truck 33,001-60,000 lbs | 1.6 | 0.0 | 0.0 | 100.0 |
| Other Bus | 0.1 | 0.0 | 0.0 | 100.0 |

**6/24/2010 1:37:19 PM**

Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Urban Bus | 0.0 | 0.0 | 0.0 | 0.0 |
| Motorcycle | 4.0 | 32.5 | 67.5 | 0.0 |
| School Bus | 0.1 | 0.0 | 0.0 | 100.0 |
| Motor Home | 1.2 | 0.0 | 91.7 | 8.3 |

Travel Conditions

| | Residential | | | Commercial | | |
|---|---|---|---|---|---|---|
| | Home-Work | Home-Shop | Home-Other | Commute | Non-Work | Customer |
| Urban Trip Length (miles) | 10.8 | 7.3 | 7.5 | 9.5 | 7.4 | 7.4 |
| Rural Trip Length (miles) | 9.3 | 9.3 | 9.2 | 9.3 | 9.5 | 9.2 |
| Trip speeds (mph) | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 |
| % of Trips - Residential | 32.9 | 18.0 | 49.1 | | | |
| % of Trips - Commercial (by land use) | | | | | | |
| City park | | | | 5.0 | 2.5 | 92.5 |
| General office building | | | | 35.0 | 17.5 | 47.5 |
| Office park | | | | 48.0 | 24.0 | 28.0 |
| General light industry | | | | 50.0 | 25.0 | 25.0 |

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Home-based work rural trip length changed from 16.8 miles to 9.3 miles

Home-based shop rural trip length changed from 7.1 miles to 9.3 miles

**6/24/2010 1:37:19 PM**

Operational Changes to Defaults

Home-based other rural trip length changed from 7.9 miles to 9.2 miles

Commercial-based commute rural trip length changed from 14.7 miles to 9.3 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 9.5 miles

Commercial-based customer rural trip length changed from 6.6 miles to 9.2 miles

**6/24/2010 1:37:49 PM**

Urbemis 2007 Version 9.2.4

Detail Report for Winter Operational Unmitigated Emissions (Pounds/Day)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\2030 GP Buildout\2030 GP Build out 6-23-2010-2.urb924

Project Name: Sutter County 2030 General Plan Build out

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Winter Pounds Per Day, Unmitigated)

| Source | CO2 |
|---|---|
| Single family housing | 505,511.73 |
| Apartments low rise | 683,872.27 |
| Apartments mid rise | 433,979.27 |
| Apartments high rise | 194,988.70 |
| City park | 9,825.88 |
| General office building | 1,069,421.88 |
| Office park | 289,782.01 |
| General light industry | 449,742.13 |
| TOTALS (lbs/day, unmitigated) | 3,637,123.87 |

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2030 Temperature (F): 40 Season: Winter

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

**6/24/2010 1:37:49 PM**

Summary of Land Uses

| Land Use Type | Acreage | Trip Rate | Unit Type | No. Units | Total Trips | Total VMT |
|---|---|---|---|---|---|---|
| Single family housing | 2,148.33 | 9.24 | dwelling units | 6,445.00 | 59,551.80 | 550,907.73 |
| Apartments low rise | 544.94 | 9.24 | dwelling units | 8,719.00 | 80,563.56 | 745,285.42 |
| Apartments mid rise | 145.61 | 9.24 | dwelling units | 5,533.00 | 51,124.92 | 472,951.51 |
| Apartments high rise | 40.10 | 9.24 | dwelling units | 2,486.00 | 22,970.64 | 212,499.09 |
| City park | | 1.59 | acres | 740.00 | 1,176.60 | 10,839.43 |
| General office building | | 22.11 | 1000 sq ft | 5,707.85 | 126,200.57 | 1,172,087.78 |
| Office park | | 22.11 | 1000 sq ft | 1,537.00 | 33,983.07 | 316,722.22 |
| General light industry | | 3.49 | 1000 sq ft | 15,097.75 | 52,691.15 | 491,344.95 |
| | | | | | 428,262.31 | 3,972,638.13 |

Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Light Auto | 39.9 | 0.0 | 100.0 | 0.0 |
| Light Truck < 3750 lbs | 19.1 | 0.0 | 99.0 | 1.0 |
| Light Truck 3751-5750 lbs | 19.7 | 0.0 | 100.0 | 0.0 |
| Med Truck 5751-8500 lbs | 9.3 | 0.0 | 100.0 | 0.0 |
| Lite-Heavy Truck 8501-10,000 lbs | 2.5 | 0.0 | 80.0 | 20.0 |
| Lite-Heavy Truck 10,001-14,000 lbs | 0.9 | 0.0 | 55.6 | 44.4 |
| Med-Heavy Truck 14,001-33,000 lbs | 1.6 | 0.0 | 18.8 | 81.2 |
| Heavy-Heavy Truck 33,001-60,000 lbs | 1.6 | 0.0 | 0.0 | 100.0 |
| Other Bus | 0.1 | 0.0 | 0.0 | 100.0 |

**6/24/2010 1:37:49 PM**

Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Urban Bus | 0.0 | 0.0 | 0.0 | 0.0 |
| Motorcycle | 4.0 | 32.5 | 67.5 | 0.0 |
| School Bus | 0.1 | 0.0 | 0.0 | 100.0 |
| Motor Home | 1.2 | 0.0 | 91.7 | 8.3 |

Travel Conditions

| | Residential | | | Commercial | | |
|---|---|---|---|---|---|---|
| | Home-Work | Home-Shop | Home-Other | Commute | Non-Work | Customer |
| Urban Trip Length (miles) | 10.8 | 7.3 | 7.5 | 9.5 | 7.4 | 7.4 |
| Rural Trip Length (miles) | 9.3 | 9.3 | 9.2 | 9.3 | 9.5 | 9.2 |
| Trip speeds (mph) | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 |
| % of Trips - Residential | 32.9 | 18.0 | 49.1 | | | |
| % of Trips - Commercial (by land use) | | | | | | |
| City park | | | | 5.0 | 2.5 | 92.5 |
| General office building | | | | 35.0 | 17.5 | 47.5 |
| Office park | | | | 48.0 | 24.0 | 28.0 |
| General light industry | | | | 50.0 | 25.0 | 25.0 |

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Home-based work rural trip length changed from 16.8 miles to 9.3 miles

Home-based shop rural trip length changed from 7.1 miles to 9.3 miles

Operational Changes to Defaults

Home-based other rural trip length changed from 7.9 miles to 9.2 miles

Commercial-based commute rural trip length changed from 14.7 miles to 9.3 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 9.5 miles

Commercial-based customer rural trip length changed from 6.6 miles to 9.2 miles

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Urbemis 2007 Version 9.2.4

Detail Report for Annual Operational Unmitigated Emissions (Tons/Year)

File Name: R:\General Air Quality Info\Projects\0D5136300 - Sutter County CAP\Modeling\GHG\2030 GP Buildout\2030 GP Build out 6-23-2010-2.urb924

Project Name: Sutter County 2030 General Plan Build out

Project Location: Feather River AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

| Source | CO2 |
|---|---|
| Single family housing | 101,273.01 |
| Apartments low rise | 137,005.33 |
| Apartments mid rise | 86,942.37 |
| Apartments high rise | 39,063.57 |
| City park | 1,970.64 |
| General office building | 214,353.93 |
| Office park | 58,069.25 |
| General light industry | 90,120.15 |
| TOTALS (tons/year, unmitigated) | 728,798.25 |

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2030 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

**6/24/2010 1:38:21 PM**

Summary of Land Uses

| Land Use Type | Acreage | Trip Rate | Unit Type | No. Units | Total Trips | Total VMT |
|---|---|---|---|---|---|---|
| Single family housing | 2,148.33 | 9.24 | dwelling units | 6,445.00 | 59,551.80 | 550,907.73 |
| Apartments low rise | 544.94 | 9.24 | dwelling units | 8,719.00 | 80,563.56 | 745,285.42 |
| Apartments mid rise | 145.61 | 9.24 | dwelling units | 5,533.00 | 51,124.92 | 472,951.51 |
| Apartments high rise | 40.10 | 9.24 | dwelling units | 2,486.00 | 22,970.64 | 212,499.09 |
| City park | | 1.59 | acres | 740.00 | 1,176.60 | 10,839.43 |
| General office building | | 22.11 | 1000 sq ft | 5,707.85 | 126,200.57 | 1,172,087.78 |
| Office park | | 22.11 | 1000 sq ft | 1,537.00 | 33,983.07 | 316,722.22 |
| General light industry | | 3.49 | 1000 sq ft | 15,097.75 | 52,691.15 | 491,344.95 |
| | | | | | 428,262.31 | 3,972,638.13 |

Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Light Auto | 39.9 | 0.0 | 100.0 | 0.0 |
| Light Truck < 3750 lbs | 19.1 | 0.0 | 99.0 | 1.0 |
| Light Truck 3751-5750 lbs | 19.7 | 0.0 | 100.0 | 0.0 |
| Med Truck 5751-8500 lbs | 9.3 | 0.0 | 100.0 | 0.0 |
| Lite-Heavy Truck 8501-10,000 lbs | 2.5 | 0.0 | 80.0 | 20.0 |
| Lite-Heavy Truck 10,001-14,000 lbs | 0.9 | 0.0 | 55.6 | 44.4 |
| Med-Heavy Truck 14,001-33,000 lbs | 1.6 | 0.0 | 18.8 | 81.2 |
| Heavy-Heavy Truck 33,001-60,000 lbs | 1.6 | 0.0 | 0.0 | 100.0 |
| Other Bus | 0.1 | 0.0 | 0.0 | 100.0 |

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Vehicle Fleet Mix

| Vehicle Type | Percent Type | Non-Catalyst | Catalyst | Diesel |
|---|---|---|---|---|
| Urban Bus | 0.0 | 0.0 | 0.0 | 0.0 |
| Motorcycle | 4.0 | 32.5 | 67.5 | 0.0 |
| School Bus | 0.1 | 0.0 | 0.0 | 100.0 |
| Motor Home | 1.2 | 0.0 | 91.7 | 8.3 |

Travel Conditions

| | Residential | | | Commercial | | |
|---|---|---|---|---|---|---|
| | Home-Work | Home-Shop | Home-Other | Commute | Non-Work | Customer |
| Urban Trip Length (miles) | 10.8 | 7.3 | 7.5 | 9.5 | 7.4 | 7.4 |
| Rural Trip Length (miles) | 9.3 | 9.3 | 9.2 | 9.3 | 9.5 | 9.2 |
| Trip speeds (mph) | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 |
| % of Trips - Residential | 32.9 | 18.0 | 49.1 | | | |
| % of Trips - Commercial (by land use) | | | | | | |
| City park | | | | 5.0 | 2.5 | 92.5 |
| General office building | | | | 35.0 | 17.5 | 47.5 |
| Office park | | | | 48.0 | 24.0 | 28.0 |
| General light industry | | | | 50.0 | 25.0 | 25.0 |

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Home-based work rural trip length changed from 16.8 miles to 9.3 miles

Home-based shop rural trip length changed from 7.1 miles to 9.3 miles

Operational Changes to Defaults

Home-based other rural trip length changed from 7.9 miles to 9.2 miles

Commercial-based commute rural trip length changed from 14.7 miles to 9.3 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 9.5 miles

Commercial-based customer rural trip length changed from 6.6 miles to 9.2 miles

**Sutter County**
**Emissions by Source**
**2030**
**Business As Usual (BAU) Inventory**
**By Source**

| Transportation | | |
|---|---|---|
| | **Source:** | **Metric tons of $CO_2e$** |
| 1 | On-Road Vehicles | 693,377 |
| 2 | Airport Operations | 155 |
| | **Total** | **693,532** |

| Energy | | |
|---|---|---|
| | **Sources:** | **Metric tons of $CO_2e$** |
| 1 | Electric | 129,434 |
| 2 | Natural Gas | 215,552 |
| | **Total** | **344,986** |

| Solid Waste | | |
|---|---|---|
| | **Source** | **Metric tons of $CO_2e$** |
| 1 | Solid Waste Disposal | 21,899 |
| 2 | Green Waste Recycling | Data Not Available |
| 3 | Materials Recycling | Data Not Available |
| | **Total** | **21,899** |

| Landscape Design | | |
|---|---|---|
| | **Sources:** | **Metric tons of $CO_2e$** |
| 1 | Landscape Maintenance Emissions | 40 |
| 2 | Carbon sink from $CO_2$ sequestration | Data Not Available |
| | **Total** | **40** |

| Agriculture | | |
|---|---|---|
| | **Sources:** | **Metric tons of $CO_2e$** |
| 1 | Enteric Fermentation | 24,248 |
| 2 | Manure Management | 29,780 |
| 3 | Rice Cultivation | 171,663 |
| 4 | Agricultural Residue Burning | 3,011 |
| 5 | Crop Growth | 372,557 |
| 6 | Animals and Runoff | 76,704 |
| 7 | Fertilizer Use | 99,760 |
| | **Total** | **777,724** |

| Net Total Emissions | | |
|---|---|---|
| | **Category** | **Metric tons of $CO_2e$** |
| | Energy | 344,986 |
| | Solid Waste | 21,899 |
| | Landscape Design | 40 |
| | Agriculture | 777,724 |
| | Transportation | 693,532 |
| | **Total** | **1,838,181** |

**Sutter County**
**Emissions by Land Use**
**2030**
**Business As Usual (BAU) Inventory**
**By Land Use Category**

| Source Type | | $CO_2e$ MT/yr | | | |
|---|---|---|---|---|---|
| | | $CO_2$ | $CH_4$ | $N_2O$ | combined $CO_2e$ |
| Residential | AG/RAN/ER | 238,228.19 | 7,487.35 | 7,828.17 | 253,544 |
| | Low Density Residential | 159,085.76 | 4,999.89 | 5,227.49 | 169,313 |
| | Medium Density Residential | 100,942.78 | 3,172.84 | 3,296.88 | 107,413 |
| | High Density Residential | 45,356.19 | 1,425.64 | 1,481.37 | 48,263 |
| | **Total Residential** | **543,612.92** | **17,085.72** | **17,833.91** | **578,533** |
| Commercial | Park | 99.21 | 2.24 | 2.37 | 104 |
| | Commercial | 117,571.44 | 2,698.28 | 2,849.17 | 123,119 |
| | Mixed Use | 31,661.78 | 726.65 | 767.29 | 33,156 |
| | **Total Commercial** | **149,332.44** | **3,427.18** | **3,618.83** | **156,378** |
| Industrial | Industrial | 310,994.93 | 7,014.56 | 7,536.58 | 325,546 |
| | **Total Industrial** | **310,994.93** | **7,014.56** | **7,536.58** | **325,546** |
| Agriculture | | 0.00 | 226,057.31 | 551,666.67 | 777,724 |
| | **Total** | **1,003,940.29** | **253,584.77** | **580,655.99** | **1,838,181** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030 Inventory**

| Land Use Type (units) | Total Trips | Total VMT | Total Trips | Total VMT | 2020 Unit Totals | Unit Type |
|---|---|---|---|---|---|---|
| **AG/RAN/ER** | 59,551.80 | 550907.73 | 59551.8 | 550907.73 | 6445 | du |
| **Low Density Residential** | 80563.56 | 745285.42 | 80563.56 | 745285.42 | 8719 | du |
| **Medium Density Residential** | 51124.92 | 472951.51 | 51124.92 | 472951.51 | 5533 | du |
| **High Density Residential** | 22970.64 | 212499.09 | 22970.64 | 212499.09 | 2486 | du |
| **Park** | 1176.6 | 10839.43 | 1176.6 | 10839.43 | 32,234,400.00 | Sq/ft |
| **Commercial** | 126200.57 | 1172087.78 | 126200.57 | 1172087.78 | 5,707,850.00 | Sq/ft |
| **Mixed Use** | 33983.07 | 316722.22 | 33983.07 | 316722.22 | 1,537,000.00 | Sq/ft |
| **Industrial** | 52691.15 | 491344.95 | 52691.15 | 491344.95 | 15,097,750.00 | Sq/ft |
| **Total** | **428262.31** | **3972638.13** | **428262.31** | **3972638.13** | | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030 Inventory**

| Land Use Type (units) | Natural gas usage rate (MMBTU/yr) | Electricity (kWh/yr) | Potable Water Usage (gallons/year) | Solid Waste (lbs/year) | % Total Square Foot - SFR/MFR/Non-Res | % Total Square Foot - Res/Non-Res | % Total Square Foot |
|---|---|---|---|---|---|---|---|
| **AG/RAN/ER** | 605,697 | 77,747,538 | 27,910,584 | 122,851,128 | 100.00% | 43.82% | 27.29% |
| **Low Density Residential** | 404,480 | 51,919,218 | 18,638,477 | 82,037,308 | 52.09% | 29.26% | 18.22% |
| **Medium Density Residential** | 256,670 | 32,946,278 | 11,827,382 | 52,059,454 | 33.06% | 18.57% | 11.56% |
| **High Density Residential** | 115,329 | 14,803,648 | 5,314,361 | 23,391,640 | 14.85% | 8.34% | 5.20% |
| **Park** | 476 | 80,025 | 796 | 36,015 | 0.02% | 0.02% | 0.01% |
| **Commercial** | 553,077 | 92,905,886 | 924,277 | 43,379,877 | 25.54% | 25.54% | 9.64% |
| **Mixed Use** | 148,939 | 25,018,859 | 248,901 | 11,682,314 | 6.88% | 6.88% | 2.60% |
| **Industrial** | 1,462,954 | 245,747,181 | 2,444,822 | 114,747,788 | 67.56% | 67.56% | 25.49% |
| **Total** | **3,547,621** | **541,168,632** | **67,309,600** | **450,185,525** | | | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030 Inventory**

**City Parks**

| Year | # of City Parks | Estimated SQ / "building" | Estimated Buildings per |
|---|---|---|---|
| 2030 | 10 | 500 | 1 |
| 2008 | 10 | 500 | 1 |

**Airport**

| Year | # of planes | Gallons fuel per day | Annual days of operation | Annual Fuel Usage (g/yr) |
|---|---|---|---|---|
| 2030 | 77 | 50.00 | 365 | 18,250 |
| 2008 | 77 | 50 | 365 | 18,250 |

| Operational(*2a,b) / Area Scenario(*3a,b) | Vehicle | | | Natural Gas | | | Total Vehicle + Natural Gas |
|---|---|---|---|---|---|---|---|
| | Summer | Winter | tons/Year | Summer | Winter | Year | |
| 2030 | 4,171,560.70 | 3,637,123.87 | 728,798.25 | 0.00 | 0.00 | 0.00 | 728,798.25 |
| 2008 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| Area Scenario(*3b,c) | Landscaping | | | Hearth | | |
|---|---|---|---|---|---|---|
| | Summer | Winter | Year | Summer | Winter | Year |
| 2030 | 481.62 | 0.00 | 43.35 | 0.00 | 645,028.98 | 26,446.19 |
| 2008 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| Vehicle Type | Fleet % | | Non-Catalyst | | Catalyst | | Diesel | |
|---|---|---|---|---|---|---|---|---|
| Light Auto | 39.60 | 0.3960 | 0.00 | 0.0000 | 100.00 | 1.0000 | 0.00 | 0.0000 |
| Light Truck <3,750 lbs | 19.30 | 0.1930 | 0.00 | 0.0000 | 95.90 | 0.9590 | 4.10 | 0.0410 |
| Light Truck 3,751-5,750 lbs | 19.70 | 0.1970 | 0.00 | 0.0000 | 100.00 | 1.0000 | 0.00 | 0.0000 |
| Med Truck 5,751-8,500 lbs | 9.30 | 0.0930 | 0.00 | 0.0000 | 100.00 | 1.0000 | 0.00 | 0.0000 |
| Lite-Heavy Truck 8,501-10,000 lbs | 2.50 | 0.0250 | 0.00 | 0.0000 | 72.00 | 0.7200 | 28.00 | 0.2800 |
| Lite-Heavy Truck 10,001-14,000 lbs | 0.90 | 0.0090 | 0.00 | 0.0000 | 55.60 | 0.5560 | 44.40 | 0.4440 |
| Med-Heavy Truck 14,001 - 33,000 lbs | 1.60 | 0.0160 | 0.00 | 0.0000 | 18.80 | 0.1880 | 81.20 | 0.8120 |
| Heavy-Heavy Truck 33,001-60,000 lbs | 1.70 | 0.0170 | 0.00 | 0.0000 | 0.00 | 0.0000 | 100.00 | 1.0000 |
| Other bus | 0.10 | 0.0010 | 0.00 | 0.0000 | 0.00 | 0.0000 | 100.00 | 1.0000 |
| Urban bus | 0.00 | 0.0000 | 0.00 | 0.0000 | 0.00 | 0.0000 | 100.00 | 1.0000 |
| Motorcycle | 4.00 | 0.0400 | 40.00 | 0.4000 | 60.00 | 0.6000 | 0.00 | 0.0000 |
| School Bus | 0.10 | 0.0010 | 0.00 | 0.0000 | 0.00 | 0.0000 | 100.00 | 1.0000 |
| Motor Home | 1.20 | 0.0120 | 0.00 | 0.0000 | 83.30 | 0.8330 | 16.70 | 0.1670 |

| **Disposal Facility** | Jurisdiction? | No | | Type of Facility: | Landfill w/ Combination | | year began: | 2009 |
|---|---|---|---|---|---|---|---|---|
| **Landfill** | **Annual (tons)** | **Total** | **Facility** | **attributed to** | **of operation** | **delivered** | **way)** | **Distance (miles)** |
| Recology Landfill | 225,092.76 | 29.14% | 9 | 2.62 | 313.00 | 100 | 4.81 | 9.62 |
| | | 0.00% | | 0.00 | | 0 | | |
| | | 0.00% | | 0.00 | | 0 | | |
| | | 0.00% | | 0.00 | | 0 | | |
| | | 0.00% | | 0.00 | | 0 | | |
| | | | | 2.62 | 313.00 | **Total** | | **9.62** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030 Inventory**

**Electrical Usage**

**177,416,681** Total 2030 Residential Electrical Usage
**363,751,951** Total 2030 Non-Residential Electrical Usage

| | Total 2030 | GP Area Growth | 2008 | kWh/yr |
|---|---|---|---|---|
| | | | 37,634 | County facilities located in Yuba City |
| | | | 214 | County facilities located in Live Oak City |
| | | | 25,475 | County facilities located in Unincorporated Sutter |
| | | | 83,676,413 | Residential in Unincorporated Sutter County |
| | **177,416,681** | **93,676,945** | **83,739,736** | **Total Residnential** |
| | | | 6,062,361 | County facilities located in Yuba City |
| | | | 88,361 | County facilities located in Live Oak City |
| | | | 793,010 | County facilities located in Unincorporated Sutter |
| | | | 38,211,643 | Commercial in Unincorporated Sutter County |
| | | | 89,160,499 | Industrial in Unincorporated Sutter County |
| | **363,751,951** | **229,436,077** | **134,315,874** | **Total Commercial** |

**Water Usage**

| | Total 2030 | GP Area Growth | 2008 | |
|---|---|---|---|---|
| **63,690,805** | 63,690,805 | 21,649,514 | 42,041,290 | Residential (gallons per year) |
| **3,618,796** | 3,618,796 | 1,230,086 | 2,388,710 | Commercial/Institutional/Industrial (gallons/year) |
| | | **22,879,600** | **44,430,000** | Total |

**Solid Waste for Unincorporated Sutter County**

| | Total 2030 | GP Area Growth | 2008 | |
|---|---|---|---|---|
| **450,185,525** | **450,185,525** | **410,348,330** | **39,837,195** | **lbs/year** |
| | | | 24,807,418 | Residential in Unincorporated Sutter County |
| | | | 15,029,777 | Non-Residential in Unincorporated Sutter County |

**Natural Gas Data**

**1,382,175** Total Residential Natural gas usage rate (MMBTU/yr)
**2,165,446** Total Non-Residential Natural gas usage rate (MMBTU/yr)

| | Total 2030 | GP Area Growth | 2008 | MMBTU/year |
|---|---|---|---|---|
| | | | 13.50 | County facilities located in Yuba City |
| | | | 0.20 | County facilities located in Live Oak City |
| | | | 0.00 | County facilities located in Unincorporated Sutter |
| | | | 268,658.68 | Residential in Unincorporated Sutter County |
| | **1,382,175** | **1,113,502** | **268,672.37** | **Total Residential** |
| | | | 14,853 | County facilities located in Yuba City |
| | | | 312 | County facilities located in Live Oak City |
| | | | 501 | County facilities located in Unincorporated Sutter |
| | | | 1,504,713 | Commercial in Unincorporated Sutter County |
| | **2,165,446** | **645,067** | **1,520,379** | **Total Commercial** |

**Sutter County**
**Input data for Agriculture**
**2030**

| | Enteric Fermentation Emission Factor ($EF_{MEF}$) | Typical Animal Mass - kg- (TAM) | Volatile Solids -kg VS/1000kg mass/day- | Max $CH_4$ Capacity - $m^3CH_4$/kg VS- ($B_O$) | K-Nitrogen - kg/day/1000kg animal mass- ($K_N$) | Number of Head |
|---|---|---|---|---|---|---|
| | EF used | EF used | EF used | EF used | EF used | |
| ***Dairy Cow*** | | | | | | |
| Dairy Cows | 123.4 | 604.0 | 9.0 | 0.2 | 0.4 | **8,293** |
| **Other** | | | | | | |
| Sheep on Feed | 8.0 | 27.0 | 9.2 | 0.4 | 0.4 | 16,397 |

**Sutter County**
**Input data for Agriculture**
**2030**

| | Residue/Crop Ratio ($R_{RC}$) | Fraction Residue Burned ($F_{RB}$) | Fraction Dry Matter ($F_{DM}$) | Burning Efficiency (BE) | Combustion Efficiency (CE) | Carbon Content (CC) | Fraction of Residue Applied ($F_{RA}$) | Nitrogen Content of Residue (NC) |
|---|---|---|---|---|---|---|---|---|
| | EF used | EF used | EF used | EF used | EF used | EF used | EF used | EF used |
| Hay (inc Alfalfa) | 0.0 | 0.00 | 0.85 | 0.00 | 0.00 | 0.00 | 0.00 | N/A |
| Barley | 1.2 | 0.03 | 0.93 | 0.93 | 0.88 | 0.45 | 0.90 | 0.01 |
| Dry Edible Beans | 2.1 | 0.00 | 0.87 | 0.00 | 0.00 | 0.00 | 1.60 | 0.02 |
| Corn | 1.0 | 0.03 | 0.91 | 0.93 | 0.88 | 0.45 | 0.90 | 0.01 |
| Corn for Grain | 1.0 | 0.00 | 0.91 | 0.00 | 0.00 | 0.00 | 0.90 | 0.01 |
| Oats | 1.3 | 0.00 | 0.92 | 0.00 | 0.00 | 0.00 | 0.90 | 0.01 |
| Rice | 1.4 | 0.10 | 0.91 | 0.93 | 0.88 | 0.38 | 1.00 | 0.01 |
| Sorghum | 1.4 | 0.00 | 0.91 | 0.00 | 0.00 | 0.00 | 0.90 | 0.01 |
| All Wheat | 1.3 | 0.03 | 0.93 | 0.93 | 0.88 | 0.44 | 0.90 | 0.01 |
| Potatoes (inc Sweet) | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cotton | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sugar Beet | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Vegetable Crops & Fruit Trees | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Safflower & Sunflower | 0.0 | 0.03 | 0.87 | 0.93 | 0.88 | 0.45 | 0.90 | 0.02 |

**Sutter County**
**Input data for Agriculture**
**2030**

| | | Growing Season Emission Factor | | |
|---|---|---|---|---|
| Primary | | **EF used** | **Entered** | **Default** |
| | | 210 | | 210 |
| Rattoon | | 780 | | 780 |
| | | ***State*** | ***Project*** | ***% of State ($\%_P$)*** |
| Total acres | 2030 | 7,667,570 | 214,769.00 | 0.02801 |
| Total acres | 2031 | 7,667,570 | 214,769.00 | 0.02801 |
| Climate Zone | Temperate | Yes | Sub Tropic | No |

| | 2030 | | | | | 2031 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Primary (Acres Harvested)** | **Annual Yield** | **Unit of Yield** | **Annual Yield (MT/yr)** | **State Acres Harvested** | **Primary (Acres Harvested)** | **Annual Yield** | **Unit of Yield** | **Annual Yield (MT/yr)** | **State Acres Harvested** |
| Hay (inc Alfalfa) | 11,138 | 66,983 | tons | 60,766 | 1,610,000 | 11,138 | 66,983 | tons | 60,766 | 1,610,000 |
| Barley | | | tons | | 60,000 | 0 | 0 | tons | | 60,000 |
| Dry Edible Beans | 8,446 | 8,459 | tons | 7,674 | 51,900 | 8,446 | 8,459 | tons | 7,674 | 51,900 |
| Corn | | | tons | 0 | 495,000 | 0 | 0 | tons | 0 | 495,000 |
| Corn for Grain | 7,720 | 47,941 | tons | 43,491 | 170,000 | 7,720 | 47,941 | tons | 43,491 | 170,000 |
| Oats | 2,035 | 24,223 | tons | 21,975 | 25,000 | 2,035 | 24,223 | tons | 21,975 | 25,000 |
| Rice | 96,186 | 409,137 | tons | 371,163 | 517,000 | 96,186 | 409,137 | tons | 371,163 | 517,000 |
| Sorghum | 572 | 2,168 | tons | 1,967 | 9,000 | 572 | 2,168 | tons | 1,967 | 9,000 |
| All Wheat | 7,631 | 48,493 | tons | 43,992 | 545,000 | 7,631 | 48,493 | tons | 43,992 | 545,000 |
| Potatoes (inc Sweet) | | | tons | 0 | 53,200 | 0 | 0 | tons | 0 | 53,200 |
| Cotton | | | bales | | 268,000 | 0 | 0 | bales | | 268,000 |
| Sugar Beet | | | | | 25,300 | 0 | 0 | | | 25,300 |
| Vegetable Crops & Fru | 66,815 | 511,775 | tons | 464,274 | 3,734,170 | 66,815 | 511,775 | tons | 464,274 | 3,734,170 |
| Safflower & Sunflower | 14,226 | 12,673 | tons | 11,497 | 104,000 | 14,226 | 12,673 | tons | 11,497 | 104,000 |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Carbon Dioxide**

## A. Direct Sources

### A1-3. Mobile (Construction Equipment, Motor Vehicles, and Landscape Equipment)

| Con (MT/yr) | Motor Vehicles (MT/yr) | Landscape (MT/yr) ($E_{Cls}$) | Hearth (MT/yr) ($E_{Cwood}$) | MT/yr |
|---|---|---|---|---|
| 0.00 | 661,154.84 | 39.33 | 23,991.59 | **685,185.75** |
| 0.00 | 0.96 | 0.00 | | |

***Fuel emissions from Airports***

| Annual Fuel Usage ($U_{AAF}$) | kg/gallon ($EF_{CAF}$) | kg/MT ($C_3$) | MT/yr ($E_{CAF}$) |
|---|---|---|---|
| 18,250.00 | 8.32 | 1,000.00 | **151.84** |

### A4. Stationary Sources (Natural Gas)

| Unit Type | MMBTU/yr ($U_{Ang}$) | kg/MMBTU ($EF_{Cng}$) | kg/MT ($C_3$) | MT/yr ($E_{Cng}$) |
|---|---|---|---|---|
| AG/RAN/ER | 605,697 | 53.07 | 1,000.00 | 32,144.3 |
| Low Density Residential | 404,480 | 53.07 | 1,000.00 | 21,465.7 |
| Medium Density Residential | 256,670 | 53.07 | 1,000.00 | 13,621.5 |
| High Density Residential | 115,329 | 53.07 | 1,000.00 | 6,120.5 |
| Park | 476 | 53.07 | 1,000.00 | 25.3 |
| Commercial | 553,077 | 53.07 | 1,000.00 | 29,351.8 |
| Mixed Use | 148,939 | 53.07 | 1,000.00 | 7,904.2 |
| Industrial | 1,462,954 | 53.07 | 1,000.00 | 77,639.0 |
| | | | **Total (MT/year)** | **188,272.2** |

## B. Indirect Sources

### B1. Electricity

| Unit Type | kWh/yr | Unit | Unit type | MWh/yr ($U_{Ae}$) | lbs/MWh ($EF_{Cele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Cele}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 77747538 | 6,445 | du | 77,748 | 524.00 | 2,204.62 | 18,479.24 |
| Low Density Residential | 51919218 | 8,719 | du | 51,919 | 524.00 | 2,204.62 | 12,340.30 |
| Medium Density Residential | 32946278 | 5,533 | du | 32,946 | 524.00 | 2,204.62 | 7,830.76 |
| High Density Residential | 14803648 | 2,486 | du | 14,804 | 524.00 | 2,204.62 | 3,518.57 |
| Park | 80025.429 | 32,234,400 | Sq/ft | 80 | 524.00 | 2,204.62 | 19.02 |
| Commercial | 92905886 | 5,707,850 | Sq/ft | 92,906 | 524.00 | 2,204.62 | 22,082.12 |
| Mixed Use | 25018859 | 1,537,000 | Sq/ft | 25,019 | 524.00 | 2,204.62 | 5,946.55 |
| Industrial | 245747181 | 15,097,750 | Sq/ft | 245,747 | 524.00 | 2,204.62 | 58,409.85 |
| | | | | | | **Total (MT/year)** | **128,626.41** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Carbon Dioxide**

**B2. Potable Water**

| Unit Type | unit type | unit number | MG/yr ($U_{Apot}$) | MWh/MG ($C_4$) | MWh/yr ($U_{epot}$) | lbs/MWh ($EF_{Cele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Cpot}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 6,445 | 27.9106 | 3.50 | 97.69 | 524.00 | 2,204.62 | 23.22 |
| Low Density Residential | du | 8,719 | 18.6385 | 3.50 | 65.23 | 524.00 | 2,204.62 | 15.51 |
| Medium Density Residential | du | 5,533 | 11.8274 | 0.01 | 0.12 | 804.54 | 2,000 | 0.05 |
| High Density Residential | du | 2,486 | 5.3144 | 0.01 | 0.05 | 804.54 | 2,000 | 0.02 |
| Park | Sq/ft | 32,234,400 | 0.0008 | 3.50 | 0.00 | 524.00 | 2,204.62 | 0.00 |
| Commercial | Sq/ft | 5,707,850 | 0.9243 | 3.50 | 3.24 | 524.00 | 2,204.62 | 0.77 |
| Mixed Use | Sq/ft | 1,537,000 | 0.2489 | 3.50 | 0.87 | 524.00 | 2,204.62 | 0.21 |
| Industrial | Sq/ft | 15,097,750 | 2.4448 | 3.50 | 8.56 | 524.00 | 2,204.62 | 2.03 |
| | | | | | | | **Total (MT/year)** | **41.81** |

**B3. Solid Waste**

**B3a. Anthropogenic Carbon**
***$CO_2$ emissions are considered anthropogenic and are not counted in this inventory.***
**B3b. Exhaust Emissions (Hauling Trucks)**

| Unit Type | tons/yr ($U_{SW}$) | tons/cuyd (d) | cuyd/trip ($C_T$) | miles/trip (M) | gr/mile ($EF_{CWT}$) | g/MT ($C_6$) | tons/yr ($E_{CWT}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 61,425.56 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 551.39 |
| Low Density Residential | 41,018.65 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 368.20 |
| Medium Density Residential | 26,029.73 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 233.66 |
| High Density Residential | 11,695.82 | 0.1125 | 33 | 9.62 | 3,464.164 | 1,000,000 | 104.99 |
| Park | 18.01 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 0.08 |
| Commercial | 21,689.94 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 97.35 |
| Mixed Use | 5,841.16 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 26.22 |
| Industrial | 57,373.89 | 0.2250 | 33 | 9.62 | 3,464.164 | 1,000,000 | 257.51 |
| | | | | | | **Total (MT/year)** | **1,639.40** |

**B3c. Exhaust Emissions (Disposal Equipment)**

| Vehicle Type | # of equip | lbs/hr ($EF_{CWD}$) | hrs/day (h) | days/yr (n) | lbs/MT ($C_1$) | MT/yr ($E_{CWD}$) |
|---|---|---|---|---|---|---|
| Excavator | 0 | 119.60 | 2.62 | 313 | 2,205 | 0.00 |
| Grader | 0 | 132.70 | 2.62 | 313 | 2,205 | 0.00 |
| Off-Highway Tractor | 0 | 151.50 | 2.62 | 313 | 2,205 | 0.00 |
| Off-Highway Truck | 0 | 260.10 | 2.62 | 313 | 2,205 | 0.00 |
| Rubber Tired Dozer | 0 | 239.00 | 2.62 | 313 | 2,205 | 0.00 |
| Disposal Facility run by City? | | | | | No | 0.00 |
| | | | | | **Total (MT/year)** | **0.00** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Carbon Dioxide**

**B4. Wastewater**

| Unit Type | MG/yr Potable ($U_{Apot}$) | % used indoors ($\%_{in}$) | MG/yr ww generated ($U_{AWW}$) | MWh/MG | MWh/yr ($U_{eWW}$) | lbs/MWh ($EF_{Cele}$) | lbs/MT ($C_1$) | MT/yr ($E_{CWW}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 27.9106 | 0.65 | 18.14189 | 1.911 | 34.669152 | 524.00 | 2,205 | 8.24 |
| Low Density Residential | 18.6385 | 0.82 | 15.28357 | 1.911 | 29.206902 | 524.00 | 2,205 | 6.94 |
| Medium Density Residential | 11.8274 | 0.82 | 9.698468 | 1.911 | 18.533772 | 524.00 | 2,205 | 4.41 |
| High Density Residential | 5.3144 | 0.82 | 4.357808 | 1.911 | 8.3277711 | 524.00 | 2,205 | 1.98 |
| Park | 0.0008 | 0.71 | 0.000568 | 1.911 | 0.0010854 | 524.00 | 2,205 | 0.00 |
| Commercial | 0.9243 | 0.71 | 0.656253 | 1.911 | 1.2540995 | 524.00 | 2,205 | 0.30 |
| Mixed Use | 0.2489 | 0.71 | 0.176719 | 1.911 | 0.33771 | 524.00 | 2,205 | 0.08 |
| Industrial | 2.4448 | 0.8 | 1.95584 | 1.911 | 3.7376102 | 524.00 | 2,205 | 0.89 |
| | | | | | | | **Total (MT/year)** | 22.83 |

**C. Reserved for AG emissions for $CH_4$ and $N_2O$, not applicable for $CO_2$.**

**D. Summary Table**

| Source Type | | Emissions, MT /yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Direct | Construction equipment | 0.00 | 0.00 |
| | Motor vehicles & Aircraft | 661306.68 | 661,306.68 |
| | Landscape equipment | 39.33 | 39.33 |
| | Cooling and heating | 212263.83 | 212,263.83 |
| **Total direct, tons/yr** | | **873609.84** | **873609.84** |
| Indirect | Electricity | 128626.41 | 128,626.41 |
| | Potable water | 41.81 | 41.81 |
| | Solid waste | 1639.40 | 1,639.40 |
| | Wastewater | 22.83 | 22.83 |
| **Total indirect, tons/yr** | | **130,330.45** | **130,330.45** |
| **Total, tons/yr** | | **1,003,940** | **1,003,940** |
| **Global warming potential index** | | **1** | |

| Source Type | | Emissions, MT/yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Residential | AG/RAN/ER | 238,228.19 | 238,228.19 |
| | Low Density Residential | 159,085.76 | 159,085.76 |
| | Medium Density Residential | 100,942.78 | 100,942.78 |
| | High Density Residential | 45,356.19 | 45,356.19 |
| | **Total Residential** | **543,612.92** | **543,612.92** |
| Commercial | Park | 99.21 | 99.21 |
| | Commercial | 117,571.44 | 117,571.44 |
| | Mixed Use | 31,661.78 | 31,661.78 |
| | **Total Commercial** | **149,332.44** | **149,332.44** |
| Industrial | Industrial | 310,994.93 | 310,994.93 |
| | **Total Industrial** | **310,994.93** | **310,994.93** |
| **Total, tons/yr** | | **1,003,940** | **1,003,940** |
| **Global warming potential index** | | 1 | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Methane**

## A. Direct Sources

### A1. Mobile Source (Construction Equipment)

| Unit Type | gallons/yr ($U_{AG}$) | gr/gallon ($EF_{MHDV}$) | gr/MT ($C_6$) | MT/yr ($E_{MCON}$) |
|---|---|---|---|---|
| Construction Equipment | 0.00 | 0.0580 | 1,000,000 | **0.00** |

### A2. Mobile Source (Motor Vehicles)

| Unit Type | miles/yr (M) | gr/mile ($EF_{MMV}$) | gr/MT ($C_6$) | tons/yr ($E_{MMV}$) |
|---|---|---|---|---|
| Non Cat passenger Car | 0.00 | 0.1696 | 1,000,000 | 0.00 |
| Cat passenger Car | 574205115.13 | 0.1355 | 1,000,000 | 77.80 |
| Diesel Passenger Car | 0.00 | 0.0006 | 1,000,000 | 0.00 |
| Non cat light-duty truck | 0.00 | 0.1908 | 1,000,000 | 0.00 |
| Cat light duty truck | 268378540.77 | 0.1516 | 1,000,000 | 40.69 |
| Diesel Light duty Truck | 11473952.21 | 0.0011 | 1,000,000 | 0.01 |
| Non Cat light-duty truck 2 | 0.00 | 0.1908 | 1,000,000 | 0.00 |
| Cat light duty truck 2 | 285652544.65 | 0.1516 | 1,000,000 | 43.30 |
| Diesel Light duty truck 2 | 0.00 | 0.0011 | 1,000,000 | 0.00 |
| Non Cat Medium duty Truck | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat med duty truck | 134851201.28 | 0.2356 | 1,000,000 | 31.77 |
| Diesel Med duty truck | 0.00 | 0.0051 | 1,000,000 | 0.00 |
| Non Cat lite-heavy duty truck | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat Light-heavy duty truck | 26100232.51 | 0.2356 | 1,000,000 | 6.15 |
| Diesel Lite-heavy duty truck | 10150090.42 | 0.0051 | 1,000,000 | 0.05 |
| Non Cat lite-heavy duty truck 2 | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat Light-heavy duty truck 2 | 7255864.64 | 0.2356 | 1,000,000 | 1.71 |
| Diesel Lite-heavy duty truck 2 | 5794251.62 | 0.0051 | 1,000,000 | 0.03 |
| Non Cat med-heavy duty truck | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat med-heavy duty truck | 4361638.85 | 0.2356 | 1,000,000 | 1.03 |
| Diesel med-heavy duty truck | 18838567.82 | 0.0051 | 1,000,000 | 0.10 |
| Non cat Heavy Duty truck | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat heavy duty truck | 0.00 | 0.2356 | 1,000,000 | 0.00 |
| Diesel heavy duty truck | 24650219.59 | 0.0051 | 1,000,000 | 0.13 |
| Non Cat Other Bus | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat other bus | 0.00 | 0.2356 | 1,000,000 | 0.00 |
| Diesel Other Bus | 1450012.92 | 0.0051 | 1,000,000 | 0.01 |
| Non Cat Urban Bus | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat Urban Bus | 0.00 | 0.2356 | 1,000,000 | 0.00 |
| Diesel Urban Bus | 0.00 | 0.0051 | 1,000,000 | 0.00 |
| Non cat motorcycle | 23200206.67 | 0.0672 | 1,000,000 | 1.56 |
| Cat motorcycle | 34800310.01 | 0.0672 | 1,000,000 | 2.34 |
| Diesel Motorcycle | 0.00 | 0.0000 | 1,000,000 | 0.00 |
| Non Cat School Bus | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat School Bus | 0.00 | 0.2356 | 1,000,000 | 0.00 |
| Diesel School Bus | 1450012.92 | 0.0051 | 1,000,000 | 0.01 |
| Non Cat Motor home | 0.00 | 0.4181 | 1,000,000 | 0.00 |
| Cat Motor home | 14494329.12 | 0.2356 | 1,000,000 | 3.41 |
| Diesel Motor home | 2905825.89 | 0.0051 | 1,000,000 | 0.01 |
| | | | **Total (MT/yr)** | **210.11** |

***Emissions from Aviation Fuel***

| Gasoline gallons/ year ($U_{AAF}$) | gr/gallon ($EF_{Maf}$) | gr/MT ($C_6$) | MT/yr ($E_{Maf}$) |
|---|---|---|---|
| 18,250.00 | 7.04 | 1,000,000 | **0.13** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Methane**

**A3. Mobile Source (Landscape Equipment)**

| Gasoline gallons/ year ($G_F$) | gr/gallon ($EF_{MF}$) | gr/MT ($C_6$) | MT/yr ($E_{Mls}$) |
|---|---|---|---|
| 4,469.07 | 0.50 | 1,000,000 | **0.00** |

**A4. Wood burning Hearth**

| MMBtu | kg/MMBtu ($EF_{Mwood}$) | kg/MT ($C_3$) | MT/yr ($E_{Mls}$) |
|---|---|---|---|
| 368,990.61 | 0.32 | 1,000 | **116.60** |

**A5. Stationary Source (Cooling and Heating) - Natural Gas**

| Land Use Type | Unit Type | Units | MMBTUs/yr ($U_{Ang}$) | kg/MMBTU ($EF_{Mng}$) | kg/MT ($C_3$) | MT/yr ($E_{Mng}$) |
|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 6,445 | 605,697 | 0.005 | 1,000 | 3.0285 |
| Low Density Residential | du | 8,719 | 404,480 | 0.005 | 1,000 | 2.0224 |
| Medium Density Residential | du | 5,533 | 256,670 | 0.005 | 1,000 | 1.2833 |
| High Density Residential | du | 2,486 | 115,329 | 0.005 | 1,000 | 0.5766 |
| Park | Sq/ft | 32,234,400 | 476 | 0.005 | 1,000 | 0.0024 |
| Commercial | Sq/ft | 5,707,850 | 553,077 | 0.005 | 1,000 | 2.7654 |
| Mixed Use | Sq/ft | 1,537,000 | 148,939 | 0.005 | 1,000 | 0.7447 |
| Industrial | Sq/ft | 15,097,750 | 1,462,954 | 0.001 | 1,000 | 1.4630 |
| | | | | | **Total (MT/yr)** | **11.89** |

**B. Indirect Sources**

**B1. Electricity**

| Land Use Type | Unit Type | Units | kWh/year | MWh/yr ($U_{Ae}$) | lbs/MWh ($EF_{Mele}$) | lbs/MT ($C_1$) | tons/yr ($E_{Mele}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 6445.00 | 77747537.9 | 77,747.54 | 0.0302 | 2,205 | 1.065 |
| Low Density Residential | du | 8719.00 | 51919217.5 | 51,919.22 | 0.0302 | 2,205 | 0.711 |
| Medium Density Residential | du | 5533.00 | 32946277.7 | 32,946.28 | 0.0302 | 2,205 | 0.451 |
| High Density Residential | du | 2486.00 | 14803647.9 | 14,803.65 | 0.0302 | 2,205 | 0.203 |
| Park | Sq/ft | 32234400.00 | 80025.4292 | 80.03 | 0.0302 | 2,205 | 0.001 |
| Commercial | Sq/ft | 5707850.00 | 92905885.8 | 92,905.89 | 0.0302 | 2,205 | 1.273 |
| Mixed Use | Sq/ft | 1537000.00 | 25018859.2 | 25,018.86 | 0.0302 | 2,205 | 0.343 |
| Industrial | Sq/ft | 15097750.00 | 245747181 | 245,747.18 | 0.0302 | 2,205 | 3.366 |
| | | | | | | **Total (MT/yr)** | **7.413** |

**B2. Potable Water**

| Unit Type | unit type | unit number | MG/yr ($U_{Apot}$) | MWh/MG ($C_4$) | MWH/yr ($U_{epot}$) | lbs/MWh ($EF_{Mele}$) | lbs/MT ($C_1$) | tons/yr ($E_{Mpot}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 6445.00 | 27.91058 | 3.50 | 97.69 | 0.0302 | 2,205 | 0.00134 |
| Low Density Residential | du | 8719.00 | 18.63848 | 3.50 | 65.23 | 0.0302 | 2,205 | 0.00089 |
| Medium Density Residential | du | 5533.00 | 11.82738 | 3.50 | 41.40 | 0.0302 | 2,205 | 0.00057 |
| High Density Residential | du | 2486.00 | 5.31436 | 3.50 | 18.60 | 0.0302 | 2,205 | 0.00025 |
| Park | Sq/ft | 32234400.00 | 0.00080 | 3.50 | 0.00 | 0.0302 | 2,205 | 0.00000 |
| Commercial | Sq/ft | 5707850.00 | 0.92428 | 3.50 | 3.23 | 0.0302 | 2,205 | 0.00004 |
| Mixed Use | Sq/ft | 1537000.00 | 0.24890 | 3.50 | 0.87 | 0.0302 | 2,205 | 0.00001 |
| Industrial | Sq/ft | 15097750.00 | 2.44482 | 3.50 | 8.56 | 0.0302 | 2,205 | 0.00012 |
| | | | | | | | **Total (MT/yr)** | **0.00323** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Methane**

**B3. Solid Waste**

**B3a. Fugitive Emissions**

| Unit Type | Unit Type | unit | tons/yr ($U_{SW}$) | MT $CO_2e$/ton ($EF_{MWF}$) | MT $CO_2e$/yr ($E_{MWF}$) |
|---|---|---|---|---|---|
| AG/RAN/ER | du | 6,445 | 61,426 | 0.09 | 5,528.30 |
| Low Density Residential | du | 8,719 | 41,019 | 0.09 | 3,691.68 |
| Medium Density Residential | du | 5,533 | 26,030 | 0.09 | 2,342.68 |
| High Density Residential | du | 2,486 | 11,696 | 0.09 | 1,052.62 |
| Park | Sq/ft | 32,234,400 | 18 | 0.09 | 1.62 |
| Commercial | Sq/ft | 5,707,850 | 21,690 | 0.09 | 1,952.09 |
| Mixed Use | Sq/ft | 1,537,000 | 5,841 | 0.09 | 525.70 |
| Industrial | Sq/ft | 15,097,750 | 57,374 | 0.09 | 5,163.65 |
| | | | | **Total (MT/yr)** | **20,258.35** |

**B3b. Exhaust Emissions (Hauling Trucks)**

| Unit Type | tons/yr ($U_{SW}$) | tons/cuyd (d) | cuyd/trip ($C_T$) | miles/trip (M) | gr/mile ($EF_{MWT}$) | gr/MT ($C_6$) | tons/yr ($E_{MWT}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 61,425.5640 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000812 |
| Low Density Residential | 41,018.6541 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000542 |
| Medium Density Residential | 26,029.7271 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000344 |
| High Density Residential | 11,695.8199 | 0.1125 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000155 |
| Park | 18.0074 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000000 |
| Commercial | 21,689.9386 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000143 |
| Mixed Use | 5,841.1572 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000039 |
| Industrial | 57,373.8942 | 0.2250 | 33 | 9.62 | 0.00510 | 1,000,000 | 0.000379 |
| | | | | | | **Total (MT/yr)** | **0.002414** |

**B3c. Exhaust Emissions (Disposal Equipment)**

| Vehicle Type | # of equip | lbs/hr ($EF_{MWD}$) | hrs/day (h) | days/yr (n) | lbs/MT ($C_1$) | MT/yr ($E_{MWD}$) |
|---|---|---|---|---|---|---|
| Excavator | 0 | 0.0164 | 2.62 | 313 | 2,205 | 0.00 |
| Grader | 0 | 0.0185 | 2.62 | 313 | 2,205 | 0.00 |
| Off-Highway Tractor | 0 | 0.0243 | 2.62 | 313 | 2,205 | 0.00 |
| Off-Highway Truck | 0 | 0.0260 | 2.62 | 313 | 2,205 | 0.00 |
| Rubber Tired Dozer | 0 | 0.0342 | 2.62 | 313 | 2,205 | 0.00 |
| Disposal Facility run by City? | | | | | No | 0.00 |
| | | | | | **Total (MT/yr)** | **0.00** |

**B4. Wastewater**

| Land Use Type | MG/yr Potable ($U_{Apot}$) | % used indoors ($\%_{in}$) | MG/yr ww generated ($U_{AWW}$) | MWh/MG ($C_5$) | MWh/yr ($U_{eWW}$) | lbs/MWh ($EF_{Mele}$) | lbs/MT ($C_1$) | MT/yr ($E_{MWW}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 27.91058 | 65 | 18.14 | 1.91 | 34.67 | 0.0302 | 2,205 | 0.000475 |
| Low Density Residential | 18.63848 | 82 | 15.28 | 1.91 | 29.21 | 0.0302 | 2,205 | 0.000400 |
| Medium Density Residential | 11.82738 | 82 | 9.70 | 1.91 | 18.53 | 0.0302 | 2,205 | 0.000254 |
| High Density Residential | 5.31436 | 82 | 4.36 | 1.91 | 8.33 | 0.0302 | 2,205 | 0.000114 |
| Park | 0.00080 | 71 | 0.00 | 1.91 | 0.00 | 0.0302 | 2,205 | 0.000000 |
| Commercial | 0.92428 | 71 | 0.66 | 1.91 | 1.25 | 0.0302 | 2,205 | 0.000017 |
| Mixed Use | 0.24890 | 71 | 0.18 | 1.91 | 0.34 | 0.0302 | 2,205 | 0.000005 |
| Industrial | 2.44482 | 80 | 1.96 | 1.91 | 3.74 | 0.0302 | 2,205 | 0.000051 |
| | | | | | | | **Total (MT/yr)** | **0.001316** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Methane**

**C. See Methane Emissions from AG Formula Spreadsheet (entered into table below under commercial AG)**
**D. Summary Table**

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Direct | Construction equipment | 0.00 | 0.00 |
| | Motor vehicles & Aviation Fuel | 210.24 | 4,415.01 |
| | Landscape equipment | 0.00 | 0.05 |
| | Cooling and heating | 128.49 | 2,698.23 |
| | **Total direct, tons/yr** | **338.73** | **7,113.29** |
| Indirect | Electricity | 7.41 | 155.68 |
| | Potable water | 0.00 | 0.07 |
| | Solid waste | 20,258.35 | 20,258.40 |
| | Wastewater | 0.00 | 0.03 |
| | **Total indirect, tons/yr** | **20,265.77** | **20,414.17** |
| | **Total from Agriculture** | **10,764.63** | **226,057.31** |
| | ***Total, tons/yr*** | ***31,369.13*** | ***253,584.77*** |
| | **Global warming potential index** | **21** | |

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Residential | AG/RAN/ER | 5,621.5537 | 7,487.35 |
| | Low Density Residential | 3,753.9513 | 4,999.89 |
| | Medium Density Residential | 2,382.1924 | 3,172.84 |
| | High Density Residential | 1,070.3798 | 1,425.64 |
| | **Total Residential** | **12,828.08** | **17,085.72** |
| Commercial | Park | 1.6503 | 2.24 |
| | Commercial | 1,987.6148 | 2,698.28 |
| | Mixed Use | 535.2698 | 726.65 |
| | **Total Commercial** | **2,524.53** | **3,427.18** |
| Industrial | Industrial | 5,251.7563 | 7,014.56 |
| | **Total Industrial** | **5,251.7563** | **7,014.56** |
| | **Total from Agriculture** | **10,764.63** | **226,057.31** |
| | ***Total, tons/yr*** | ***31,369.00*** | ***253,584.77*** |
| | **Global warming potential index** | 21 | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Nitrous Oxide**

**A. Direct Sources**

**A1. Mobile Source (Construction Equipment)**

| Unit Type | gallons/yr ($U_{AG}$) | gr/gallon ($EF_{NHDV}$) | gr/MT ($C_6$) | MT/yr ($E_{NCON}$) |
|---|---|---|---|---|
| Non cat heavy-duty truck | 0.00 | 0.0260 | 1,000,000 | **0.00000** |

**A2. Mobile Source (Motor Vehicles)**

| Unit Type | miles/yr (M) | gr/mile ($EF_{NMV}$) | gr/MT ($C_6$) | MT/yr ($E_{NMV}$) |
|---|---|---|---|---|
| Non Cat passenger Car | 0 | 0.0197 | 1,000,000 | 0.00000 |
| Cat passenger Car | 574,205,115 | 0.0504 | 1,000,000 | 28.93994 |
| Diesel Passenger Car | 0 | 0.0012 | 1,000,000 | 0.00000 |
| Non cat light-duty truck | 0 | 0.0218 | 1,000,000 | 0.00000 |
| Cat light duty truck | 268,378,541 | 0.0639 | 1,000,000 | 17.14939 |
| Diesel Light duty Truck | 11,473,952 | 0.0017 | 1,000,000 | 0.01951 |
| Non Cat light-duty truck 2 | 0 | 0.0218 | 1,000,000 | 0.00000 |
| Cat light duty truck 2 | 285,652,545 | 0.0639 | 1,000,000 | 18.25320 |
| Diesel Light duty truck 2 | 0 | 0.0017 | 1,000,000 | 0.00000 |
| Non Cat Medium duty Truck | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat med duty truck | 134,851,201 | 0.1317 | 1,000,000 | 17.75990 |
| Diesel Med duty truck | 0 | 0.0048 | 1,000,000 | 0.00000 |
| Non Cat lite-heavy duty truck | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat Light-heavy duty truck | 26,100,233 | 0.1317 | 1,000,000 | 3.43740 |
| Diesel Lite-heavy duty truck | 10,150,090 | 0.0048 | 1,000,000 | 0.04872 |
| Non Cat lite-heavy duty truck 2 | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat Light-heavy duty truck 2 | 7,255,865 | 0.1317 | 1,000,000 | 0.95560 |
| Diesel Lite-heavy duty truck 2 | 5,794,252 | 0.0048 | 1,000,000 | 0.02781 |
| Non Cat med-heavy duty truck | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat med-heavy duty truck | 4,361,639 | 0.1317 | 1,000,000 | 0.57443 |
| Diesel med-heavy duty truck | 18,838,568 | 0.0048 | 1,000,000 | 0.09043 |
| Non cat Heavy Duty truck | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat heavy duty truck | 0 | 0.1317 | 1,000,000 | 0.00000 |
| Diesel heavy duty truck | 24,650,220 | 0.0048 | 1,000,000 | 0.11832 |
| Non Cat Other Bus | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat other bus | 0 | 0.1317 | 1,000,000 | 0.00000 |
| Diesel Other Bus | 1,450,013 | 0.0048 | 1,000,000 | 0.00696 |
| Non Cat Urban Bus | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat Urban Bus | 0 | 0.1317 | 1,000,000 | 0.00000 |
| Diesel Urban Bus | 0 | 0.0048 | 1,000,000 | 0.00000 |
| Non cat motorcycle | 23,200,207 | 0.0069 | 1,000,000 | 0.16008 |
| Cat motorcycle | 34,800,310 | 0.0069 | 1,000,000 | 0.24012 |
| Diesel Motorcycle | 0 | 0.0000 | 1,000,000 | 0.00000 |
| Non Cat School Bus | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat School Bus | 0 | 0.1317 | 1,000,000 | 0.00000 |
| Diesel School Bus | 1,450,013 | 0.0048 | 1,000,000 | 0.00696 |
| Non Cat Motor home | 0 | 0.0473 | 1,000,000 | 0.00000 |
| Cat Motor home | 14,494,329 | 0.1317 | 1,000,000 | 1.90890 |
| Diesel Motor home | 2,905,826 | 0.0048 | 1,000,000 | 0.01395 |
| | | | **Total (MT/yr)** | **89.71** |

***Emissions from Aviation Fuel***

| Gasoline gallons/ year ($U_{Aaf}$) | gr/gallon ($EF_{Naf}$) | gr/lbs ($C_6$) | MT/yr ($E_{Nls}$) |
|---|---|---|---|
| 18,250.00 | 0.11000 | 1000000 | **0.002008** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Nitrous Oxide**

**A3. Mobile Source (Landscape Equipment)**

| Gasoline gallons/ year | gr/gallon ($EF_{Nls}$) | gr/lbs ($C_6$) | MT/yr ($E_{Nls}$) |
|---|---|---|---|
| 4,469.07 | 0.22000 | 1000000 | **0.000983** |

**A4. Wood burning Hearth**

| MMBtu | kg/MMBtu ($EF_{Mwood}$) | kg/MT ($C_3$) | MT/yr ($E_{Mls}$) |
|---|---|---|---|
| 368,990.61 | 0.00420 | 1000 | **1.549761** |

**A5. Stationary Source (Cooling and Heating)**

| Land Use Type | Unit Type | Units | MMBTUs/yr ($U_{Ang}$) | kg/MMBTU ($EF_{Nng}$) | kg/MT ($C_3$) | MT/yr ($E_{Nng}$) |
|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 6445 | 605,697 | 0.0001 | 1,000 | 0.060570 |
| Low Density Residential | du | 8719 | 404,480 | 0.0001 | 1,000 | 0.040448 |
| Medium Density Residential | du | 5533 | 256,670 | 0.0001 | 1,000 | 0.025667 |
| High Density Residential | du | 2486 | 115,329 | 0.0001 | 1,000 | 0.011533 |
| Park | Sq/ft | 32234400 | 476 | 0.0001 | 1,000 | 0.000048 |
| Commercial | Sq/ft | 5707850 | 553,077 | 0.0001 | 1,000 | 0.055308 |
| Mixed Use | Sq/ft | 1537000 | 148,939 | 0.0001 | 1,000 | 0.014894 |
| Industrial | Sq/ft | 15097750 | 1,462,954 | 0.0001 | 1,000 | 0.146295 |
| | | | | | **Total (MT/yr)** | **0.354763** |

**B. Indirect Sources**

**B1. Electricity**

| Land Use Type | Unit Type | Units | kWh/yr | MWh/yr ($U_{Ae}$) | lbs/MWh ($EF_{Nele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Nele}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 6445 | 77747537.9 | 77,748 | 0.0081 | 2,205 | 0.28565 |
| Low Density Residential | du | 8719 | 51919217.5 | 51,919 | 0.0081 | 2,205 | 0.19076 |
| Medium Density Residential | du | 5533 | 32946277.7 | 32,946 | 0.0037 | 2,205 | 0.05529 |
| High Density Residential | du | 2486 | 14803647.9 | 14,804 | 0.0037 | 2,205 | 0.02484 |
| Park | Sq/ft | 32234400 | 80025.4292 | 80 | 0.0081 | 2,205 | 0.00029 |
| Commercial | Sq/ft | 5707850 | 92905885.8 | 92,906 | 0.0081 | 2,205 | 0.34135 |
| Mixed Use | Sq/ft | 1537000 | 25018859.2 | 25,019 | 0.0081 | 2,205 | 0.09192 |
| Industrial | Sq/ft | 15097750 | 245747181 | 245,747 | 0.0081 | 2,205 | 0.90290 |
| | | | | | | **Total (MT/yr)** | **1.89301** |

**B2. Potable Water**

| Unit Type | unit type | unit number | MG/yr ($U_{Apot}$) | MWh/MG ($C_4$) | MWH/yr ($U_{epot}$) | lbs/MWh ($EF_{Nele}$) | lbs/MT ($C_1$) | MT/yr ($E_{Npot}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | du | 6445 | 27.9105844 | 3.50 | 97.69 | 0.0081 | 2,205 | 0.000359 |
| Low Density Residential | du | 8719 | 18.6384771 | 3.50 | 65.23 | 0.0081 | 2,205 | 0.000240 |
| Medium Density Residential | du | 5533 | 11.8273824 | 3.50 | 41.40 | 0.0081 | 2,205 | 0.000152 |
| High Density Residential | du | 2486 | 5.3143607 | 3.50 | 18.60 | 0.0081 | 2,205 | 0.000068 |
| Park | Sq/ft | 32234400 | 0.0007961 | 3.50 | 0.00 | 0.0081 | 2,205 | 0.000000 |
| Commercial | Sq/ft | 5707850 | 0.9242766 | 3.50 | 3.23 | 0.0081 | 2,205 | 0.000012 |
| Mixed Use | Sq/ft | 1537000 | 0.2489008 | 3.50 | 0.87 | 0.0081 | 2,205 | 0.000003 |
| Industrial | Sq/ft | 15097750 | 2.4448222 | 3.50 | 8.56 | 0.0081 | 2,205 | 0.000031 |
| | | | | | | | **Total (MT/yr)** | **0.000866** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Nitrous Oxide**

**B3. Solid Waste**

**B3a. Fugitive Emissions** No Fugitive Nitrous Oxide Emissions

**B3b. Exhaust Emissions (Hauling Trucks)**

| Unit Type | tons/yr ($U_{SW}$) | tons/cuyd (d) | cuyd/trip ($C_T$) | miles/trip (M) | gr/mile ($EF_{NWT}$) | gr/MT ($C_6$) | MT/yr ($E_{NWT}$) |
|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 61,425.56 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00076401 |
| Low Density Residential | 41,018.65 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00051019 |
| Medium Density Residential | 26,029.73 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00032376 |
| High Density Residential | 11,695.82 | 0.1125 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00014547 |
| Park | 18.01 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00000011 |
| Commercial | 21,689.94 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00013489 |
| Mixed Use | 5,841.16 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00003633 |
| Industrial | 57,373.89 | 0.2250 | 33 | 9.62 | 0.0048 | 1,000,000 | 0.00035681 |
| | | | | | | **Total (MT/yr)** | **0.002272** |

**B3c. Exhaust Emissions (Disposal Equipment)**

| Vehicle Type | # of equip. | lbs/hr ($EF_{NWD}$) | hrs/day (h) | days/yr (n) | lbs/MT ($C_1$) | tons/yr ($E_{NWD}$) |
|---|---|---|---|---|---|---|
| Excavator | 0 | 0.0074 | 2.62 | 313 | 2,205 | 0.00 |
| Grader | 0 | 0.0083 | 2.62 | 313 | 2,205 | 0.00 |
| Off-Highway Tractor | 0 | 0.0109 | 2.62 | 313 | 2,205 | 0.00 |
| Off-Highway Truck | 0 | 0.0117 | 2.62 | 313 | 2,205 | 0.00 |
| Rubber Tired Dozer | 0 | 0.0153 | 2.62 | 313 | 2,205 | 0.00 |
| Disposal Facility run by City? | | | | | No | 0.00 |
| | | | | | **Total, tons/yr** | **0.00** |

**B4. Wastewater**

| AG/RAN/ER | MG/yr Potable ($U_{Apot}$) | % used indoors ($\%_{in}$) | MG/yr ww generated ($U_{AWW}$) | MWh/MG ($C_5$) | MWh/yr ($U_{eWW}$) | lbs/MWh ($EF_{Nele}$) | lbs/MT ($C_1$) | MT/yr ($E_{NWW}$) |
|---|---|---|---|---|---|---|---|---|
| AG/RAN/ER | 27.91 | 65 | 18.14 | 1.91 | 34.6691 | 0.0081 | 2204.62 | 0.00012738 |
| Low Density Residential | 18.64 | 82 | 15.28 | 1.91 | 29.2069 | 0.0081 | 2204.62 | 0.00010731 |
| Medium Density Residential | 11.83 | 82 | 9.70 | 1.91 | 18.5337 | 0.0037 | 2204.62 | 0.00003111 |
| High Density Residential | 5.31 | 82 | 4.36 | 1.91 | 8.3277 | 0.0037 | 2204.62 | 0.00001398 |
| Park | 0.00 | 71 | 0.00 | 1.91 | 0.0011 | 0.0081 | 2204.62 | 0.00000000 |
| Commercial | 0.92 | 71 | 0.66 | 1.91 | 1.2541 | 0.0081 | 2204.62 | 0.00000461 |
| Mixed Use | 0.25 | 71 | 0.18 | 1.91 | 0.3377 | 0.0081 | 2204.62 | 0.00000124 |
| Industrial | 2.44 | 80 | 1.96 | 1.91 | 3.7376 | 0.0081 | 2204.62 | 0.00001373 |
| | | | | | | | **Total (MT/yr)** | **0.00029935** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Nitrous Oxide**

**C. See Nitrous Emissions from AG Formula Spreadsheet (entered into table below under commercial AG)**
**D. Summary Table**

| Source Type | | Emissions, tons/yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Direct | Construction equipment | 0.00000 | 0.00 |
| | Motor vehicles + aviation fuel | 89.7120 | 27,810.72 |
| | Landscape equipment | 0.0010 | 0.30 |
| | Cooling and heating | 1.9045 | 590.40 |
| **Total direct, tons/yr** | | **91.6175** | **28,401.43** |
| Indirect | Electricity | 1.8930 | 586.83 |
| | Potable water | 0.0009 | 0.27 |
| | Solid waste | 0.0023 | 0.70 |
| | Wastewater | 0.0003 | 0.09 |
| **Total indirect, tons/yr** | | **1.8964** | **587.90** |
| **Total From Agriculture** | | **1,779.57** | **551,666.67** |
| ***Total, tons/yr*** | | ***1,873.08*** | ***580,655.99*** |
| **Global warming potential index** | | **310** | |

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Residential | AG/RAN/ER | 25.2516 | 7,828.17 |
| | Low Density Residential | 16.8625 | 5,227.49 |
| | Medium Density Residential | 10.6349 | 3,296.88 |
| | High Density Residential | 4.7785 | 1,481.37 |
| | **Total Residential** | **57.5275** | **17,833.91** |
| Commercial | Park | 0.0076 | 2.37 |
| | Commercial | 9.1907 | 2,849.17 |
| | Mixed Use | 2.4751 | 767.29 |
| | **Total Commercial** | **11.6734** | **3,618.83** |
| Industrial | Industrial | 24.3110 | 7,536.58 |
| | **Total Industrial** | **24.3110** | **7,536.58** |
| **Total from Agriculture** | | **1,779.57** | **551,666.67** |
| **Total, tons/yr** | | **1,873.08** | **580,655.99** |
| **Global warming potential index** | | 310 | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Agricultural Emissions**

## CM. Methane

### CM1. Enteric Fermentation

| Source | Number - Head/year ($U_{Aani}$) | Emission Factor kg $CH_4$/head ($EF_{MEF}$) | Conversion factor kg to MT ($C_3$) | MT $CH_4$/year ($E_{MEF}$) |
|---|---|---|---|---|
| ***Dairy Cow*** | | | | |
| Dairy Cows | 8,293.00 | 123.42 | 1000.0 | 1,023.51 |
| ***Others*** | | | | |
| Sheep | 16,397.00 | 8.00 | 1000.0 | 131.18 |
| | | | **Total** | **1,154.68** |

### CM2. Manure Management

| Source | Number - 1000s Head/year ($U_{Aani}$) | Typical Animal Mass kg/head (TAM) | Volatile Solids Produced kgVS/1000kg/year (VS) | Max $CH_4$ capacity $m^3CH_4$/kgVS ($B_O$) | Extent Capacity Realized (MCF) | Density of Methane ($C_8$) | MT $CH_4$/year ($E_{MMM}$) |
|---|---|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | | | |
| Dairy Cows | 8.293 | 604.0 | 3278.5 | 0.24 | 0.499 | 0.678 | 1,332.76 |
| **Other** | | | | | | | |
| Sheep on Feed | 16.397 | 27.0 | 3361.7 | 0.36 | 0.012 | 0.678 | 4.36 |
| | | | | | | **Total** | **1,337.11** |

### CM3. Rice Cultivation

| Season | Acres ($U_{AC}$) | Conversion hectares/acre ($C_{11}$) | Emission Factor ($EF_{PS}$) | Conversion kg/MT ($C_3$) | MT/year ($E_{MRC}$) |
|---|---|---|---|---|---|
| Primary | 96,186 | 0.40 | 210 | 1,000 | 8,174.45 |
| | | | | **Total** | **8,174.45** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Agricultural Emissions**

**CM4. Agricultural Residue Burning**

| Source | Production - Tons ($U_C$) | Residue/Crop Ratio ($R_{RC}$) | Fraction Burned ($F_{RB}$) | Fraction Dry ($F_{DM}$) | Burning Efficiency (BE) | Combustion Efficiency (CE) | Carbon Content (CC) | Ratio $CH_4$-C ($R_{CH4-C}$) | Conversion $CH_4$- to Mol.Wt. ($C_{11}$) | Emissions Tons/year ($E_{MARB}$) |
|---|---|---|---|---|---|---|---|---|---|---|
| Hay (inc Alfalfa) | 60,765.97 | 0 | 0.000 | 0.85 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Dry Edible Beans | 7,673.75 | 2.1 | 0.000 | 0.87 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Corn for Grain | 43,491.36 | 1 | 0.000 | 0.91 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Oats | 21,974.74 | 1.3 | 0.000 | 0.92 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| Rice | 371,163.14 | 1.4 | 0.097 | 0.91 | 0.93 | 0.88 | 0.38 | 0.005 | 1.33 | 94.54 |
| Sorghum | 1,966.78 | 1.4 | 0.000 | 0.91 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| All Wheat | 43,991.75 | 1.3 | 0.030 | 0.93 | 0.93 | 0.88 | 0.44 | 0.005 | 1.33 | 3.85 |
| Vegetable Crops & Fruit Trees | 464,274.43 | 0 | 0.030 | 0.87 | 0.93 | 0.88 | 0.45 | 0.005 | 1.33 | 0.00 |
| Safflower & Sunflower | 11,496.73 | 0 | 0.000 | 0.00 | 0 | 0.00 | 0.00 | 0.005 | 1.33 | 0.00 |
| | | | | | | | | | **Total** | **98.39** |

**CN. Nitrous Oxide**

**CN1. Manure Management**

| Source | Total Nitrogen Excreted ($N_T$) | Manure Anaerobic Lagoons ($\%_{AL}$) | Manure Liquid/Slurry ($\%_S$) | Manure Deep Pit ($\%_{DP}$) | Emission Factor for Liquid System ($EF_{NML}$) | $N_2O$ Emissions from Liquid System Mgt. | Manure Solid Storage/ Managed ($\%_{SS}$) | Manure Deep Pit / DryLot ($\%_{DP}$) | Manure Pasture / Poultry ($\%_P$) | Emission Factor for Solid System ($EF_{NMS}$) | $N_2O$ Emissions from solid system Mgt. | Total $N_2OMT/yr$ ($E_{NMM}$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | | | | | | | | |
| Dairy Cows | 804,440.90 | 467,234 | 166,683 | *N/A* | 0.001 | *996.16* | 74,355 | 1,830 | *N/A* | 0.02 | *2,394.41* | 3.39 |
| ***Other*** | | | | | | | | | | | | |
| Sheep on Feed | 67,868.82 | *N/A* | *N/A* | *N/A* | *N/A* | *N/A* | 66,678 | *N/A* | *N/A* | 0.02 | *2,095.60* | 2.10 |
| | | | | | | | | | | | **Total** | **5.49** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Agricultural Emissions**

## CN2. Emissions from Animals and Runoff

Indirect emissions from animals

| Source | Total Nitrogen Excreted ($N_T$) | % of Indirect Volitazition ($\%_{VI}$) | Rate of conversion from $NH_3$ to $NO_X$ ($EF_{NH3-NOX}$) | Conversion factor for kg to MT ($C_3$) | Tons/year ($E_{NIA}$) |
|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | |
| Dairy Cows | 804,440.90 | 0.20 | 0.01 | 1,000 | 2.53 |
| ***Other*** | | | | | |
| Sheep on Feed | 67,868.82 | 0.20 | 0.01 | 1,000 | 0.21 |
| | | | | **Total** | **2.74** |

Direct emissions from animals

| Source | Unmanaged Nitrogen ($N_{UM}$) | Emission Factor for Pastures, Ranges and Paddocks ($EF_{PRP}$) | Conversion factor for kg to MT ($C_3$) | Manure for Pasture, Range and Paddock ($M_{PRP}$) | Managed Nitrogen ($N_M$) | Unmanaged Daily Spread ($N_{DS}$) | % of Indirect Volitazition ($\%_{VI}$) | Emission Factor for ground Applications ($EF_{NV}$) | Manure applied to Soils ($M_{AS}$) | MT/year ($E_{NDA}$) |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Dairy Cow*** | | | | | | | | | | |
| Dairy Cows | 7,442.98 | 0.02 | 1,000 | 0.149 | 710,103 | 86,895.10 | 0.20 | 0.0125 | 7.970 | 12.992 |
| ***Other*** | | | | | | | | | | |
| Sheep on Feed | 66,678.14 | 0.02 | 1,000 | 1.334 | 1,191 | *N/A* | 0.20 | 0.0125 | 0.012 | 4.210 |
| | | | | | | | | | **Total** | **17.202** |

Emissions from Leaching

| Source | Unvolatized Synthetic Nitrogen ($N_{UVS}$) | Unvolatized Non-Manure Organic Nitrogen ($N_{UVO}$) | Conversion factor for kg to MT ($C_3$) | Leaching % of Soil ($\%_{Leach}$) | Leaching Factor - kg N2O-N / kg N ($F_{Leach}$) | Molecular Weight Ratio $N_2O:N_2$ ($C_{10}$) | Total Leaching from non-manure Fertilizer ($L_{fert}$) | Total Nitrogen Excreted ($N_T$) | % of Volitazation from Manure ($\%_{VM}$) | Total Leaching from Manure ($L_{man}$) | Total Emissions from Leaching MT/yr ($E_{NL}$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total emissions of $N_2O$ from Leaching | 18,422,105 | 7726.96 | 1,000 | 0.3000 | 0.025 | 1.57 | 217.21 | 872,310 | 0.00 | 10.28 | **227.49** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Agricultural Emissions**

**CN3: Nitrous Oxide from Crop Growth:**

| Source | Crop Production MTs | Conversion factor for kg to tons ($C_3$) | Residue/Crop Ratio ($R_{RC}$) | Fraction Dry ($F_{DM}$) | Nitrogen Content of Aboveground biomass | Nitrogen Fixed by Crops (FN) | Fraction of Residue Applied ($F_{RA}$) | Nitrogen Content of Residue ($N_{CR}$) | Nitrogen Returned to Soil ($N_{RS}$) |
|---|---|---|---|---|---|---|---|---|---|
| Hay (inc Alfalfa) | 60,765.97 | 1,000 | 0.0 | 0.8500 | 0.03 | 1,549,532 | 0.00 | *N/A* | *0* |
| Dry Edible Beans | 7,673.75 | 1,000 | 2.1 | 0.8700 | 0.03 | 620,883 | 1.60 | 0.02 | 376,856 |
| Corn for Grain | 43,491.36 | 1,000 | 1.0 | 0.9100 | *N/A* | *0* | 0.90 | 0.01 | 206,593 |
| Oats | 21,974.74 | 1,000 | 1.3 | 0.9200 | *N/A* | *0* | 0.90 | 0.01 | 165,575 |
| Rice | 371,163.14 | 1,000 | 1.4 | 0.9100 | *N/A* | *0* | 1.00 | 0.01 | 3,404,605 |
| Sorghum | 1,966.78 | 1,000 | 1.4 | 0.9100 | *N/A* | *0* | 0.90 | 0.01 | 24,355 |
| All Wheat | 43,991.75 | 1,000 | 1.3 | 0.9300 | *N/A* | *0* | 0.90 | 0.01 | 296,778 |
| Vegetable Crops & Fruit Trees | 464,274.43 | 1,000 | 0.0 | 0.0000 | 0.03 | 0 | 0.00 | 0.00 | 0 |
| Safflower & Sunflower | 11,496.73 | 1,000 | 0.0 | 0.8700 | 0.03 | 300,065 | 0.90 | 0.02 | 0 |
| Total | | | | | | 2,470,480 | | | 4,474,762 |

| Source | Crop Production (Hectares) | Nitrogen Fixed by Crops ($FN_T$) | Nitrogen Returned to Soil ($N_{RST}$) | Conversion factor for kg to tons ($C_3$) | Emission factor for soils (kg N2O-N/kgN) ($EF_{DIR}$) | Molecular Weight Ratio $N_2O:N_2$ ($C_{10}$) | Emission factor kg $N_2O$-N / ha_yr | Emissions in MT ($N_{CG}$) |
|---|---|---|---|---|---|---|---|---|
| N2O emissions from Legumes | - | 2,470,480.38 | - | 1,000 | 0.0100 | 1.57 | - | 38.82 |
| N2O emissions from Residues | - | - | 4,474,762 | 1,000 | 0.0100 | 1.57 | - | 70.32 |
| $N_2O$ from Histols (Temperate Zone) | 86,915.82 | - | - | 1,000 | - | 1.57 | 8 | 1,092.66 |
| $N_2O$ from Histols (Sub tropic Zone) | 0.00 | - | - | 1,000 | - | 1.57 | 12 | 0.00 |
| | | | | | | | **Total** | **1,201.80** |

**CN4. Emissions from Fertilizers**

| Source | Total Fertilizer Use (kg N) | Year Total Fertilizer Use (kg N) | Fertilizers (Calendar Year) | Unvolatized N (kg) (NUV) | Volatized N (kg) (NV) | Emissions (metric tons) | $N_2O$ Emissions (metric | Total Emissions from |
|---|---|---|---|---|---|---|---|---|
| **Synthetic** | 20,469,005 | 20,469,005 | 20,469,005 | 18,422,105 | 2,046,901 | 289.61 | 32.20 | **321.81** |
| **Organic** | 236,778 | 236,778 | 236,778 | 7,727 | 1,931.74 | | | |
| Dried Manure | 1,200 | 1,200 | 1,200 | | | | | |
| Activated Sewage Sludge | 204,861 | 204,861 | 204,861 | | | | | |
| Other | 30,717 | 30,717 | 30,717 | | | | | |
| *Dried Manure %* | 1% | 1% | 1% | | | | | |
| *Non-Manure Organics* | 235,578 | 235,578 | 235,578 | | | | | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Business As Usual (BAU) Inventory**
**Agricultural Emissions**

**CN5. Emissions on $N_2O$ from agricultural residue burning**

| Source | Production - MTTons ($U_C$) | Residue/Crop Ratio ($R_{RC}$) | Fraction Burned ($F_{RB}$) | Fraction Dry ($F_{DM}$) | Burning Efficiency (BE) | Combustion Efficiency (CE) | Nitrogen Content (NC) | Ratio N2O-N ($R_{N2O-N}$) | Conversion to Mol.Wt. ($C_{10}$) | Emissions MT/year ($E_{NARB}$) |
|---|---|---|---|---|---|---|---|---|---|---|
| Hay (inc Alfalfa) | 60,765.97 | 0.0000 | 0.000 | 0.85 | 0.000 | 0.00 | *N/A* | 0.007 | 1.57 | *0.00* |
| Dry Edible Beans | 7,673.75 | 2.1000 | 0.000 | 0.87 | 0.000 | 0.00 | 0.017 | 0.007 | 1.57 | 0.00 |
| Corn for Grain | 43,491.36 | 1.0000 | 0.000 | 0.91 | 0.000 | 0.00 | 0.006 | 0.007 | 1.57 | 0.00 |
| Oats | 21,974.74 | 1.3000 | 0.000 | 0.92 | 0.000 | 0.00 | 0.007 | 0.007 | 1.57 | 0.00 |
| Rice | 371,163.14 | 1.4000 | 0.097 | 0.91 | 0.930 | 0.88 | 0.007 | 0.007 | 1.57 | 2.96 |
| Sorghum | 1,966.78 | 1.4000 | 0.000 | 0.91 | 0.000 | 0.00 | 0.011 | 0.007 | 1.57 | 0.00 |
| All Wheat | 43,991.75 | 1.3000 | 0.030 | 0.93 | 0.930 | 0.88 | 0.006 | 0.007 | 1.57 | 0.09 |
| Vegetable Crops & Fruit Trees | 464,274.43 | 0.0000 | 0.000 | 0.00 | 0.000 | 0.00 | 0.000 | 0.007 | 1.57 | 0.00 |
| Safflower & Sunflower | 11,496.73 | 0.0000 | 0.030 | 0.87 | 0.930 | 0.88 | 0.023 | 0.007 | 1.57 | 0.00 |
| | | | | | | | | | **Total** | **3.05** |

**D. Summary Table**

| Source Type | | Emissions, tons/yr | $CO_2E$ metric tons/yr |
|---|---|---|---|
| Methane | Enteric Fermentation | 1,154.68 | 24,248.37 |
| | Manure Management | 1,337.11 | 28,079.41 |
| | Rice Cultivation | 8,174.45 | 171,663.40 |
| | Agricultural Residue Burning | 98.39 | 2,066.13 |
| **Total Methane** | | 10,764.63 | **226,057.31** |
| Nitrous Oxide | Manure Management | 5.49 | 1,700.71 |
| | Animals and Runoff | 247.43 | 76,704.25 |
| | Crop Growth | 1,201.80 | 372,556.64 |
| | Fertilizer Use | 321.81 | 99,760.35 |
| | Agricultural Residue Burning | 3.05 | 944.72 |
| **Total Nitrous Oxide** | | 1,779.57 | **551,666.67** |
| | **Total emissions from Agriculture** | | **777,723.98** |

# Appendix G: Reduction Measures, Assumptions and Attributed Reductions

# Sutter County
## Reduction Measures

### R1 Reductions
In order to provide credit to the County for regulatory actions already taken or planned by the State of California, The Climate Action Plan first evaluates the greenhouse gas reductions that will occur within the County as a result of these actions. These will be identified in the CAP as R1 reduction measures.

### R2 Reductions
R2 and R3 reduction measures are measures that can be incorporated at the County level to provide reductions in greenhouse gas emissions. R2 measures are those measures that can be quantified to show the value of the reduction from the incorporation of those measures.

### R3 Reductions
R3 measures are those measures that, although they provide a vehicle through which reductions in emissions will occur, cannot be quantified at this time. The R3 measures can be viewed as supportive measures or methods of implementation for the R2 measures.

## Transportation Reduction Measures

**R1-T 1 Assembly Bill 1493: Pavley I**

Assembly Bill (AB) 1493 (Pavley) required the California Air Resources Board (CARB) to adopt regulations that will reduce GHG from automobiles and light-duty trucks by 30 percent below 2002 levels by the year 2016, effective with 2009 models. By 2020, this requirement will reduce emissions in California by approximately 16.4 million metric tons of carbon dioxide equivalent ($MMTCO_2e$), representing 17.3 percent of emissions from passenger/light-duty vehicles in the State. By 2030 this requirement will reduce emissions in California by 19.70 percent from passenger/light-duty vehicles in the State.

| Pavley Afforded Reduction to automobiles & light duty Trucks | | 2020 | 2030 |
|---|---|---|---|
| | = | 17.30% | 19.70% |

**R1-T 2 Assembly Bill 1493: Pavley II**

California committed to further strengthening the AB1493 standards beginning in 2017 to obtain a 45 percent GHG reduction from 2020 model year vehicles. By 2020, this requirement will reduce emissions in California by approximately 4.0 $MMTCO_2e$, representing 2.5 percent of emissions from passenger/light-duty vehicles in the State. By 2030 reductions from increased energy efficiency for passenger and light duty vehicles would increase by 55% (from combined Pavley I and II 2020 reductions of 22.2% to 34.25%) and will provide reductions from heavy duty vehicles by at least 25%. Airplane fuel economy will increase reductions by at least 25% by 2030 (PEW, 2003).

| | | 2020 | 2030 |
|---|---|---|---|
| Pavley Afforded Reduction to automobiles & light duty Trucks | = | 2.50% | 14.55% |
| Pavley Afforded Reductions to Heavy Duty Trucks | = | N/A | 25.00% |
| Reduction afforded to airplane fuel | = | N/A | 25.00% |

**R1-T 3 Executive Order S-1-07 (Low Carbon Fuel Standard)**

The Low Carbon Fuel Standard (LCFS) will require a reduction of at least ten (10) percent in the carbon intensity of California's transportation fuels by 2020. This requirement will reduce emissions in California by approximately 15 $MMTCO_2e$, representing 6.9 percent of emissions from passenger/light-duty vehicles in the State. This requirement will reduce emissions in California by 7.2 percent from passenger/light-duty vehicles in the State by 2030.

| Reduction to automobiles & light duty Trucks | | 2020 | 2030 |
|---|---|---|---|
| | = | 6.90% | 7.20% |

**R1-T 4 Tire Pressure Program**

The AB32 early action measure involves actions to ensure that vehicle tire pressure is maintained to manufacturer specifications. By 2020, this requirement will reduce emissions in California by approximately 0.55 $MMTCO_2e$, representing 0.3 percent of emissions from passenger/light-duty vehicles in the State.

| | | 2020 | 2030 |
|---|---|---|---|
| Reduction to automobiles & light duty Trucks | = | 0.30% | 0.30% |

**R1-T 5 Low Rolling Resistance Tires**

This AB32 early action measure would increase vehicle efficiency by creating an energy efficiency standard for automobile tires to reduce rolling resistance. By 2020, this requirement will reduce emissions in California by approximately 0.3 $MMTCO_2e$, representing 0.2 percent of emissions from passenger/light-duty vehicles in the State.

| | | 2020 | 2030 |
|---|---|---|---|
| Reduction to automobiles & light duty Trucks | = | 0.30% | 0.30% |

**R1-T 6 Low Friction Engine Oils**

This AB32 early action measure would increase vehicle efficiency by mandating the use of engine oils that meet certain low friction specifications. By 2020, this requirement will reduce emissions in California by approximately 2.8 $MMTCO_2e$, representing 1.7 percent of emissions from passenger light-duty vehicles in the State.

| | | 2020 | 2030 |
|---|---|---|---|
| Reduction to automobiles & light duty Trucks | = | 1.70% | 1.70% |

**R1-T 7 Cool Paints and Reflective Glazing**

This AB32 early action measure is based on measures to reduce the solar heat gain in a vehicle parked in the sun. By 2020, this requirement will reduce emissions in California by approximately 0.89 $MMTCO_2e$, representing 0.6 percent of emissions from passenger/light-duty vehicles in the State.

| | | 2020 | 2030 |
|---|---|---|---|
| Reduction to automobiles & light duty Trucks | = | 0.60% | 0.60% |

**R1-T 8 Goods Movement Efficiency Measures**

This AB32 early action measure targets system wide efficiency improvements in goods movement to achieve GHG reductions from reduced diesel combustion. By 2020, this requirement will reduce emissions in California by approximately 3.5 $MMTCO_2e$, representing 1.6 Percent of emissions from all mobile sources (on-road and off-road) in the State.

| | | 2020 | 2030 |
|---|---|---|---|
| Reduction afforded to Medium and Heavy Duty Vehicle emissions | = | 1.60% | 1.60% |

**R1-T 9 Heavy-Duty Vehicle GHG Emission Reduction (Aerodynamic Efficiency)**

This AB32 early action measure would increase heavy-duty vehicle (long-haul trucks) efficiency by requiring installation of best available technology and/or CARB approved technology to reduce aerodynamic drag and rolling resistance. By 2020, this requirement will reduce emissions in California by approximately 0.93 $MMTCO_2e$, representing 1.9 percent of emissions from heavy-duty vehicles in the State.

| Reduction afforded to Heavy Duty Vehicles emissions | | 2020 | 2030 |
|---|---|---|---|
| | = | 1.90% | 1.90% |

**R1-T 10 Medium and Heavy Duty Vehicle Hybridization**

The implementation approach for this AB 32 measure is to adopt a regulation and/or incentive program that reduce the GHG emissions of new trucks (parcel delivery trucks and vans, utility trucks, garbage trucks, transit buses, and other vocational work trucks) sold in California by replacing them with hybrids. By 2020, this requirement will reduce emissions in California by approximately 0.5 $MMTCO_2e$, representing 0.2 percent of emissions from all on-road mobile sources in the State. This reduction is also equivalent to a 1.0 percent reduction of emissions from all heavy-duty trucks in the State.

| Reduction afforded to all on-road mobile sources | | 2020 | 2030 |
|---|---|---|---|
| | = | 0.20% | 0.20% |

**R2-T 1 Employment Based Trip and VMT Reduction**

Implementation of this measure would require adopting a voluntary trip reduction ordinance that promotes commuter-choice programs, employer transportation management, guaranteed ride home programs and commuter assistance and outreach type programs intended to reduce commuter vehicle miles traveled. A guaranteed ride home program is a program that ensures employees that take advantage of carpooling opportunities are guaranteed a safe ride home should the employee miss the carpool pick-up time due to work related activities. This could be as simple as the employer paying for taxi service for the employee. This measure would require employers with more than 100 employees within the unincorporated County to establish a trip reduction plan that would incorporate annual employee commute surveys, marketing of commute alternatives, ride matching assistance, and transit information at a minimum. This reduction measure adds to and enhances Mobility Policies 2.G-2 and 2.G-3.

The Sutter Pointe development, in addition to the above ordinance, and in accordance with its Master Air Quality Mitigation Plan (MAQMP), will provide the following services and programs that will enhance the reduction of VMT within this Specific Plan Area. The following elements of the Sutter Pointe MAQMP are included within R2-T1 because they will reduce GHG emissions and further the County's goal of achieving the reduction target:

- Sutter Pointe will create a Transportation Management Association (TMA) with the primary goal of providing alternative mode use programs and services to the residents, employers, and employees, as
- Employment of a Transportation Coordinator (TC) will be required for all commercial/industrial development with 500 or more employees. The primary role of the TC will be to act as a liaison between the TMA and their employer and employees to disseminate information and facilitate trip

**Assumptions:**

* By 2020, this measure results in a 0.2% reduction in passenger/light-duty VMT in the County.
* By 2030, this measure results in a 4% reduction in passenger/light-duty VMT in the County.
* The percentage reduction reflects a growing decentralized and geographically extensive transportation network in the County.
* Measures R1-T1 through R1-T7 are implemented

**Reductions:**

| Reduction afforded to passenger/light duty VMT in county | | 2020 | 2030 |
|---|---|---|---|
| | = | 0.20% | 4.00% |

**R2-T 2 Land Use Based trips and VMT Reduction Policies**

The demand for transportation is influenced by the density and geographic distribution of people and places. Whether neighborhoods have sidewalks or bike paths, whether homes are within walking distance of shops or transit stops will influence the type and amount of transportation that is utilized. By changing the focus of land use from automobile centered transportation, a reduction in vehicle miles traveled will occur. Implementation of Policies LU1.2 (Balanced Land Use Pattern), LU1.3 (Adequate Land Use Supply), LU 3.5 (Infill Development), LU 3.9 (Rural Hubs), LU 3.12 (Mixed Use); Mobility Policies M 3.1 (Transit Service for Residents), M 3.2 (Transit in New Development), M 3.3 (Transit Integration); and Agricultural Policies AG 4.4 (Farm worker Housing), AG 4.6 (Local Processing), AG 4.7 (Local Purchasing), and AG 4.12 (Support Uses) will all work together to provide a reduction in VMT for the County, by changing the focus of land use away from vehicle centered transportation to the increased densities and lay-outs that foster the implementation and use of alternate modes of transportation.

**Assumptions:**

* General Plan Policies: Land Use LU 1.2, 1.3, 3.5, 3,.9, 3.12, Mobility 2.C-1, 2.C-2, 2.C-3, and Agricultural policies AG4.4, AG 4.6, AG 4.7, and AG 4.12; are implemented and enforced with the planning of new development.
* In 2020, reduction in VMT is approximately 4% per year.
* In 2030, reduction in VMT is approximately 6% per year.
* Measures R2-T2, R2-T3, R2-T5, R2-T6, R2-T8, and R3-T1 are implemented.

**Reductions:**

| Reduction afforded to passenger/light duty | | 2020 | 2030 |
|---|---|---|---|
| VMT in county | = | 4.00% | 6.00% |

**R2-T 3 Preferential Parking**

Implementation of this reduction measure would encourage the County to adopt a comprehensive parking program for public and private parking lots that facilitate carpooling and alternate transportation. Incentives to encourage carpooling and the use of alternate transportation methods could include:

- Providing reserved preferential parking spaces for car-share, carpool, and ultra-low or zero emission vehicles;
- Provide larger parking spaces that can accommodate vans used for ride-sharing programs and reserve them for vanpools; and include adequate passenger waiting/loading areas;
- Consider restricting the number of parking spaces within the County by sharing parking among different land uses where feasible. For example in areas where there are multiple land uses provide resident restricted parking during nighttime hours (7pm to 7am) and open the parking lot
- Provide convenient pedestrian pathways through parking areas.

The development within the Sutter Pointe Specific Plan area requires, as part of the MAQMP, that developments with 100 or more employees provide the minimum required parking and develop the sites to facilitate alternate modes of transportation.

**Assumptions:**

* The percentage reduction reflects a growing decentralized and geographically extensive transportation network in the County.
* Measures R1-T1 through R1-T7 and R2-T1 - R2-T2 are implemented
* In 2020, reduction is equal to 0.1% from all vehicle miles traveled by passenger and light duty vehicles in the County.
* In 2030. reduction is equal to 0.88% from all vehicle miles traveled by passenger and light duty vehicles in the County.

**Reductions:**

| Reduction afforded to passenger/light duty | | 2020 | 2030 |
|---|---|---|---|
| VMT in county | = | 0.10% | 0.88% |

**R2-T 4**

**Roadway Improvements Including Signal Synchronization and Transportation Flow Management**

This reduction builds on Mobility Goals M 1 and M 2, and Agricultural Policy AG 4.1 and supports (through the policies associated with those goals) modification of arterial roadways to promote and support multimodal transportation options for automobiles, transit, trucks,. In addition, this measure results in the maintenance of existing regional transportation systems to support the local, national, and global movement of agricultural products. These modifications include, but are not limited to, synchronization of signals, improvement of traffic flow, the development of parallel roadways, and support for the extension of freight rail into Sutter County's industrial areas.

**Assumptions:**

* In 2020, results in a 1% reduction in fuel consumption.
* In 2030, results in a 1.5% reduction in fuel consumption.
* A 1% reduction in fuel consumption is equal to a 1% reduction in VMT.
* A 1.5% reduction in fuel consumption is equal to a 1.5% reduction in VMT.
* Measures R1-T1 through R1-T7 and R2-T1 - R2-T3 are implemented

**Reductions:**

| Reduction afforded to passenger/light duty VMT in county | | 2020 | 2030 |
|---|---|---|---|
| | = | 1.00% | 1.50% |

**R2-T 5 Increase the Use of Ridesharing as an Alternative to Single Occupancy Vehicle Use**

Mobility Implementation Programs M 3-A, M 3-B, and M 3-C promote the use of ridesharing throughout the County by strengthening the transportation network within the Unincorporated County as well as between the Unincorporated County and the Cities within the County. Encouraging community car-sharing through employers will further enhance the use of these services and support the underlying goal of reducing congestion and providing viable alternatives to automobile use. Further reductions in VMT could be obtained through assistance provided by a Transportation Management Agency (TMA). A TMA could oversee or provide assistance with the creation of rideshare incentives for employees such as gas cards, carpool awards, educational seminars, commuter-choice programs, commuter-tax benefits, guaranteed ride-home programs, commuter assistance and outreach, parking incentives, and the encouragement of telecommuting and compressed work weeks. This reduction measure will also be enhanced by the requirements of the MAQMP as discussed in R2-T1 above.

**Assumptions:**

* The percentage reduction reflects a growing decentralized and geographically extensive transportation network in the County.
* Measures R1-T1 through R1-T7 and R2-T1 - R2-T4 are implemented are implemented
* Results in a 0.1% reduction in vehicle miles traveled by passenger cars and light duty trucks in 2020.
* Results in a 3% reduction in vehicle miles traveled by passenger cars and light duty trucks in 2030.

**Reductions:**

| Reduction afforded to passenger/light duty VMT in county | | 2020 | 2030 |
|---|---|---|---|
| | = | 0.10% | 3.00% |

**R2-T 6 Provide a Comprehensive System of Facilities for Non-motorized Transportation**

Mobility Goal M 5, and land use policies LU 1.10 (Efficient Land Use Patterns) and LU 4.8 (Quality New Development) require the County to address bicycle and pedestrian facilities. These goals and policies should: encourage the creation of bike lanes and walking paths directed to the location of schools, provide adequate bicycle parking; and encourage the development of bicycle stations, attended parking, and other attended bicycle support facilities at intermodal hubs. Bicycle stations are full-service bicycle facilities that in addition to providing secure, guarded bicycle parking could include other amenities such as "valet" bicycle service, showers, bicycle rentals, or repair services. These types of requirements are intended for large residential and non-residential development as well as large employers (500 or more employees). In addition, the establishment of multi-use trails that promote off-street bicycle and pedestrian travel as well as secure bicycle racks along these pathways will encourage their use.

The development within the Sutter Pointe Specific Plan area requires, as part of the MAQMP, bicycle and pedestrian connectivity where projects will be required to support bicycling and walking through providing amenities or incorporating convenient access to/within the project sites. Amenities and site design for these developments may include:

- Proximity to bike lanes;
- Elimination of impediments to bicycle and pedestrian circulation;
- Secure bicycle storage;
- Bicycle and pedestrian incentive programs; and
- Showers and lockers.

**Assumptions:**

* The percentage reduction reflects a growing decentralized and geographically extensive transportation network in the County.
* Measures R1-T1 through R1-T7 and R2-T1 - R2-T5 are implemented are implemented
* Results in a 0.02% reduction in 2020, and 0.07% reduction in 2030, in vehicle miles traveled by passenger cars and light duty trucks from the development of Sutter Pointe only. - Assumes that large residential, commercial, and industrial development will occur only in Sutter Pointe.

**Reductions:**

| | | 2020 | 2030 |
|---|---|---|---|
| Afforded Reduction | = | 0.20% | 0.20% |
| % passenger/light duty from Sutter Pointe | = | 18.48% | 34.47% |
| Reduction afforded to passenger/light duty VMT County | = | 0.02% | 0.07% |

**R2-T 7 Expand Renewable Fuel/Low-Emission Vehicle Use**

Implementation of the following would promote the expanded use of renewable fuel and low-emission vehicles:

- Collaboration between local and regional governments and business to foster the increased use of renewable fuels. This can be accomplished by coordinating the siting of new alternative fueling/recharging locations for example.
- Providing preferential parking for ultra low-, zero- emission, and alternative fuel vehicles;
- Collaboration with energy providers to ensure the availability of necessary facilities and infrastructure to encourage the use of privately owned zero emission vehicles. This can be accomplished by having conveniently located charging and fueling stations for these vehicles.
- Provide incentives for taxicabs to use gas-electric hybrid vehicles or, at a minimum, smaller more fuel-efficient vehicles.

New developments within the Sutter Pointe Specific Plan area (as provided in the EIR for the area) will be required to provide the necessary facilities and infrastructure in all land use types to encourage the use of low or zero-emission vehicles (e.g., electric vehicle charging facilities and conveniently located alternative fueling stations). In addition industrial and commercial land uses will require all forklifts, yard trucks, or vehicles that are predominantly used onsite at non-residential land uses to be electric-powered or powered by biofuels that are produced from waste products, or shall use other technologies that do not rely on direct fossil fuel consumption.

**Assumptions:**

* Results in a 2% increase in 2020, and a 3% increase in 2030, in average miles per gallon for passenger vehicles and light duty trucks.
* A 2 % increase in average miles per gallon is equal to a 2% reduction in VMT.
* Measures R1-T1 through R1-T7 and R2-T1 - R2-T6 are implemented are implemented

**Reductions:**

| | | 2020 | 2030 |
|---|---|---|---|
| Reduction afforded to passenger/light duty VMT County | = | 2.00% | 3.00% |
| Reduction from increase in alternative fuel use | = | N/A | 4.00% |
| Reduction afforded to passenger/light duty VMT County | = | N/A | 7.00% |

**R2-T 8 Transit Infrastructure Development within the Sutter Pointe Specific Plan**

The Sutter Pointe Specific Plan EIR has included the following requirements regarding transportation. The inclusion of these requirements will facilitate the reduction of vehicle miles traveled and help to reduce greenhouse gas emissions throughout the County. A Conceptual Transit Plan has been developed for Sutter Pointe that includes plans for phased transit service which will begin as soon as 50 interested riders have been identified. There are four phases of transportation improvement within the Sutter Pointe development as follows:

- Phase 1 will extend past 2020 based on anticipated residential development. The primary focus of this phase is for the TMA to facilitate or develop and market rideshare initiatives including car and vanpool programs, commuter bus services, incorporation of transit stops for the Yuba-Sutter Transit system, and Airporter services to and from Sacramento International Airport.
- Phase 2 of the Sutter Pointe Transit Plan would incorporate an expansion of Sutter Pointe Transit Commuter Express Service.
- Phase 3 would increase Sacramento commuter service capacity, expand commuter service to Placer County, establish midday service to Sacramento and provide commute services to the Sutter Pointe Business Park from adjacent communities. With warranted demand, dedicated peak hour trips serving the Sutter Pointe business and industrial parks could be added from the Yuba City/Marysville area.
- Phase 4 would incorporate further expansion of the Sutter Pointe commuter bus services to Sacramento and Placer County, develop local transit services, and expand neighboring regional transit services.

**Assumptions:**

* Results in a 2.00% reduction in worker trips in 2020, and 5% reduction in 2030, from the Sutter Pointe development.
* Assumes ~32% of workers in 2020, and ~48% of workers in 2030, will be from the Sutter Pointe development.
* Assumes that ~34% of Conseptual Transit Plan Phase 1 is implemented by 2020, and 100% is built out by 2030.
* Measures R1-T1 through R1-T7 and R2-T1 - R2-T7 are implemented are implemented

**Reductions:**

| | | 2020 | 2030 |
|---|---|---|---|
| Afforded Reduction | = | 2.00% | 5.00% |
| % workers from Sutter Pointe | | 32.15% | 48.20% |
| % of Phase 1 implemented | = | 34.34% | 100.00% |
| Reduction afforded to passenger/light duty VMT County | = | 0.22% | 2.41% |

## Energy Reduction Measures

**R1-E 1 Renewable Portfolio Standard for Building Energy Use**

Senate Bills (SBs) 1075 (2002) and 107 (2006) created the State's Renewable Portfolio Standard (RPS), with an initial goal of 20 percent renewable energy production by 2010. Executive Order (EO) S-14-08 establishes a RPS target of 33 percent by the year 2020 and requires State agencies to take all appropriate actions to ensure the target is met. The 33 percent RPS by 2020 goal is supported by the California Air Resources Board (CARB), though its feasibility is not certain due to current limitations in production and transmission of renewable energy.

**Assumptions:**

* PG&E reaches it 33% goal for 2020.
* Assumes that in 2008 PG&E's renewable portfolio was at 12% with respect to California's RPS.
* Assumes a 21% reduction in emissions from existing kWHs used.
* Assumes R1-E2 through R1-E6 have been implemented.

**Reductions:**

| | | 2020 | 2030 |
|---|---|---|---|
| % Reduction Afforded | = | 21.00% | 21.00% |

**R1-E 2 & 3 AB1109 Energy Efficiency Standard for Lighting**

Assembly Bill (AB1109) mandated that the California Energy Commission (CEC) on or before December 31, 2008, adopt energy efficiency standards for general purpose lighting. These regulations, combined with other State efforts, shall be structured to reduce State-wide electricity consumption in the following ways:

- R1-E2: At least 50 percent reduction from 2007 levels for indoor residential lighting by 2018; and
- R1-E3: At least 25 percent reduction from 2007 levels for indoor commercial and outdoor lighting by 2018.

**Assumptions:**

* Assumes 20% of residential electrical use is from lighting.
* Assumes 37.14% of commercial/industrial electrical usage is from lighting.
* No data was available to determine outdoor lighting use, therefore no reduction was taken.

**Reductions:**

| | | 2020 | 2030 |
|---|---|---|---|
| % reduction from residential electrical use | = | 10.00% | 10.00% |
| % reduction from commercial/industrial electrical use | = | 9.29% | 9.29% |

**R1-E 4 Electrical Energy Efficiency**

This measure captures the emission reductions associated with electricity energy efficiency activities included in CARB's AB32 Scoping Plan that are not attributed to other R1 or R2 reductions, as described in this report. This measure includes energy efficiency measures that CARB views as crucial to meeting the State-wide 2020 target, and will result in additional emissions reductions beyond those already accounted for in California's Energy Efficiency Standards for Residential and Non-Residential Buildings (Title 24, Part 6 of the California Code of Regulations; hereinafter referred to as, "Title 24 Energy Efficiency Standards"), the County's adopted Green Building ordinance (effective January 1, 2011), etc. By 2020, this requirement will reduce emissions in California by approximately 21.3 $MMTCO_2e$, representing 17.5 percent of emissions from all electricity in the State. This measure includes the following strategies:

- "Zero Net Energy" buildings (buildings that combine energy efficiency and renewable generation so that they, based on an annual average, extract no energy from the grid);

- Broader standards for new types of appliances and for water efficiency;
- Improved compliance and enforcement of existing standards;
- Voluntary efficiency and green building targets beyond mandatory codes;
- Voluntary and mandatory whole-building retrofits for existing buildings;
- Innovative financing to overcome first-cost and split incentives for energy efficiency, on-site renewables, and high efficiency distributed generation;
- More aggressive utility programs to achieve long-term savings;
- Water system and water use efficiency and conservation measures;
- Additional industrial and agricultural efficiency initiatives; and
- Providing real time energy information technologies to help consumers conserve and optimize energy performance.

**Assumptions:**

* The percent reduction from California's emissions from various energy efficiency measures is equal to the County's emissions from this measures or 17.5%.
* Assumes application only to New development

**Reductions:**

| | | 2020 | 2030 |
|---|---|---|---|
| % reduction afforded | = | 17.50% | 17.50% |
| % of 2020 from growth | = | 38.56% | 38.56% |
| % reduction applied | = | 6.75% | 6.75% |
| % reduction afforded in 2030 | = | N/A | 11.31% |
| % of 2030 growth from 2020 | = | N/A | 35.99% |
| % reduction from 2030 growth | = | N/A | 4.07% |
| % reduction applied | = | N/A | 10.82% |

**R1-E 5 Natural Gas Energy Efficiency**

This measure captures the emission reductions associated with natural gas energy efficiency activities included in CARB's AB32 Scoping Plan that are not attributed to other R1 or R2 reductions, as described in this report. This measure includes energy efficiency measures that CARB views as crucial to meeting the State-wide 2020 target, and will result in additional emissions reductions beyond those already accounted for in California's Energy Efficiency Standards for Residential and Non-Residential Buildings (Title 24, Part 6 of the California Code of Regulations; hereinafter referred to as, "Title 24 Energy Efficiency Standards"), the County's adopted Green Building ordinance(effective January 1, 2011), etc. By 2020, this requirement will reduce emissions in California by approximately 4.3 $MMTCO_2e$, representing 6.2 percent of emissions from all natural gas combustion in the State. This measure includes the following strategies:

- "Zero Net Energy" buildings (buildings that combine energy efficiency and renewable generation so that they, based on an annual average, extract no energy from the grid);
- Broader standards for new types of appliances and for water efficiency;
- Improved compliance and enforcement of existing standards;
- Voluntary efficiency and green building targets beyond mandatory codes;
- Voluntary and mandatory whole-building retrofits for existing buildings;
- Innovative financing to overcome first-cost and split incentives for energy efficiency, on-site renewables, and high efficiency distributed generation;
- More aggressive utility programs to achieve long-term savings;
- Water system and water use efficiency and conservation measures;
- Additional industrial and agricultural efficiency initiatives; and
- Providing real time energy information technologies to help consumers conserve and optimize energy performance.

**Assumptions:**

* The percent reduction from California's emissions from various energy efficiency measures is equal to the County's emissions from this measures or 6.2%.
* Assumes application only to New development

**Reductions:**

| | | 2020 | 2030 |
|---|---|---|---|
| % reduction afforded | = | 6.20% | |
| % of 2020 from growth | = | 38.56% | |
| % reduction applied | = | 2.39% | |
| % reduction afforded in 2030 | = | N/A | 2.20% |
| % of 2030 growth from 2020 | = | N/A | 35.99% |
| % reduction from 2030 growth | = | N/A | 0.79% |
| % reduction applied | = | N/A | 3.18% |

**R1-E 6 Increased Combined Heat and Power**

This measure captures the reduction in building electricity emissions associated with the increase of combined heat and power activities, as outlined in CARB's AB32 Scoping Plan. The Scoping Plan suggests that increased combined heat and power systems, which capture "waste heat" produced during power generation for local use, will offset 30,000 GWh State-wide in 2020. Approaches to lowering market barriers include utility-provided incentive payments, a possible CHP portfolio standard, transmission and distribution support systems, or the use of feed-in tariffs. By 2020, this requirement will reduce emissions in California by approximately 6.7 $MMTCO_2e$, representing 7.6 percent of emissions from all electricity in the State.

**Assumptions:**

* The percent reduction from California's emissions is equal to the County's emissions from this measures or 7.6%.

**Reductions:**

| | | 2020 | 2030 |
|---|---|---|---|
| % reduction afforded | = | 7.60% | 7.60% |

**R1-E 7 Industrial Efficiency Measures**

This measure captures the reduction in industrial building energy emissions associated with the energy efficiency measures for industrial sources included in CARB's AB32 Scoping Plan. By 2020, this requirement will reduce emissions in California by approximately 1.0 $MMTCO_2e$, representing 3.9 percent of emissions from all industrial natural gas combustion in the State. CARB proposes the following possible State-wide measures:

- Oil and gas extraction;
- GHG leak reduction from oil and gas transmission;
- Refinery flare recovery process improvements; and
- Removal of methane exemption from existing refinery regulations.

**Assumptions:**

* The percent reduction from California's emissions is equal to the County's emissions from this measures or 3.9%.
* Assumes applies to all residential, commercial, and industrial land uses.

**Reductions:**

| | | 2020 | 2030 |
|---|---|---|---|
| % reduction afforded | = | 3.90% | 3.90% |

**R1-E 8 Renewable Portfolio Standard (33% by 2020) Related to Water Supply and Conveyance**

This measure would increase electricity production from eligible renewable power sources to 33 percent by 2020. A reduction in GHG emissions results from replacing natural gas-fired electricity production with zero GHG-emitting renewable sources of power. By 2020, this requirement will reduce emissions from electricity used for water supply and conveyance in California by approximately 21.3 $MMTCO_2e$, representing 15.2 percent of emissions from electricity generation (in-State and imports).

**Assumptions:**

* The percent reduction from California's emissions is equal to the County's emissions from electricity used for water supply and conveyance or 21%.
* Assumes applies to all residential, commercial, and industrial land uses.

**Reductions:**

| | | 2020 | 2030 |
|---|---|---|---|
| % reduction afforded | = | 21.00% | 21.00% |

**R2-E 1 Residential Energy Efficiency Program**

This measure involves the adoption of a program that facilitates energy efficient design for all new residential buildings within the Sutter Pointe Specific Plan to be 20% beyond the current Title 24 Standards which will implement the new development requirements set forth in the Sutter Pointe Specific Plan EIR. This energy efficiency requirement for the Sutter Pointe Specific Plan is equal to that of the LEED for Homes and ENERGY STAR programs.

The 2008 Title 24 Energy Standards were adopted by the Energy Commission on April 23, 2008, with the 2008 Residential Compliance Manual adopted by the Commission on December 17, 2008. Compliance with the 2008 standards went into effect January 1, 2010. In an effort to meet the overall goal of the California Energy Efficiency Strategic Plan of reaching zero net energy for residential buildings by 2020, the stringency of the Title 24 Energy Standards as regulated and required by the State will continue to increase every three years. As energy efficiency standards increase the County may want to periodically re-evaluate their percentage beyond Title 24 goal to ensure it is still a feasibly achievable goal.

As described in the Sutter Pointe Specific Plan DEIR and to facilitate the implementation of this program, the County could provide all developers with a list of potentially feasible GHG reduction measures that reflect the current state of the regulatory environment prior to design development. The developer will then submit to the County a mitigation report demonstrating which of the proposed reduction measures are feasible as well as why the unselected measures are infeasible. The County will develop a menu of options with points assigned to them. As long as a developer meets the required point allotment (100 points) the developer will meet the requirements of this measure. This system will assure flexibility in the implementation of this reduction measure. Although not limited to these actions, this reduction goal can be achieved through the incorporation of the following:

- Install energy efficient appliances, including air conditioning and heating units, dishwashers, water heaters, etc.;
- Install solar water heaters;
- Install top quality windows and insulation;
- Install energy efficient lighting;
- Optimize conditions for natural heating, cooling and lighting by building siting and orientation.
- Use features that incorporate natural ventilation;
- Install light-colored "cool" pavements, and strategically located shade trees along all bicycle and pedestrian routes; and
- Incorporate skylights; reflective surfaces, and natural shading in buildings design and layouts.

Sutter Pointe is implementing a pilot solar program which will offer solar as a standard feature on a percentage of homes in the Phase 1 development stage and as an upgrade for all homes. Given the success of the program it will be continued through the additional phases of the specific plan development.

Residential developments within the unincorporated portions of Sutter County that are not within the Sutter Pointe Specific Plan are encouraged to participate in the volunteer Residential Energy Efficiency Program. This volunteer program would set a minimum goal of achieving energy efficiency of 5% greater than current Title 24 Standards. Incentives to participate in this volunteer program include prioritization and streamlining of the application process for residential projects that achieve the minimum goal. The County will develop a menu of options with points assigned to them. As long as a developer meets the required point allotment (33 points) the developer will meet the requirements of this measure. This system will assure flexibility in the implementation of this reduction measure. Although not limited to these actions, this reduction goal can be achieved through the incorporation of the strategies outlined in the bullet points above.

**Assumptions:**

- Applies to new development only.
- Assumes new development within Sutter Pointe to be 20% beyond current Title 24.
- Assumes new development within the remainder of Unincorporated County to be 10% beyond current Title 24.

**Reductions:**

| | | 2020 | 2030 |
|---|---|---|---|
| % 2020 residential growth | = | 35.66% | 52.71% |
| % of new residential development from Sutter Pointe | = | 47.85% | 33.60% |
| % new development from Sutter Pointe | = | 17.06% | 34.47% |
| % Development from Unincorporated County | = | 18.60% | 18.24% |
| % reduction afforded to Sutter Pointe | = | 20.00% | 20.00% |
| % reduction afforded to Unincorporated County | = | 5.00% | 10.00% |
| % reduction from Sutter Pointe | = | 3.41% | 6.89% |
| % reduction from Unincorporated County | = | 0.93% | 1.82% |
| Reduction from growth between 2008 and 2020 | = | N/A | 4.34% |
| Total % reduction | = | 4.34% | 13.06% |

**R2-E 2 Residential Renewable Energy Program**

This measure facilitates the voluntary incorporation of renewable energy (such as photovoltaic panels) into new residential developments. For participating developments, renewable energy application should be such that the new home's projected energy use from the grid is reduced by 50%. The California Energy Commissions' New Solar Homes Partnership is a component of the California Solar Initiative and provides rebates to developers of 6 or more units where 50% of the units include solar power. In addition this measure would encourage that all residents be equipped with "solar ready" features where feasible, to encourage future installation of solar energy systems. These features should include the proper solar orientation (south facing roof sloped at $20^{O}$ to $55^{O}$ from the horizontal), clear access on south sloped roofs, electrical conduit installed for solar electric system wiring, plumbing installed for solar hot water systems, and space provided for a solar hot water tank. The incentive program should provide enough funding and other incentives as shown in the R3 measures to result in approximately fifty percent of new residential development participation in this program, thereby resulting in a 25% reduction in electrical consumption from new residential developments.

As an alternative to, or in support of, providing onsite renewable energy, the project proponent can buy into a purchased energy offset program that will allow for the purchase of electricity generated from renewable energy resources offsite. Purchased energy offsets (or a combination of incorporated renewables and purchased offsets) must be equal to 25% of the total projected energy consumption for the development. See R3-E3 for further details on the financing program.

**Assumptions:**

* Applies to new development only.
* Assumes that 50% of new development will participate.
* Assumes that those developments participating will reduce electrical use by 50%.

**Reductions:**

| | | 2020 | 2030 |
|---|---|---|---|
| % 2020 residential growth | = | 35.66% | 52.71% |
| % reduction from energy use | = | 25.00% | 25.00% |
| Total % reduction | = | 8.91% | 13.18% |

**R2-E 3 Residential Retrofit Implementation Program**

This measure would initiate a County program that facilitates the incorporation of energy reduction measures for residential buildings undergoing major renovations. AB 811 is a potential funding source to the County for implementing incentive programs to encourage residences within the County to undertake energy efficiency retrofitting and reducing energy consumption in retrofitted homes by a minimum of 15%. As with the new development, the County will develop a menu of options with points assigned to them. As long as a developer meets the required point allotment (100 points) the developer will meet the requirements of this measure. This system will be provided to assure flexibility in the implementation of this reduction measure. Although not limited to these actions, this reduction goal can be achieved through the incorporation of the following:

- Replace inefficient air conditioning and heating units with new energy efficient models;
- Replace older, inefficient appliances with new energy efficient models;
- Replace old windows and insulation with top-quality windows and insulation;
- Install solar water heaters;
- Replace inefficient and incandescent lighting with energy efficient lighting; and
- Weatherize the existing building to increase energy efficiency.

**Assumptions:**

* Applies to existing development only.
* Assumes that 25% of existing development will participate.
* Assumes that those developments participating will increase efficiency by 15%.
* Assumes reduction from electrical and natural gas.

| **Reductions:** | | 2020 | 2030 |
|---|---|---|---|
| % of 2020 that is existing residential development | = | 64.34% | 47.29% |
| % reduction applied | = | 15.00% | 15.00% |
| % existing homes participating | = | 5.00% | 25.00% |
| Total % reduction | = | 0.48% | 1.77% |

**R2-E 4 Residential Renewable Retrofit Program**

This measure will initiate an incentive program that encourages residents to retrofit their homes with photovoltaic panels such that 50% of all of the home's electrical usage is offset. The California Energy Commission's Solar Initiative has incentives available to home owners.

**Assumptions:**

* Applies to existing development only.
* Assumes that 25% of existing development will participate.
* Assumes that those developments participating will reduce emissions from electricity by 50%.
* Assumes reduction from electricity.

| **Reductions:** | | 2020 | 2030 |
|---|---|---|---|
| % of 2020 that is existing residential development | = | 64.34% | 47.29% |
| % reduction applied | = | 50.00% | 50.00% |
| % existing homes participating | = | 5.00% | 25.00% |
| Total % reduction | = | 1.61% | 5.91% |

**R2-E 5 Commercial Energy Efficiency Program**

This measure involves the adoption of a County Program that facilitates the energy efficient design for all new commercial buildings within Sutter Pointe to be 20% beyond the current Title 24 Standards which expands the new development requirements set forth in the Sutter Pointe Specific Plan EIR. This voluntary energy efficiency requirement is 10% greater than the minimum requirements of the LEED and ENERGY STAR programs. As energy efficiency standards increase the County may want to periodically re-evaluate their percentage beyond Title 24 goal to ensure it is still a feasibly achievable goal.

As described in R2-E1 above, the County could provide all developers with a list of potentially feasible GHG reduction measures that reflect the current state of the regulatory environment. The County will develop a menu of options with points assigned to them. As long as a developer meets the required point allotment (100 points) the developer will meet the requirements of this measure. This system will provide flexibility in the implementation of this reduction measure. Although not limited to these actions, this reduction goal can be achieved through the incorporation of the following:

- Install energy efficient appliances, including air conditioning and heating units, dishwashers, water heaters, etc.;
- Install solar water heaters;
- Install top quality windows and insulation;
- Install energy efficient lighting;
- Optimize conditions for natural heating, cooling and lighting by building siting and orientation.
- Use features that incorporate natural ventilation;
- Install light-colored "cool" pavements, and strategically located shade trees along all bicycle and pedestrian routes; and
- Incorporate skylights; reflective surfaces, and natural shading in buildings design and layouts.

The Sutter Pointe Specific Plan requires all non-residential buildings (25,000 sq feet or more) to install Energy Star (or equivalent) cool roofing systems and energy efficient furnaces. These features are intended to reduce energy consumption for non-residential projects.

Commercial developments within the unincorporated portions of Sutter County that are not within the Sutter Pointe Specific Plan are encouraged to participate in the volunteer Commercial Energy Efficiency Program. This volunteer program would set a minimum goal of achieving energy efficiency of 5% greater than current Title 24 Standards. Incentives to participate in this volunteer program include prioritization and streamlining of the application process for commercial projects that achieve the minimum goal. The County will develop a menu of options with points assigned to them. As long as a developer meets the required point allotment (33 points) the developer will meet the requirements of this program. This system will assure flexibility in the implementation of this reduction measure. Although not limited to these actions, this reduction goal can be achieved through the incorporation of the strategies outlined in the bullet points above.

**Assumptions:**

- Applies to new development only.
- Assumes new development within Sutter Pointe to be 20% beyond current Title 24.
- Assumes new development within the remainder of Unincorporated County to be 10% beyond current Title 24.

| **Reductions:** | | 2020 | 2030 |
|---|---|---|---|
| % new com/ind development that is commercial | = | 16.63% | 32.58% |
| % of new commercial development from Sutter Pointe | = | 28.13% | 42.93% |
| % new development from Sutter Pointe | = | 4.68% | 62.88% |
| % Development from Unincorporated County | = | 11.95% | 37.12% |
| % reduction afforded to Sutter Pointe | = | 20.00% | 20.00% |
| % reduction afforded to Unincorporated County | = | 5.00% | 10.00% |
| % reduction from Sutter Pointe | = | 0.94% | 12.58% |
| % reduction from Unincorporated County | = | 0.60% | 3.71% |
| Reduction from growth between 2008 and 2020 | = | N/A | 1.53% |
| Total % reduction | = | 1.53% | 17.82% |

**R2-E 6 Commercial/Industrial Renewable Energy Program**

This measure would facilitate the voluntary incorporation of renewable (solar or other renewable) energy generation into the design and construction of new commercial, office, and industrial developments. Renewable energy generation shall be incorporated such that a minimum of 20% of the project's total energy needs are offset. In addition this measure would encourage all facilities be equipped with "solar ready" features where feasible, to facilitate future installation of solar energy systems. These features should include the proper solar orientation (south facing roof sloped at $20^{O}$ to $55^{O}$ from the horizontal), clear access on south sloped roofs, electrical conduit installed for solar electric system wiring, plumbing installed for solar hot water systems, and space provided for a solar hot water tank.

As an alternative to, or in support of, providing onsite renewable energy, the project proponent can buy into an offset program that will allow for the purchase of renewable energy resources offsite. Purchased energy offsets (or a combination of incorporated renewables and purchased offsets) must be equal 20% of the total projected energy consumption for the development. See R3-E3 for further details on the financing program.

**Assumptions:**

* Applies to new development only.
* Assumes that 25% of new development will participate in 2020, and 35% in 2030.
* Assumes that those developments participating will reduce electrical use by 20%.

**Reductions:**

| | | 2020 | 2030 |
|---|---|---|---|
| % of com/ind development from growth | = | 60.47% | 47.43% |
| % reduction from program | = | 20.00% | 20.00% |
| % of participation | = | 5.00% | 35.00% |
| Total % reduction | = | 0.60% | 3.32% |

**R2-E 7 Commercial/Industrial Retrofit Program**

This measure encourages all commercial or industrial buildings undergoing major renovations to reduce their energy consumption by a minimum of 20%. As with the new development, a menu of options will be provided to assure flexibility in the implementation of this reduction measure. Although not limited to these actions, this reduction goal can be achieved through the incorporation of the following:

- Replace inefficient air conditioning and heating units with new energy efficient models;
- Replace older, inefficient appliances with new energy efficient models;
- Replace old windows and insulation with top-quality windows and insulation;
- Install solar water heaters;
- Replace inefficient and incandescent lighting with energy efficient lighting; and
- Weatherize the existing building to increase energy efficiency.

**Assumptions:**

* Applies to existing development only.
* Assumes that 25% of existing development will participate in 2020, and 35% in 2030.
* Assumes that those developments participating will increase efficiency by 20%.
* Assumes reduction from electrical and natural gas.

**Reductions:**

| | | 2020 | 2030 |
|---|---|---|---|
| % from existing com/ind development | = | 39.53% | 39.33% |
| % reduction applied | = | 20.00% | 20.00% |
| % of participation | = | 5.00% | 35.00% |
| Total % reduction | = | 0.40% | 2.75% |

**R2-E 8 Agricultural Alternative Energy Programs**

This program combines Agricultural Draft Policies AG 3.7 (Alternative Energy), and AG 4.3 (New Technologies) to support the incorporation and expansion of existing and new technologies to increase the energy efficiency and profitability of agricultural processes throughout Sutter County.

**Assumptions:**

* Applies to agricultural development only.
* Program furthers success of commercial/industrial energy efficiency measures.
* Assumes no reduction specific to this program. Reduction included in Electrical and natural gas usage from commercial and industrial usage.
* Utilities classify agricultural usage with the non-residential or commercial/industrial uses. Therefore this measure is quantified by applying the reduction to the fraction of the non-residential consumption that is associated with agricultural use.

**R2-E 9 Water Use Reduction Initiative**

This initiative would reduce emissions associated with electricity consumption for water treatment and reduction and therefore are included with the energy reductions. This measure encourages the County to adopt a per capita water use reduction goal in support of the Governors Executive Order S-14-08 which mandates the reduction of water use of 20 percent per capita. The County's adoption of a water use reduction goal would introduce requirements for new development and would provide cooperative support for water purveyors that are required to implement these reductions for existing developments. The County would also provide internal reduction measures such that County facilities will support this reduction requirement. The following represent potential programs that can be implemented to attain this reduction goal.

***Water Conservation Program:***

Under this program the excessive watering of landscaping, excessive fountain operation, watering during peak daylight hours, water of non-permeable surfaces, excessive water use for noncommercial washing, and water use resulting in flooding or runoff would be prohibited. In addition the program would encourage efficient water use for construction activities, the installation of low-flow toilets and showerheads for all new developments, use of drought-tolerant plants with efficient landscape watering systems for all new developments, recycling of water used for cooling systems, use of pool covers, and the posting of water conservation signage at all hotels.

***Sutter Pointe Water Conservation and Efficiency Requirement***

Under the provisions in the Sutter Pointe Specific Plan EIR, new developments within the Sutter Pointe Specific Plan area are required to adhere to the following water conservation and efficiency measures:

- With the exception of ornamental shade trees, use water-efficient landscapes with native, drought resistant species in all public areas and commercial landscaping. Use water-efficient turf in parks and other turf-dependant spaces;
- Install the infrastructure to use reclaimed water for landscape irrigation and/or washing cars;
- Install water-efficient irrigation systems and devices, such as soil moisture-based irrigation controls;
- Design buildings and lots to be water efficient. Only install water-efficient fixtures and appliances;
- Restrict water methods (prohibit systems that apply water to non-vegetated surfaces) and control runoff. Prohibit businesses from using pressure washers for cleaning driveways, parking lots, sidewalks, and street surfaces;
- Provide education about water conservation and available programs and incentives; and
- Construct driveways to single family detached residences, multi-family residences and parking lots with pervious surfaces.

***New Development Incentives:***

Provide incentives for developers to comply with the California Green Building Standards Code as requirements for all new development. Under this Code new developments are required to reduce indoor potable water use by 20% beyond the Energy Policy Act of 1992 fixture performance requirements, and to reduce outdoor potable water use by 50% from a mid-summer baseline average consumption through irrigation efficiency, native plant selection, the use of recycled water and/or captured rainwater for example.

***Water Meter Program:***

Encourage water providers to install water meters for all County homes not using wells. This would provide for a better accounting of County water usage and provide potential costing per usage to help offset costs of the implementation of water conservation programs.

***Water Efficiency Pricing Program***

Under this program, the County would encourage water suppliers to adopt a water conservation pricing schedule (i.e. tiered rate) to encourage efficient water use. Notices could be provided in each billing showing water use budgets and the relationship between the budget and the actual usage.

***Water Efficiency Retrofit Program:***

This program would encourage upgrades in water efficiency for renovations or additions of residential, commercial, office, and industrial properties equivalent to that of new developments. The County would work with local water purveyors to achieve consistent standards, and to develop, approve, and review procedures for implementation.

***Water Efficiency Training and Education:***

Under this measure the County, in coordination with local water purveyors would implement a public information and education program that promotes water conservation. The program could include certification programs for irrigation designers, installers, and managers, as well as classes to promote the use of drought tolerant, native species and xeriscaping.

***Increased Recycled Water Use:***

Promote the use of municipal wastewater and graywater for agricultural, industrial and irrigation purposes. This measure would be subject to approval of the State Health Department and compliance with Title 22 provisions. This measure would facilitate the following:

- Inventory of non-potable water uses that could be substituted with recycled or graywater;
- Determination of the feasibility of producing and distributing recycled water for groundwater replenishment;
- Determine the associated energy/GHG tradeoffs for treatment/use vs. out of basin water supply usage; and
- Cooperation and coordination with responsible agencies to encourage the use of recycled water where energy tradeoffs are favorable.

**Assumptions:**

- Applies to all land uses (existing and new development)
- Assumes emission reduction of 20% in 2020, and 30% in 2030.
- Assumes reduction to electricity used to treat and convey water and wastewater.
- Assumes that approximately 14% of the electricity usage is used to pump water from wells in 2020, and 10% in 2030.

**Reductions:**

| | | 2020 | 2030 |
|---|---|---|---|
| % reduction applied to water usage directly | = | 20.00% | 30.00% |
| % of electricity from water pumps | = | 15.26% | 10.61% |
| % reduction applied to electricity: | = | 3.05% | 3.18% |

## Solid Waste Reduction Measures

**R1-W 1 Waste Measures**

The CARB AB32 Scoping Plan recommends three measures for reducing emissions from Municipal Solid Waste at the State level, including: 1) landfill methane control; 2) increase the efficiency of landfill methane capture; and 3) high recycling/zero waste. CARB is in the process of developing a discrete early action program for methane recovery (1), likely to be adopted in early 2010. This measure is expected to result in a 1.0 $MMTCO_2e$ reduction by 2020. Other measures proposed by CARB include increasing efficiency of landfill methane capture (2) and instituting high recycling/zero waste policies (3). Potential reductions associated with these measures are still to be determined. CARB estimates a preliminary one-time cost for adoption of these measures to be approximately $70 per ton of $CO_2$ reduced. Capital cost is estimated to be approximately $3,440,000 and annual operation cost is estimated to be approximately $706,400 per landfill. Total industry cost estimates will be evaluated further in the staff report for the landfill methane control measure.

**Assumptions:**

* Currently Not Quantified because complete life cycle emissions vs. reductions are unknown.

**R2-W 1 County Diversion Program**

This measure would implement a County wide waste diversion plan to further the goal of diverting 75% of all waste from landfills by 2020. The following is a potential list of waste reduction measures that will further strengthen existing waste reduction/diversion programs.

- Provide outreach and education programs for residential, commercial, and industrial land uses in order to further promote existing County diversion programs;
- Increase disposal fees and/or reduce residential pick-up frequency;
- Encourage businesses to adopt a voluntary procurement standard and prioritize those products that have less packaging, are reusable, recyclable, or compostable;
- Support State level policies that provide incentives for efficient and reduced packaging waste for commercial products;
- Expand list of recyclable materials;
- Work with Recology to develop and provide waste audits;
- Make recycling and composting opportunities mandatory at all public events;
- Establish an appliance end-of-life requirement;
- For new developments, require the use of recycled-content materials, or recycled materials;
- Require a minimum of 15% of materials used in construction be sourced locally, as feasible; and
- Encourage the use of recycled building materials and cement substitutes for new developments.

**Assumptions:**

* Applies to existing and future development not associated with Sutter Pointe.
* Assumes an existing diversion rate of 50%
* Assumes 2020 goal of 75% diversion rate and 80% in 2030.
* Does not apply to construction activities

| **Reductions:** | | 2020 | 2030 |
|---|---|---|---|
| % of development in 2020 that existed in 2008 | = | 61.44% | 39.33% |
| % waste from non-Sutter Pointe uses | = | 20.88% | 26.72% |
| % reduction applied | = | 25.00% | 30.00% |
| % not from construction activities | = | 71.00% | 71.00% |
| % reduction applied to Existing | = | 10.91% | 8.38% |
| % reduction applied to non-Sutter Pointe new | = | 3.71% | 5.69% |
| % reduction applied | = | 14.61% | 14.07% |

**R2-W 2 County Diversion Program**

This reduction measure would encourage a diversion of 60% of construction waste by 2020. This provides a 10% increase in diversion beyond AB2176, § 42911, that requires development projects to provide adequate areas for collecting and loading recyclable materials and ensures a 50% diversion rate prior to being issued a building permit.

**Assumptions:**

* Applies to new development
* Assumes an existing diversion rate of 50%
* Assumes 2020 goal of 60% diversion rate, and 70% in 2030.
* Only applies to construction activities

**Reductions:**

| | 2020 | 2030 |
|---|---|---|
| % waste from Construction Activities | 29.00% | 29.00% |
| % reduction | 10.00% | 20.00% |
| % reduction applied | 2.90% | 5.80% |

**R2-W 3 Sutter Pointe Solid Waste Reduction Measures**

All development within the Sutter Pointe Specific Plan area would be required to abide by the following solid waste reduction measures:

- Reuse and recycle construction and demolition waste (including, but not limited to, soil, vegetation, concrete, lumber, metal, and cardboard);
- Provide interior and exterior storage areas for recyclables and green waste at all buildings;
- Provide adequate recycling containers in public areas, including parks, school grounds, golf courses, and pedestrian zones in areas of mixed-use development; and
- Provide education and publicity about reducing waste and available recycling services.

**Assumptions:**

* Applies to Sutter Pointe only.
* Assumes all development meets the existing 50% diversion rate.
* Assumes 2020 goal of 75% diversion rate, and 80% in 2030.
* Assumes reduction from construction activities accounted for in R2-W2.
* Assumes R2-W1 is implemented.

**Reductions:**

| | 2020 | 2030 |
|---|---|---|
| % waste from Sutter Pointe | 17.68% | 33.95% |
| % reduction | 25.00% | 30.00% |
| % reduction applied | 4.42% | 10.19% |

## Industrial Reduction Measures

**R1-I 1 Oil and Gas Extraction Combustion Related GHG Emission Reduction**

This AB 32 measure would reduce combustion emissions from oil and gas extraction. By 2020, this requirement will reduce emissions in California by approximately 1.8 MMTCO2e, representing 13 percent of combustion emissions from oil and gas extraction in the State.

**Reductions:**

| | 2020 | 2030 |
|---|---|---|
| % reduction applied | 13.00% | 13.00% |

**R1-I 2 Stationary Internal Combustion Engine Electrification**

This AB 32 measure would affect owners and operators of industrial and commercial engines over 50 horsepower used as primary power sources by replacing internal combustion engines with electric motors. By 2020, this requirement will reduce emissions in California by approximately 0.3 $MMTCO_2e$, representing 0.5 Percent of combustion emissions from industrial sources (non-coal) in the State.

| **Reductions:** | 2020 | 2030 |
|---|---|---|
| % reduction applied | 0.50% | 0.50% |

## Agricultural Reduction Measures

**R1-A 1 Methane Capture at Large Dairies**

This is an AB 32 voluntary measure to encourage the installation of methane digesters to capture methane emissions at large dairies. By 2020, this requirement will reduce emissions in California by approximately one (1) $MMTCO_2$ representing 7.8 percent of $CH_4$ and $N_2O$ emissions from manure management and enteric fermentation at dairies in the State.

**Assumptions:**

* All cows reported are from large dairies.
* Assumes no methane capture systems were in place in 2008
* Assumes reductions are to methane and nitrous oxide emissions.

| **Reductions:** | 2020 | 2030 |
|---|---|---|
| % reduction applied | 7.80% | 7.80% |

**R2-A 2 Agricultural Water Management**

Encourage the agricultural community to be cognizant of the necessity of water conservation and to provide access to information on technologies to reduce potable water usage where feasible. This would encourage the County in conjunction with the local water purveyors to explore the feasibility of and promote using recycled water while maintaining water quality and quantity necessary for agriculture purposes. Further, this would encourage the County to explore the feasibility of and promote water management. This measure enhances the Agricultural policies AG 3.1 (Efficient Water Management), 3.2 (Water Conservation and Recycling), 3.3 (Water Quality and Quantity), and 3.5 (Groundwater Resources).

**Assumptions:**

* Agricultural Water Use is included in the water use for the County under commercial/industrial uses.
* Assumes this measure fosters and improves the success of water reduction measure R2-E9.
* Assumes reductions are accounted for in reduction taken from R2-E9. No additional reduction applied.

# Appendix H:2020 Reduced URBEMIS Output and GHG Calculations

**Sutter County**
**Emissions by Land Use**
**2020**
**Reduced Inventory**
**By Land Use Category**

| Source Type | | $CO_2e$ MT/yr | | | |
|---|---|---|---|---|---|
| | | $CO_2$ | $CH_4$ | $N_2O$ | combined $CO_2e$ |
| Residential | AG/RAN/ER | 160,827.23 | 4,882.60 | 5,533.60 | 171,243 |
| | Low Density Residential | 85,421.84 | 2,593.33 | 2,939.10 | 90,954 |
| | Medium Density Residential | 30,471.10 | 925.15 | 1,044.35 | 32,441 |
| | High Density Residential | 12,364.03 | 375.40 | 423.77 | 13,163 |
| | **Total Residential** | 289,084.20 | 8,776.48 | 9,940.82 | **307,801** |
| Commercial | Park | 95.99 | 1.73 | 1.94 | 100 |
| | Commercial | 63,031.78 | 1,147.84 | 1,291.92 | 65,472 |
| | Mixed Use | 9,847.92 | 179.32 | 201.83 | 10,229 |
| | **Total Commercial** | 73,127.52 | 1,331.58 | 1,496.31 | **75,955** |
| Industrial | Industrial | 146,254.57 | 2,688.46 | 3,131.45 | 152,074 |
| | **Total Industrial** | 146,254.57 | 2,688.46 | 3,131.45 | **152,074** |
| Agriculture | | 0.00 | 192,880.80 | 559,858.41 | 752,739 |
| | **Total** | **508,466.29** | **205,677.32** | **574,426.99** | **1,288,571** |

**Sutter County**
**Emissions by Source**
**2020**
**Reduced Inventory**
**By Source**

| Transportation | | |
|---|---|---|
| | **Source:** | **Metric tons of $CO_2e$** |
| 1 | On-Road Vehicles | 348,058 |
| 2 | Airport Operations | 155 |
| | **Total** | **348,213** |

| Energy | | |
|---|---|---|
| | **Sources:** | **Metric tons of $CO_2e$** |
| 1 | Electric | 46,600 |
| 2 | Natural Gas | 131,623 |
| | **Total** | **178,223** |

| Solid Waste | | |
|---|---|---|
| | **Source** | **Metric tons of $CO_2e$** |
| 1 | Solid Waste Disposal | 9,359 |
| 2 | Green Waste Recycling | Data Not Available |
| 3 | Materials Recycling | Data Not Available |
| | **Total** | **9,359** |

| Landscape Emissions | | |
|---|---|---|
| | **Sources:** | **Metric tons of $CO_2e$** |
| 1 | Landscape Emissions | 36 |
| 2 | Carbon sink from $CO_2$ sequestration | Data Not Available |
| | **Total** | **36** |

| Agriculture | | |
|---|---|---|
| | **Sources:** | **Metric tons of $CO_2e$** |
| 1 | Enteric Fermentation | 22,572 |
| 2 | Manure Management | 27,515 |
| 3 | Rice Cultivation | 142,346 |
| 4 | Agricultural Residue Burning | 3,011 |
| 5 | Crop Growth | 378,097 |
| 6 | Animals and Runoff | 77,806 |
| 7 | Fertilizer Use | 101,392 |
| | **Total** | **752,739** |

| Net Total Emissions | |
|---|---|
| **Category** | **Metric tons of $CO_2e$** |
| Energy | 178,223 |
| Solid Waste | 9,359 |
| Landscape Emissions | 36 |
| Agriculture | 752,739 |
| Transportation | 348,213 |
| **Total** | **1,288,571** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Carbon Dioxide**

**A. Direct Sources**

**A1-3. Mobile (Construction Equipment, Motor Vehicles, and Landscape Equipment) Unreduced Emissions**

| Con (MT/yr) | Motor Vehicles (MT/yr) | Landscape (MT/yr) ($E_{Cls}$) | Hearth (MT/yr) ($E_{Cwood}$) |
|---|---|---|---|
| | 457,219.54 | 35.57 | 15,710.48 |

**Transportation Emission Reductions**

| | | R1-T 1 | R1-T 2 | R1-T 3 | R1-T 4 | R1-T 5 | R1-T 6 |
|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 17.30% | 2.50% | 6.90% | 0.30% | 0.30% | 1.70% |
| Medium Duty Vehicles | **Unmitigated** | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Passenger & Light Duty Vehicles | 377,663.34 | 312,327.58 | 304,519.40 | 283,507.56 | 282,657.03 | 281,809.06 | 277,018.31 |
| Medium Duty Vehicles | 48,922.49 | 48,922.49 | 48,922.49 | 48,922.49 | 48,922.49 | 48,922.49 | 48,922.49 |
| Heavy Duty Vehicles | 30,633.71 | 30,633.71 | 30,633.71 | 30,633.71 | 30,633.71 | 30,633.71 | 30,633.71 |

| | | R1-T 7 | R1-T 8 | R1-T 9 | R1-T 10 | | R2-T 1 |
|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 0.60% | 0.00% | 0.00% | 0.20% | | 0.20% |
| Medium Duty Vehicles | | 0.00% | 1.60% | 0.00% | 0.20% | | 0.00% |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | 1.60% | 1.90% | 0.20% | | 0.00% |
| Passenger & Light Duty Vehicles | 277,018.31 | 275,356.20 | 275,356.20 | 275,356.20 | 274,805.49 | | 274,255.88 |
| Medium Duty Vehicles | 48,922.49 | 48,922.49 | 48,139.73 | 48,139.73 | 48,043.45 | | 48,043.45 |
| Heavy Duty Vehicles | 30,633.71 | 30,633.71 | 30,143.57 | 29,570.84 | 29,511.70 | | 29,511.70 |

| | | R2-T 2 | R2-T 3 | R2-T 4 | R2-T 5 | R2-T 6 | R2-T 7 |
|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 4.00% | 0.10% | 1.00% | 0.10% | 0.02% | 2.00% |
| Medium Duty Vehicles | | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Passenger & Light Duty Vehicles | 274,255.88 | 263,286.74 | 263,023.45 | 260,393.22 | 260,132.82 | 260,080.80 | 254,879.18 |
| Medium Duty Vehicles | 48,043.45 | 48,043.45 | 48,043.45 | 48,043.45 | 48,043.45 | 48,043.45 | 48,043.45 |
| Heavy Duty Vehicles | 29,511.70 | 29,511.70 | 29,511.70 | 29,511.70 | 29,511.70 | 29,511.70 | 29,511.70 |

| | | R2-T 8 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 0.22% | | | | | **Reduced** | |
| Medium Duty Vehicles | | 0.00% | | | | | **MT/yr** | **%** |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | | | | | **(ECele)** | **Reduction** |
| Passenger & Light Duty Vehicles | 254,879.18 | 254,316.39 | | | | | 254,316 | **32.66%** |
| Medium Duty Vehicles | 48,043.45 | 48,043.45 | | | | | 48,043 | **1.80%** |
| Heavy Duty Vehicles | 29,511.70 | 29,511.70 | | | | | 29,512 | **3.66%** |
| ***Reduced Total (MT/yr)*** | | | | | | | **331,872** | **27.42%** |
| ***Unmitigated Total (MT/yr)*** | | | | | | | **457,220** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Carbon Dioxide**

***Airport Fuel Emission Reductions***

| ($U_{AAF}$) | Unmitigated MT/yr ($E_{CWD}$) | | | | | | Reduced MT/yr (ECele) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Reductions | | | | | | | | |
| Annual Fuel Usage | 151.84 | | | | | | 151.84 | 0.00% |

**A4. Stationary Sources (Natural Gas) Emission Reductions**

| Unit Type | | R1-E 5 | R1-E 7 | R2-E 1 | R2-E 3 | R2-E 5 | R2-E 7 |
|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 2.39% | 3.90% | 4.34% | 0.48% | 0.00% | 0.00% |
| Multi Family Residential Reduction | | 2.39% | 3.90% | 4.34% | 0.48% | 0.00% | 0.00% |
| Commercial Reduction | Unmitigated | 2.39% | 3.90% | 0.00% | 0.00% | 1.53% | 0.40% |
| Industrial Reduction | MT/yr | 2.39% | 3.90% | 0.00% | 0.00% | 0.00% | 0.40% |
| AG/RAN/ER | 21,197.79 | 20,691.03 | 19,884.08 | 19,020.73 | 18,928.94 | 18,928.94 | 18,928.94 |
| Low Density Residential | 11,258.65 | 10,989.50 | 10,560.91 | 10,102.36 | 10,053.61 | 10,053.61 | 10,053.61 |
| Medium Density Residential | 4,016.81 | 3,920.78 | 3,767.87 | 3,604.27 | 3,586.88 | 3,586.88 | 3,586.88 |
| High Density Residential | 1,629.66 | 1,590.70 | 1,528.67 | 1,462.29 | 1,455.23 | 1,455.23 | 1,455.23 |
| Park | 40.60 | 39.63 | 38.09 | 38.09 | 38.09 | 37.50 | 37.35 |
| Commercial | 26,353.15 | 25,723.15 | 24,719.95 | 24,719.95 | 24,719.95 | 24,340.85 | 24,244.62 |
| Mixed Use | 4,117.74 | 4,019.30 | 3,862.55 | 3,862.55 | 3,862.55 | 3,803.31 | 3,788.28 |
| Industrial | 63,910.41 | 62,382.56 | 59,949.64 | 59,949.64 | 59,949.64 | 59,949.64 | 59,712.63 |

| Unit Type | | R1-I 1 | R1-I 2 | | | | Reduced MT/yr ($E_{Cele}$) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 0.00% | 0.00% | | | | | |
| Multi Family Residential Reduction | | 0.00% | 0.00% | | | | | |
| Commercial Reduction | | 0.00% | 0.00% | | | | | |
| Industrial Reduction | MT/yr ($E_{Cng}$) | 13.00% | 0.50% | | | | | |
| AG/RAN/ER | 18,928.94 | 18,928.94 | 18,928.94 | | | | 18,929 | 10.70% |
| Low Density Residential | 10,053.61 | 10,053.61 | 10,053.61 | | | | 10,054 | 10.70% |
| Medium Density Residential | 3,586.88 | 3,586.88 | 3,586.88 | | | | 3,587 | 10.70% |
| High Density Residential | 1,455.23 | 1,455.23 | 1,455.23 | | | | 1,455 | 10.70% |
| Park | 37.35 | 37.35 | 37.35 | | | | 37 | 8.00% |
| Commercial | 24,244.62 | 24,244.62 | 24,244.62 | | | | 24,245 | 8.00% |
| Mixed Use | 3,788.28 | 3,788.28 | 3,788.28 | | | | 3,788 | 8.00% |
| Industrial | 59,712.63 | 51,949.99 | 51,690.24 | | | | 51,690 | 19.12% |
| **Total Reduced (MT/yr)** | | | | | | | **113,785** | **14.14%** |
| **Total Unmitigated (MT/yr)** | **132,524.81** | | | | | | | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Carbon Dioxide**

**B. Indirect Sources**

**B1. Electricity Emission Reductions**

| Unit Type | Unmitigated MT/yr ($E_{Cele}$) | R1-E 1 | R1-E 2 & 3 | R1-E 4 | R1-E 6 | R2-E 1 | R2-E 2 |
|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 21.00% | 10.00% | 6.75% | 7.60% | 4.34% | 8.91% |
| Multi Family Residential Reduction | | 21.00% | 10.00% | 6.75% | 7.60% | 4.34% | 8.91% |
| Commercial Reduction | | 21.00% | 9.29% | 6.75% | 7.60% | 0.00% | 0.00% |
| Industrial Reduction | | 21.00% | 9.29% | 6.75% | 7.60% | 0.00% | 0.00% |
| AG/RAN/ER | 16,071.06 | 12,696.14 | 11,426.52 | 10,655.49 | 9,845.68 | 9,418.18 | 8,578.64 |
| Low Density Residential | 8,535.72 | 6,743.22 | 6,068.90 | 5,659.39 | 5,229.27 | 5,002.22 | 4,556.32 |
| Medium Density Residential | 3,045.34 | 2,405.82 | 2,165.24 | 2,019.13 | 1,865.68 | 1,784.67 | 1,625.58 |
| High Density Residential | 1,235.52 | 976.06 | 878.45 | 819.18 | 756.92 | 724.06 | 659.51 |
| Park | 23.14 | 18.28 | 16.45 | 15.34 | 14.18 | 14.18 | 14.18 |
| Commercial | 15,016.84 | 11,863.30 | 10,676.97 | 9,956.52 | 9,199.83 | 9,199.83 | 9,199.83 |
| Mixed Use | 2,346.42 | 1,853.67 | 1,668.30 | 1,555.73 | 1,437.50 | 1,437.50 | 1,437.50 |
| Industrial | 36,418.12 | 28,770.31 | 26,098.99 | 24,337.91 | 22,488.23 | 22,488.23 | 22,488.23 |

| Unit Type | MT/yr ($E_{Cele}$) | R2-E 3 | R2-E 4 | R2-E 5 | R2-E 6 | R2-E 7 | |
|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 0.48% | 1.61% | 0.00% | 0.00% | 0.00% | |
| Multi Family Residential Reduction | | 0.48% | 1.61% | 0.00% | 0.00% | 0.00% | |
| Commercial Reduction | | 0.00% | 0.00% | 1.53% | 0.60% | 0.40% | |
| Industrial Reduction | | 0.00% | 0.00% | 0.00% | 0.60% | 0.40% | |
| AG/RAN/ER | 8,578.64 | 8,537.24 | 8,399.91 | 8,399.91 | 8,399.91 | 8,399.91 | |
| Low Density Residential | 4,556.32 | 4,534.33 | 4,461.39 | 4,461.39 | 4,461.39 | 4,461.39 | |
| Medium Density Residential | 1,625.58 | 1,617.74 | 1,591.72 | 1,591.72 | 1,591.72 | 1,591.72 | |
| High Density Residential | 659.51 | 656.33 | 645.77 | 645.77 | 645.77 | 645.77 | |
| Park | 14.18 | 14.18 | 14.18 | 13.96 | 13.87 | 13.82 | |
| Commercial | 9,199.83 | 9,199.83 | 9,199.83 | 9,058.74 | 9,003.97 | 8,968.37 | |
| Mixed Use | 1,437.50 | 1,437.50 | 1,437.50 | 1,415.45 | 1,406.89 | 1,401.33 | |
| Industrial | 22,488.23 | 22,488.23 | 22,488.23 | 22,488.23 | 22,352.25 | 22,263.88 | |

| Unit Type | MT/yr (ECele) | R2-E 9 | | | | | Reduced MT/yr ($E_{Cele}$) | % reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 3.05% | | | | | | |
| Multi Family Residential Reduction | | 3.05% | | | | | | |
| Commercial Reduction | | 3.05% | | | | | | |
| Industrial Reduction | | 3.05% | | | | | | |
| AG/RAN/ER | 8,399.91 | 8,143.55 | | | | | 8,144 | 49.33% |
| Low Density Residential | 4,461.39 | 4,325.23 | | | | | 4,325 | 49.33% |
| Medium Density Residential | 1,591.72 | 1,543.14 | | | | | 1,543 | 49.33% |
| High Density Residential | 645.77 | 626.06 | | | | | 626 | 49.33% |
| Park | 13.82 | 13.40 | | | | | 13 | 42.10% |
| Commercial | 8,968.37 | 8,694.66 | | | | | 8,695 | 42.10% |
| Mixed Use | 1,401.33 | 1,358.56 | | | | | 1,359 | 42.10% |
| Industrial | 22,263.88 | 21,584.40 | | | | | 21,584 | 40.73% |
| **Reduced total (MT/year)** | | | | | | | **46,289** | **44.02%** |
| **Unmitigated total (MT/year)** | | | | | | | **82,692** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Carbon Dioxide**

**B2. Potable Water Emission Reductions**

| Unit Type | Unmitigated MT/yr | R1-E 8 | R2-E 9 | | | | Reduced MT/yr ($E_{Cele}$) | % reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 21.00% | 20.00% | | | | | |
| Multi Family Residential Reduction | | 21.00% | 20.00% | | | | | |
| Commercial Reduction | | 21.00% | 20.00% | | | | | |
| Industrial Reduction | | 21.00% | 20.00% | | | | | |
| AG/RAN/ER | 23.49 | 18.56 | 14.85 | | | | 14.85 | 36.80% |
| Low Density Residential | 12.48 | 9.86 | 7.89 | | | | 7.89 | 36.80% |
| Medium Density Residential | 0.02 | 0.02 | 0.01 | | | | 0.01 | 36.80% |
| High Density Residential | 0.01 | 0.01 | 0.01 | | | | 0.01 | 36.80% |
| Park | 0.00 | 0.00 | 0.00 | | | | 0.00 | 0.00% |
| Commercial | 0.67 | 0.53 | 0.42 | | | | 0.42 | 36.80% |
| Mixed Use | 0.10 | 0.08 | 0.06 | | | | 0.06 | 36.80% |
| Industrial | 1.62 | 1.28 | 1.02 | | | | 1.02 | 36.80% |
| **Reduced total (MT/year)** | | | | | | | **24** | **36.80%** |
| **Unmitigated total (MT/year)** | | | | | | | **38** | |

**B3. Solid Waste**

**Combined: B3a. Anthropogenic Carbon and B3b. Exhaust Emissions Reductions**

| Unit Type | Unmitigated MT/yr | R1-E 1 | R2-W 1 | R2-W 2 | R2-W 3 | | Reduced MT/yr ($E_{Cele}$) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 21.00% | 14.61% | 2.90% | 4.42% | | | |
| Multi Family Residential Reduction | | 21.00% | 14.61% | 2.90% | 4.42% | | | |
| Commercial Reduction | | 21.00% | 14.61% | 2.90% | 4.42% | | | |
| Industrial Reduction | | 21.00% | 14.61% | 2.90% | 4.42% | | | |
| AG/RAN/ER | 424.00 | 334.96 | 286.02 | 277.72 | 265.45 | | 265.45 | 37.39% |
| Low Density Residential | 225.20 | 177.91 | 151.91 | 147.51 | 140.99 | | 140.99 | 37.39% |
| Medium Density Residential | 80.34 | 63.47 | 54.19 | 52.62 | 50.30 | | 50.30 | 37.39% |
| High Density Residential | 32.60 | 25.75 | 21.99 | 21.35 | 20.41 | | 20.41 | 37.39% |
| Park | 0.07 | 0.06 | 0.05 | 0.05 | 0.04 | | 0.04 | 37.39% |
| Commercial | 47.75 | 37.72 | 32.21 | 31.28 | 29.89 | | 29.89 | 37.39% |
| Mixed Use | 7.46 | 5.89 | 5.03 | 4.89 | 4.67 | | 4.67 | 37.39% |
| Industrial | 115.80 | 91.48 | 78.12 | 75.85 | 72.50 | | 72.50 | 37.39% |
| **Total Reduced (MT/year)** | | | | | | | **584** | **37.39%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **933.22** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Carbon Dioxide**

**B3c. Exhaust Emissions (Disposal Equipment) Emission Reductions**

| Vehicle Type | Unmitigated MT/yr | | | | | | Reduced MT/yr (ECele) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Reduction | | | | | | | | |
| Excavator | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Grader | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Off-Highway Tractor | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Off-Highway Truck | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Rubber Tired Dozer | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Disposal Facility run by City? | | | | | | | No | |
| **Total Reduced (MT/year)** | | | | | | | **0.00** | **0.00%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **0.00** | |

**B4. Wastewater Emission Reductions**

| Unit Type | Unmitigated MT/yr | R2-E 9 | | | | | Reduced MT/yr ($E_{Cele}$) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 20.00% | | | | | | |
| Multi Family Residential Reduction | | 20.00% | | | | | | |
| Commercial Reduction | | 20.00% | | | | | | |
| Industrial Reduction | | 20.00% | | | | | | |
| AG/RAN/ER | 8.34 | 6.67 | | | | | 6.67 | 20.00% |
| Low Density Residential | 5.59 | 4.47 | | | | | 4.47 | 20.00% |
| Medium Density Residential | 1.99 | 1.59 | | | | | 1.59 | 20.00% |
| High Density Residential | 0.81 | 0.65 | | | | | 0.65 | 20.00% |
| Park | 0.00 | 0.00 | | | | | 0.00 | 20.00% |
| Commercial | 0.26 | 0.21 | | | | | 0.21 | 20.00% |
| Mixed Use | 0.04 | 0.03 | | | | | 0.03 | 20.00% |
| Industrial | 0.71 | 0.57 | | | | | 0.57 | 20.00% |
| **Total Reduced (MT/year)** | | | | | | | **14** | **20.00%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **17.73** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Carbon Dioxide**

**C. AG emissions for $CH_4$ and $N_2O$, not applicable for $CO_2$.**

**D. Summary Table**

| Source Type | | Emissions, MT /yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Direct | Motor vehicles & Aircraft | 332,023.38 | 332,023.38 |
| | Landscape equipment | 35.57 | 35.57 |
| | Cooling and heating | 129,495.63 | 129,495.63 |
| | **Total direct, tons/yr** | **461,554.58** | **461,554.58** |
| Indirect | Electricity | 46,289.02 | 46,289.02 |
| | Potable water | 24.26 | 24.26 |
| | Solid waste | 584.24 | 584.24 |
| | Wastewater | 14.19 | 14.19 |
| | **Total indirect, tons/yr** | **46,911.71** | **46,911.71** |
| Agriculture | | 0.00 | 0.00 |
| | **Total, tons/yr** | **508,466.29** | **508,466.29** |
| | **Global warming potential index** | **1** | |

| Source Type | | Emissions, MT/yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Residential | AG/RAN/ER | 160,827.23 | 160,827.23 |
| | Low Density Residential | 85,421.84 | 85,421.84 |
| | Medium Density Residential | 30,471.10 | 30,471.10 |
| | High Density Residential | 12,364.03 | 12,364.03 |
| | **Total Residential** | **289,084.20** | **289,084.20** |
| Commercial | Park | 95.99 | 95.99 |
| | Commercial | 63,031.78 | 63,031.78 |
| | Mixed Use | 9,847.92 | 9,847.92 |
| | **Total Commercial** | **73,127.52** | **73,127.52** |
| Industrial | Industrial | 146,254.57 | 146,254.57 |
| | **Total Industrial** | **146,254.57** | **146,254.57** |
| Agricultural | | **0.00** | **0.00** |
| | **Total, tons/yr** | **508,466.29** | **508,466.29** |
| | **Global warming potential index** | 1 | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Methane**

**A. Direct Sources**

**A1-3. Mobile (Construction Equipment, Motor Vehicles, and Landscape Equipment) Unreduced Emissions**

| Con (MT/yr) | Motor Vehicles (MT/yr) | Landscape (MT/yr) ($E_{Cls}$) | Hearth (MT/yr) ($E_{Cwood}$) |
|---|---|---|---|
| | 145.20 | 0.0020 | 76.35 |

**Transportation Emission Reductions**

| | | R1-T 1 | R1-T 2 | R1-T 3 | R1-T 4 | R1-T 5 | R1-T 6 |
|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 17.30% | 2.50% | 6.90% | 0.30% | 0.30% | 1.70% |
| Medium Duty Vehicles | | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Heavy Duty Vehicles | MT/yr | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Passenger & Light Duty Vehicles | 119.94 | 99.19 | 96.71 | 90.03 | 89.76 | 89.49 | 87.97 |
| Medium Duty Vehicles | 15.54 | 15.54 | 15.54 | 15.54 | 15.54 | 15.54 | 15.54 |
| Heavy Duty Vehicles | 9.73 | 9.73 | 9.73 | 9.73 | 9.73 | 9.73 | 9.73 |

| | | R1-T 7 | R1-T 8 | R1-T 9 | R1-T 10 | | R2-T 1 |
|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 0.60% | 0.00% | 0.00% | 0.00% | | 0.20% |
| Medium Duty Vehicles | | 0.00% | 1.60% | 0.00% | 0.20% | | 0.00% |
| Heavy Duty Vehicles | MT/yr | 0.00% | 1.60% | 1.90% | 0.20% | | 0.00% |
| Passenger & Light Duty Vehicles | 87.97 | 87.45 | 87.45 | 87.45 | 87.45 | | 87.27 |
| Medium Duty Vehicles | 15.54 | 15.54 | 15.29 | 15.29 | 15.26 | | 15.26 |
| Heavy Duty Vehicles | 9.73 | 9.73 | 9.57 | 9.39 | 9.37 | | 9.37 |

| | | R2-T 2 | R2-T 3 | R2-T 4 | R2-T 5 | R2-T 6 | R2-T 7 |
|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 4.00% | 0.10% | 1.00% | 0.10% | 0.02% | 2.00% |
| Medium Duty Vehicles | | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Heavy Duty Vehicles | MT/yr | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Passenger & Light Duty Vehicles | 87.27 | 83.78 | 83.70 | 82.86 | 82.78 | 82.76 | 81.10 |
| Medium Duty Vehicles | 15.26 | 15.26 | 15.26 | 15.26 | 15.26 | 15.26 | 15.26 |
| Heavy Duty Vehicles | 9.37 | 9.37 | 9.37 | 9.37 | 9.37 | 9.37 | 9.37 |

| | | R2-T 8 | | | | | Reduced MT/yr (ECele) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 0.22% | | | | | | |
| Medium Duty Vehicles | | 0.00% | | | | | | |
| Heavy Duty Vehicles | MT/yr | 0.00% | | | | | | |
| Passenger & Light Duty Vehicles | 81.10 | 80.93 | | | | | 81 | **32.53%** |
| Medium Duty Vehicles | 15.26 | 15.26 | | | | | 15 | **1.80%** |
| Heavy Duty Vehicles | 9.37 | 9.37 | | | | | 9 | **3.66%** |
| ***Reduced Total (MT/yr)*** | | | | | | | **106** | **27.30%** |
| ***Unmitigated Total (MT/yr)*** | 145.20 | | | | | | | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Methane**

***Airport Fuel Emissions Reductions***

| ($U_{AAF}$) | MT/yr ($E_{CWD}$) | | | | | | Reduced MT/yr (ECele) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Reductions | | | | | | | | |
| Annual Fuel Usage | 0.13 | | | | | | 0.13 | 0.00% |

**A4. Stationary Sources (Natural Gas) Emission Reductions**

| Unit Type | | R1-E 5 | R1-E 7 | R2-E 1 | R2-E 3 | R2-E 5 | R2-E 7 |
|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 2.39% | 3.90% | 4.34% | 0.48% | 0.00% | 0.00% |
| Multi Family Residential Reduction | | 2.39% | 3.90% | 4.34% | 0.48% | 0.00% | 0.00% |
| Commercial Reduction | | 2.39% | 3.90% | 0.00% | 0.00% | 1.53% | 0.40% |
| Industrial Reduction | MT/yr ($E_{Cng}$) | 2.39% | 3.90% | 0.00% | 0.00% | 0.00% | 0.40% |
| AG/RAN/ER | 2.00 | 1.95 | 1.87 | 1.79 | 1.78 | 1.78 | 1.78 |
| Low Density Residential | 1.06 | 1.04 | 0.99 | 0.95 | 0.95 | 0.95 | 0.95 |
| Medium Density Residential | 0.38 | 0.37 | 0.35 | 0.34 | 0.34 | 0.34 | 0.34 |
| High Density Residential | 0.15 | 0.15 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 |
| Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Commercial | 2.48 | 2.42 | 2.33 | 2.33 | 2.33 | 2.29 | 2.28 |
| Mixed Use | 0.39 | 0.38 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 |
| Industrial | 1.20 | 1.18 | 1.13 | 1.13 | 1.13 | 1.13 | 1.13 |

| Unit Type | | R1-I 1 | R1-I 2 | | | | Reduced MT/yr ($E_{Cele}$) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 0.00% | 0.00% | | | | | |
| Multi Family Residential Reduction | | 0.00% | 0.00% | | | | | |
| Commercial Reduction | | 0.00% | 0.00% | | | | | |
| Industrial Reduction | MT/yr ($E_{Cng}$) | 13.00% | 0.50% | | | | | |
| AG/RAN/ER | 1.78 | 1.78 | 1.78 | | | | 2 | 10.70% |
| Low Density Residential | 0.95 | 0.95 | 0.95 | | | | 1 | 10.70% |
| Medium Density Residential | 0.34 | 0.34 | 0.34 | | | | 0 | 10.70% |
| High Density Residential | 0.14 | 0.14 | 0.14 | | | | 0 | 10.70% |
| Park | 0.00 | 0.00 | 0.00 | | | | 0 | 8.00% |
| Commercial | 2.28 | 2.28 | 2.28 | | | | 2 | 8.00% |
| Mixed Use | 0.36 | 0.36 | 0.36 | | | | 0 | 8.00% |
| Industrial | 1.13 | 0.98 | 0.97 | | | | 1 | 19.12% |
| **Total Reduced (MT/yr)** | | | | | | | **7** | **11.01%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **7.67** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Methane**

**B. Indirect Sources**

**B1. Electricity Emission Reductions**

| Unit Type | Unmitigated MT/yr ($E_{Cele}$) | R1-E 1 | R1-E 2 & 3 | R1-E 4 | R1-E 6 | R2-E 1 | R2-E 2 |
|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 21.00% | 10.00% | 6.75% | 7.60% | 4.34% | 8.91% |
| Multi Family Residential Reduction | | 21.00% | 10.00% | 6.75% | 7.60% | 4.34% | 8.91% |
| Commercial Reduction | | 21.00% | 9.29% | 6.75% | 7.60% | 0.00% | 0.00% |
| Industrial Reduction | | 21.00% | 9.29% | 6.75% | 7.60% | 0.00% | 0.00% |
| AG/RAN/ER | 0.93 | 0.73 | 0.66 | 0.61 | 0.57 | 0.54 | 0.49 |
| Low Density Residential | 0.49 | 0.39 | 0.35 | 0.33 | 0.30 | 0.29 | 0.26 |
| Medium Density Residential | 0.18 | 0.14 | 0.12 | 0.12 | 0.11 | 0.10 | 0.09 |
| High Density Residential | 0.07 | 0.06 | 0.05 | 0.05 | 0.04 | 0.04 | 0.04 |
| Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Commercial | 0.87 | 0.68 | 0.62 | 0.57 | 0.53 | 0.53 | 0.53 |
| Mixed Use | 0.14 | 0.11 | 0.10 | 0.09 | 0.08 | 0.08 | 0.08 |
| Industrial | 2.10 | 1.66 | 1.50 | 1.40 | 1.30 | 1.30 | 1.30 |

| Unit Type | MT/yr ($E_{Cele}$) | R2-E 3 | R2-E 4 | R2-E 5 | R2-E 6 | R2-E 7 | Reduced MT/yr ($E_{Cele}$) | % reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 0.48% | 1.61% | 0.00% | 0.00% | 0.00% | | |
| Multi Family Residential Reduction | | 0.48% | 1.61% | 0.00% | 0.00% | 0.00% | | |
| Commercial Reduction | | 0.00% | 0.00% | 1.53% | 0.60% | 0.40% | | |
| Industrial Reduction | | 0.00% | 0.00% | 0.00% | 0.60% | 0.40% | | |
| AG/RAN/ER | 0.49 | 0.49 | 0.48 | 0.48 | 0.48 | 0.48 | 0.4841 | 47.73% |
| Low Density Residential | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.2571 | 47.73% |
| Medium Density Residential | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.0917 | 47.73% |
| High Density Residential | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.0372 | 47.73% |
| Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0008 | 40.28% |
| Commercial | 0.53 | 0.53 | 0.53 | 0.52 | 0.52 | 0.52 | 0.5169 | 40.28% |
| Mixed Use | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.0808 | 40.28% |
| Industrial | 1.30 | 1.30 | 1.30 | 1.30 | 1.29 | 1.28 | 1.2831 | 38.87% |

| Unit Type | MT/yr (ECele) | R2-E 9 | | | | | Reduced MT/yr (ECele) | % reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 3.05% | | | | | | |
| Multi Family Residential Reduction | | 3.05% | | | | | | |
| Commercial Reduction | | 3.05% | | | | | | |
| Industrial Reduction | | 3.05% | | | | | | |
| AG/RAN/ER | 0.48 | 0.46934 | | | | | 0.4693 | 49.33% |
| Low Density Residential | 0.257123761 | 0.24928 | | | | | 0.2493 | 49.33% |
| Medium Density Residential | 0.09173434 | 0.08893 | | | | | 0.0889 | 49.33% |
| High Density Residential | 0.037219545 | 0.03608 | | | | | 0.0361 | 49.33% |
| Park | 0.000794304 | 0.00077 | | | | | 0.0008 | 42.10% |
| Commercial | 0.516876723 | 0.5011 | | | | | 0.5011 | 42.10% |
| Mixed Use | 0.080762175 | 0.0783 | | | | | 0.0783 | 42.10% |
| Industrial | 1.283149197 | 1.24399 | | | | | 1.2440 | 40.73% |
| **Reduced total (MT/year)** | | | | | | | **2.67** | **44.02%** |
| **Unmitigated total (MT/year)** | | | | | | | **4.77** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Methane**

**B2. Potable Water Emission Reductions**

| Unit Type | MT/yr ($E_{Cpot}$) | R1-E 8 | R2-E 9 | | | | Reduced MT/yr ($E_{Cele}$) | % reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 21.00% | 20.00% | | | | | |
| Multi Family Residential Reduction | | 21.00% | 20.00% | | | | | |
| Commercial Reduction | | 21.00% | 20.00% | | | | | |
| Industrial Reduction | | 21.00% | 20.00% | | | | | |
| AG/RAN/ER | 0.00135 | 0.001069 | 0.000856 | | | | 0.00086 | 36.80% |
| Low Density Residential | 0.00072 | 0.000568 | 0.000454 | | | | 0.00045 | 36.80% |
| Medium Density Residential | 0.00026 | 0.000203 | 0.000162 | | | | 0.00016 | 36.80% |
| High Density Residential | 0.00010 | 0.000082 | 0.000066 | | | | 0.00007 | 36.80% |
| Park | 0.00000 | 0.000000 | 0.000000 | | | | 0.00000 | 36.80% |
| Commercial | 0.00004 | 0.000030 | 0.000024 | | | | 0.00002 | 36.80% |
| Mixed Use | 0.00001 | 0.000005 | 0.000004 | | | | 0.00000 | 36.80% |
| Industrial | 0.00009 | 0.000074 | 0.000059 | | | | 0.00006 | 36.80% |
| **Reduced total (MT/year)** | | | | | | | **0.00163** | **36.80%** |
| **Unmitigated total (MT/year)** | | | | | | | **0.00257** | |

**B3. Solid Waste**

**Combined: B3a. Anthropogenic Carbon and B3b. Exhaust Emissions Reductions**

| Unit Type | MT/yr ($E_{CWF}$) | R2-W 1 | R2-W 2 | R2-W 3 | | | Reduced MT/yr ($E_{Cele}$) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 14.61% | 2.90% | 4.42% | | | | |
| Multi Family Residential Reduction | | 14.61% | 2.90% | 4.42% | | | | |
| Commercial Reduction | | 14.61% | 2.90% | 4.42% | | | | |
| Industrial Reduction | | 14.61% | 2.90% | 4.42% | | | | |
| AG/RAN/ER | 202.43 | 172.86 | 167.84 | 160.42 | | | 160.42 | 20.75% |
| Low Density Residential | 107.52 | 91.81 | 89.15 | 85.21 | | | 85.21 | 20.75% |
| Medium Density Residential | 38.36 | 32.75 | 31.80 | 30.40 | | | 30.40 | 20.75% |
| High Density Residential | 15.56 | 13.29 | 12.90 | 12.33 | | | 12.33 | 20.75% |
| Park | 0.07 | 0.06 | 0.06 | 0.05 | | | 0.05 | 20.75% |
| Commercial | 45.60 | 38.93 | 37.80 | 36.13 | | | 36.13 | 20.75% |
| Mixed Use | 7.12 | 6.08 | 5.91 | 5.64 | | | 5.64 | 20.75% |
| Industrial | 110.58 | 94.42 | 91.68 | 87.63 | | | 87.63 | 20.75% |
| **Total Reduced (MT/year)** | | | | | | | **418** | **20.75%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **527.24** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Methane**

**B3c. Exhaust Emissions (Disposal Equipment) Reductions**

| Vehicle Type | | | | | | | Reduced MT/yr | % |
|---|---|---|---|---|---|---|---|---|
| Reductions | MT/yr ($E_{CWD}$) | | | | | | (ECele) | Reduction |
| Excavator | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Grader | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Off-Highway Tractor | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Off-Highway Truck | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Rubber Tired Dozer | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Disposal Facility run by City? | | | | | | | No | |
| **Total Reduced (MT/year)** | | | | | | | **0.00** | **0.00%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **0.00** | |

**B4. Wastewater Emission Reductions**

| Unit Type | | R2-E 9 | | | | | Reduced MT/yr | % |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 20.00% | | | | | | |
| Multi Family Residential Reduction | | 20.00% | | | | | | |
| Commercial Reduction | | 20.00% | | | | | | |
| Industrial Reduction | MT/yr | 20.00% | | | | | ($E_{Cele}$) | Reduction |
| AG/RAN/ER | 0.0004804 | 0.000384 | | | | | 0.000384 | 20.00% |
| Low Density Residential | 0.0003219 | 0.000258 | | | | | 0.000258 | 20.00% |
| Medium Density Residential | 0.0001148 | 0.000092 | | | | | 0.000092 | 20.00% |
| High Density Residential | 0.0000466 | 0.000037 | | | | | 0.000037 | 20.00% |
| Park | 0.0000000 | 0.000000 | | | | | 0.000000 | 20.00% |
| Commercial | 0.0000150 | 0.000012 | | | | | 0.000012 | 20.00% |
| Mixed Use | 0.0000023 | 0.000002 | | | | | 0.000002 | 20.00% |
| Industrial | 0.0000409 | 0.000033 | | | | | 0.000033 | 20.00% |
| **Total Reduced (MT/year)** | | | | | | | **0.000818** | **20.00%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **0.0010220** | |

**C. AG emissions Reductions for $CH_4$**

| | | R1-A 1 | R2-E 9 | | | | Reduced | % |
|---|---|---|---|---|---|---|---|---|
| Emissions Source | MT/yr | 7.80% | 20.00% | | | | MT/yr | Reduction |
| Enteric Fermentation - Dairy Cows | 1,023.51 | 943.67 | | | | | 943.67 | 7.80% |
| Enteric Fermentation - Other Animals | 131.18 | 131.18 | | | | | 131.18 | 0.00% |
| Manure Management - Dairy Cows | 1,332.76 | 1,228.80 | | | | | 1,228.80 | 7.80% |
| Manure Management - Other Animals | 4.36 | 4.36 | | | | | 4.36 | 0.00% |
| Rice Cultivation | 8473.00 | 8,473.00 | 6,778.40 | | | | 6,778.40 | 20.00% |
| Agricultural Crop Burning | 98.39 | 98.39 | | | | | 98.39 | 0.00% |
| **Total Reduced (MT/year)** | | | | | | | **9,184.80** | **16.98%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **11,063.19** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Methane**

**D. Summary Table**

| Source Type | | Emissions, MT /yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Direct | Motor vehicles & Aircraft | 105.68 | 2,219.35 |
| | Landscape equipment | 0.00 | 0.04 |
| | Cooling and heating | 83.18 | 1,746.75 |
| | **Total direct, tons/yr** | **188.86** | **3,966.14** |
| Indirect | Electricity | 2.67 | 56.02 |
| | Potable water | 0.00 | 0.03 |
| | Solid waste | 417.82 | 8,774.31 |
| | Wastewater | 0.00 | 0.02 |
| | **Total indirect, tons/yr** | **420.49** | **8,830.38** |
| Agriculture | | 9,184.80 | 192,880.80 |
| | **Total, tons/yr** | **9,794.16** | **205,677.33** |
| | **Global warming potential index** | **21** | |

| Source Type | | Emissions, MT/yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Residential | AG/RAN/ER | 232.50 | 4,882.60 |
| | Low Density Residential | 123.49 | 2,593.33 |
| | Medium Density Residential | 44.05 | 925.15 |
| | High Density Residential | 17.88 | 375.40 |
| | **Total Residential** | **417.93** | **8,776.48** |
| Commercia | Park | 0.08 | 1.73 |
| | Commercial | 54.66 | 1,147.84 |
| | Mixed Use | 8.54 | 179.32 |
| | **Total Commercial** | **63.41** | **1,331.58** |
| Industrial | Industrial | 128.02 | 2,688.46 |
| | **Total Industrial** | **128.02** | **2,688.46** |
| Agricultural | | **9,184.80** | **192,880.80** |
| | **Total, tons/yr** | **9,794.16** | **205,677.32** |
| | **Global warming potential index** | 21 | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Nitrous Oxide**

**A. Direct Sources**

**A1-3. Mobile (Construction Equipment, Motor Vehicles, and Landscape Equipment) Unreduced Emissions**

| Con (MT/yr) | Motor Vehicles (MT/yr) | Landscape (MT/yr) ($E_{Cls}$) | Hearth (MT/yr) ($E_{Cwood}$) |
|---|---|---|---|
| | 61.99 | 0.0008893 | 1.0148345 |

**Transportation Emissions Reductions**

| | | R1-T 1 | R1-T 2 | R1-T 3 | R1-T 4 | R1-T 5 | R1-T 6 | |
|---|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 17.30% | 2.50% | 6.90% | 0.30% | 0.30% | 1.70% | |
| Medium Duty Vehicles | **Unmitigated** | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | |
| Passenger & Light Duty Vehicles | 51.20 | 42.35 | 41.29 | 38.44 | 38.32 | 38.21 | 37.56 | |
| Medium Duty Vehicles | 6.63 | 6.63 | 6.63 | 6.63 | 6.63 | 6.63 | 6.63 | |
| Heavy Duty Vehicles | 4.15 | 4.15 | 4.15 | 4.15 | 4.15 | 4.15 | 4.15 | |
| | | | | | | | | |
| | | **R1-T 7** | **R1-T 8** | **R1-T 9** | **R1-T 10** | | **R2-T 1** | |
| Passenger & Light Duty Vehicles | | 0.60% | 0.00% | 0.00% | 0.00% | | 0.20% | |
| Medium Duty Vehicles | | 0.00% | 1.60% | 0.00% | 0.20% | | 0.00% | |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | 1.60% | 1.90% | 0.20% | | 0.00% | |
| Passenger & Light Duty Vehicles | 37.56 | 37.33 | 37.33 | 37.33 | 37.33 | | 37.26 | |
| Medium Duty Vehicles | 6.63 | 6.63 | 6.53 | 6.53 | 6.51 | | 6.51 | |
| Heavy Duty Vehicles | 4.15 | 4.15 | 4.09 | 4.01 | 4.00 | | 4.00 | |
| | | | | | | | | |
| | | **R2-T 2** | **R2-T 3** | **R2-T 4** | **R2-T 5** | **R2-T 6** | **R2-T 7** | |
| Passenger & Light Duty Vehicles | | 4.00% | 0.10% | 1.00% | 0.10% | 0.02% | 2.00% | |
| Medium Duty Vehicles | | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | |
| Passenger & Light Duty Vehicles | 37.26 | 35.77 | 35.73 | 35.37 | 35.34 | 35.33 | 34.63 | |
| Medium Duty Vehicles | 6.51 | 6.51 | 6.51 | 6.51 | 6.51 | 6.51 | 6.51 | |
| Heavy Duty Vehicles | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | |
| | | | | | | | | |
| | | **R2-T 8** | | | | | **Reduced MT/yr (ECele)** | **% Reduction** |
| Passenger & Light Duty Vehicles | | 0.22% | | | | | | |
| Medium Duty Vehicles | | 0.00% | | | | | | |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | | | | | | |
| Passenger & Light Duty Vehicles | 34.63 | 34.55 | | | | | 35 | **32.53%** |
| Medium Duty Vehicles | 6.51 | 6.51 | | | | | 7 | **1.80%** |
| Heavy Duty Vehicles | 4.00 | 4.00 | | | | | 4 | **3.66%** |
| ***Reduced Total (MT/yr)*** | | | | | | | **45** | **27.30%** |
| ***Unmitigated Total (MT/yr)*** | | | | | | | 61.99 | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Nitrous Oxide**

***Airport Fuel Emissions Reductions***

| ($U_{AAF}$) | Unmitigated MT/yr ($E_{CWD}$) | | | | | | Reduced MT/yr (ECele) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Reductions | | | | | | | | |
| Annual Fuel Usage | 0.0020075 | | | | | | 0.0020075 | 0.00% |

**A4. Stationary Sources (Natural Gas)**

| Unit Type | Unmitigated MT/yr | R1-E 5 | R1-E 7 | R2-E 1 | R2-E 3 | R2-E 5 | R2-E 7 |
|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 2.39% | 3.90% | 4.34% | 0.48% | 0.00% | 0.00% |
| Multi Family Residential Reduction | | 2.39% | 3.90% | 4.34% | 0.48% | 0.00% | 0.00% |
| Commercial Reduction | | 2.39% | 3.90% | 0.00% | 0.00% | 1.53% | 0.40% |
| Industrial Reduction | | 2.39% | 3.90% | 0.00% | 0.00% | 0.00% | 0.40% |
| AG/RAN/ER | 0.0399430 | 0.0389881 | 0.0374676 | 0.0358408 | 0.0356678 | 0.0356678 | 0.0356678 |
| Low Density Residential | 0.0212150 | 0.0207078 | 0.0199002 | 0.0190362 | 0.0189443 | 0.0189443 | 0.0189443 |
| Medium Density Residential | 0.0075690 | 0.0073881 | 0.0070999 | 0.0067916 | 0.0067589 | 0.0067589 | 0.0067589 |
| High Density Residential | 0.0030710 | 0.0029976 | 0.0028807 | 0.0027556 | 0.0027423 | 0.0027423 | 0.0027423 |
| Park | 0.0000770 | 0.0000752 | 0.0000722 | 0.0000722 | 0.0000722 | 0.0000711 | 0.0000708 |
| Commercial | 0.0496570 | 0.0484699 | 0.0465796 | 0.0465796 | 0.0465796 | 0.0458652 | 0.0456839 |
| Mixed Use | 0.0077590 | 0.0075735 | 0.0072781 | 0.0072781 | 0.0072781 | 0.0071665 | 0.0071382 |
| Industrial | 0.1204270 | 0.1175481 | 0.1129637 | 0.1129637 | 0.1129637 | 0.1129637 | 0.1125171 |

| Unit Type | MT/yr ($E_{Cng}$) | R1-I 1 | R1-I 2 | | | | Reduced MT/yr ($E_{Cele}$) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 0.00% | 0.00% | | | | | |
| Multi Family Residential Reduction | | 0.00% | 0.00% | | | | | |
| Commercial Reduction | | 0.00% | 0.00% | | | | | |
| Industrial Reduction | | 13.00% | 0.50% | | | | | |
| AG/RAN/ER | 0.0356678 | 0.0356678 | 0.0356678 | | | | 0.0356678 | 10.70% |
| Low Density Residential | 0.0189443 | 0.0189443 | 0.0189443 | | | | 0.0189443 | 10.70% |
| Medium Density Residential | 0.0067589 | 0.0067589 | 0.0067589 | | | | 0.0067589 | 10.70% |
| High Density Residential | 0.0027423 | 0.0027423 | 0.0027423 | | | | 0.0027423 | 10.70% |
| Park | 0.0000708 | 0.0000708 | 0.0000708 | | | | 0.0000708 | 8.00% |
| Commercial | 0.0456839 | 0.0456839 | 0.0456839 | | | | 0.0456839 | 8.00% |
| Mixed Use | 0.0071382 | 0.0071382 | 0.0071382 | | | | 0.0071382 | 8.00% |
| Industrial | 0.1125171 | 0.0978899 | 0.0974004 | | | | 0.0974004 | 19.12% |
| **Total Reduced (MT/yr)** | | | | | | | **0.2144066** | **14.14%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **0.2497180** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Nitrous Oxide**

**B. Indirect Sources**

**B1. Electricity Emissions Reductions**

| Unit Type | | R1-E 1 | R1-E 2 & 3 | R1-E 4 | R1-E 6 | R2-E 1 | R2-E 2 |
|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 21.00% | 10.00% | 6.75% | 7.60% | 4.34% | 8.91% |
| Multi Family Residential Reduction | | 21.00% | 10.00% | 6.75% | 7.60% | 4.34% | 8.91% |
| Commercial Reduction | Unmitigated | 21.00% | 9.29% | 6.75% | 7.60% | 0.00% | 0.00% |
| Industrial Reduction | MT/yr | 21.00% | 9.29% | 6.75% | 7.60% | 0.00% | 0.00% |
| AG/RAN/ER | 0.2484300 | 0.1962597 | 0.1766337 | 0.1647150 | 0.1521967 | 0.1455884 | 0.1326105 |
| Low Density Residential | 0.1319453 | 0.1042368 | 0.0938131 | 0.0874829 | 0.0808342 | 0.0773244 | 0.0704316 |
| Medium Density Residential | 0.0215033 | 0.0169876 | 0.0152888 | 0.0142572 | 0.0131737 | 0.0126017 | 0.0114783 |
| High Density Residential | 0.0087241 | 0.0068920 | 0.0062028 | 0.0057843 | 0.0053447 | 0.0051126 | 0.0046569 |
| Park | 0.0003576 | 0.0002825 | 0.0002543 | 0.0002371 | 0.0002191 | 0.0002191 | 0.0002191 |
| Commercial | 0.2321305 | 0.1833831 | 0.1650448 | 0.1539080 | 0.1422110 | 0.1422110 | 0.1422110 |
| Mixed Use | 0.0362709 | 0.0286540 | 0.0257886 | 0.0240485 | 0.0222208 | 0.0222208 | 0.0222208 |
| Industrial | 0.5629518 | 0.4447319 | 0.4034386 | 0.3762157 | 0.3476233 | 0.3476233 | 0.3476233 |

| Unit Type | | R2-E 3 | R2-E 4 | R2-E 5 | R2-E 6 | R2-E 7 | Reduced MT/yr ($E_{Cele}$) | % reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 0.48% | 1.61% | 0.00% | 0.00% | 0.00% | | |
| Multi Family Residential Reduction | | 0.48% | 1.61% | 0.00% | 0.00% | 0.00% | | |
| Commercial Reduction | | 0.00% | 0.00% | 1.53% | 0.60% | 0.40% | | |
| Industrial Reduction | MT/yr ($E_{Cele}$) | 0.00% | 0.00% | 0.00% | 0.60% | 0.40% | | |
| AG/RAN/ER | 0.1326105 | 0.1319705 | 0.1298477 | 0.1298477 | 0.1298477 | 0.1298477 | 0.1298477 | 47.73% |
| Low Density Residential | 0.0704316 | 0.0700917 | 0.0689642 | 0.0689642 | 0.0689642 | 0.0689642 | 0.0689642 | 47.73% |
| Medium Density Residential | 0.0114783 | 0.0114229 | 0.0112392 | 0.0112392 | 0.0112392 | 0.0112392 | 0.0112392 | 47.73% |
| High Density Residential | 0.0046569 | 0.0046344 | 0.0045599 | 0.0045599 | 0.0045599 | 0.0045599 | 0.0045599 | 47.73% |
| Park | 0.0002191 | 0.0002191 | 0.0002191 | 0.0002157 | 0.0002144 | 0.0002136 | 0.0002136 | 40.28% |
| Commercial | 0.1422110 | 0.1422110 | 0.1422110 | 0.1400301 | 0.1391834 | 0.1386332 | 0.1386332 | 40.28% |
| Mixed Use | 0.0222208 | 0.0222208 | 0.0222208 | 0.0218800 | 0.0217477 | 0.0216617 | 0.0216617 | 40.28% |
| Industrial | 0.3476233 | 0.3476233 | 0.3476233 | 0.3476233 | 0.3455214 | 0.3441554 | 0.3441554 | 38.87% |

| Unit Type | | R2-E 9 | | | | | Reduced MT/yr (ECele) | % reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 3.05% | | | | | | |
| Multi Family Residential Reduction | | 3.05% | | | | | | |
| Commercial Reduction | | 3.05% | | | | | | |
| Industrial Reduction | MT/yr (ECele) | 3.05% | | | | | | |
| AG/RAN/ER | 0.1298477 | 0.12588 | | | | | 0.1258848 | 49.33% |
| Low Density Residential | 0.068964247 | 0.06686 | | | | | 0.0668595 | 49.33% |
| Medium Density Residential | 0.011239195 | 0.0109 | | | | | 0.0108962 | 49.33% |
| High Density Residential | 0.004559852 | 0.00442 | | | | | 0.0044207 | 49.33% |
| Park | 0.000213566 | 0.00021 | | | | | 0.000207 | 42.10% |
| Commercial | 0.138633173 | 0.1344 | | | | | 0.1344022 | 42.10% |
| Mixed Use | 0.021661737 | 0.021 | | | | | 0.0210006 | 42.10% |
| Industrial | 0.344155371 | 0.33365 | | | | | 0.333652 | 40.73% |
| **Reduced total (MT/year)** | | | | | | | **0.70** | **43.87%** |
| **Unmitigated total (MT/year)** | | | | | | | **1.24** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Nitrous Oxide**

**B2. Potable Water Emissions Reductions**

| Unit Type | Unmitigated MT/yr | R1-E 8 | R2-E 9 | | | | Reduced MT/yr ($E_{Cele}$) | % reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 21.00% | 20.00% | | | | | |
| Multi Family Residential Reduction | | 21.00% | 20.00% | | | | | |
| Commercial Reduction | | 21.00% | 20.00% | | | | | |
| Industrial Reduction | | 21.00% | 20.00% | | | | | |
| AG/RAN/ER | 0.0003631 | 0.0002868 | 0.0002295 | | | | 0.0002295 | 36.80% |
| Low Density Residential | 0.0001928 | 0.0001523 | 0.0001219 | | | | 0.0001219 | 36.80% |
| Medium Density Residential | 0.0000688 | 0.0000544 | 0.0000435 | | | | 0.0000435 | 36.80% |
| High Density Residential | 0.0000279 | 0.0000221 | 0.0000176 | | | | 0.0000176 | 36.80% |
| Park | 0.0000000 | 0.0000000 | 0.0000000 | | | | 0.0000000 | 36.80% |
| Commercial | 0.0000103 | 0.0000082 | 0.0000065 | | | | 0.0000065 | 36.80% |
| Mixed Use | 0.0000016 | 0.0000013 | 0.0000010 | | | | 0.0000010 | 36.80% |
| Industrial | 0.0000251 | 0.0000198 | 0.0000159 | | | | 0.0000159 | 36.80% |
| **Reduced total (MT/year)** | | | | | | | **0.0004359** | **36.80%** |
| **Unmitigated total (MT/year)** | | | | | | | **0.0006897** | |

**B3. Solid Waste**

**Combined: B3a. Anthropogenic Carbon and B3b. Exhaust Emissions Reductions**

| Unit Type | Unmitigated MT/yr | R2-W 1 | R2-W 2 | R2-W 3 | | | Reduced MT/yr ($E_{Cele}$) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 14.61% | 2.90% | 4.42% | | | | |
| Multi Family Residential Reduction | | 14.61% | 2.90% | 4.42% | | | | |
| Commercial Reduction | | 14.61% | 2.90% | 4.42% | | | | |
| Industrial Reduction | | 14.61% | 2.90% | 4.42% | | | | |
| AG/RAN/ER | 0.0005875 | 0.0005017 | 0.0004871 | 0.0004656 | | | 0.0004656 | 20.75% |
| Low Density Residential | 0.0003120 | 0.0002664 | 0.0002587 | 0.0002473 | | | 0.0002473 | 20.75% |
| Medium Density Residential | 0.0001113 | 0.0000951 | 0.0000923 | 0.0000882 | | | 0.0000882 | 20.75% |
| High Density Residential | 0.0000452 | 0.0000386 | 0.0000375 | 0.0000358 | | | 0.0000358 | 20.75% |
| Park | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | | | 0.0000001 | 20.75% |
| Commercial | 0.0000662 | 0.0000565 | 0.0000549 | 0.0000524 | | | 0.0000524 | 20.75% |
| Mixed Use | 0.0000103 | 0.0000088 | 0.0000086 | 0.0000082 | | | 0.0000082 | 20.75% |
| Industrial | 0.0001605 | 0.0001370 | 0.0001330 | 0.0001272 | | | 0.0001272 | 20.75% |
| **Total Reduced (MT/year)** | | | | | | | **0.0010247** | **20.75%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **0.0012931** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Nitrous Oxide**

**B3c. Exhaust Emissions (Disposal Equipment) Reductions**

| Vehicle Type | | | | | | | Reduced MT/yr | % |
|---|---|---|---|---|---|---|---|---|
| Reductions | MT/yr ($E_{CWD}$) | | | | | | (ECele) | Reduction |
| Excavator | 0.0000000 | 0.0000000 | | | | | 0.0000000 | 0.00% |
| Grader | 0.0000000 | 0.0000000 | | | | | 0.0000000 | 0.00% |
| Off-Highway Tractor | 0.0000000 | 0.0000000 | | | | | 0.0000000 | 0.00% |
| Off-Highway Truck | 0.0000000 | 0.0000000 | | | | | 0.0000000 | 0.00% |
| Rubber Tired Dozer | 0.0000000 | 0.0000000 | | | | | 0.0000000 | 0.00% |
| Disposal Facility run by City? | | | | | | | No | |
| **Total Reduced (MT/year)** | | | | | | | **0.0000000** | **0.00%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **0.0000000** | |

**B4. Wastewater Emissions Reduction**

| Unit Type | | R2-E 9 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 20.00% | | | | | | |
| Multi Family Residential Reduction | | 20.00% | | | | | Reduced | |
| Commercial Reduction | Unmitigated | 20.00% | | | | | MT/yr | % |
| Industrial Reduction | MT/yr | 20.00% | | | | | ($E_{Cele}$) | Reduction |
| AG/RAN/ER | 0.0001289 | 0.0001031 | | | | | 0.0001031 | 20.00% |
| Low Density Residential | 0.0000863 | 0.0000691 | | | | | 0.0000691 | 20.00% |
| Medium Density Residential | 0.0000141 | 0.0000113 | | | | | 0.0000113 | 20.00% |
| High Density Residential | 0.0000057 | 0.0000046 | | | | | 0.0000046 | 20.00% |
| Park | 0.0000000 | 0.0000000 | | | | | 0.0000000 | 20.00% |
| Commercial | 0.0000040 | 0.0000032 | | | | | 0.0000032 | 20.00% |
| Mixed Use | 0.0000006 | 0.0000005 | | | | | 0.0000005 | 20.00% |
| Industrial | 0.0000110 | 0.0000088 | | | | | 0.0000088 | 20.00% |
| **Total Reduced (MT/year)** | | | | | | | **0.0002005** | **20.00%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **0.0002506** | |

**C. AG Emissions Reductions for $N_2O$.**

| Emissions Source | Unmitigated | R1-A 1 | | | | | Reduced | % |
|---|---|---|---|---|---|---|---|---|
| Reductions | MT/yr | 7.80% | | | | | MT/yr | Reduction |
| Manure Management - Dairy Cows | 3.39 | 3.13 | | | | | 3.13 | 7.80% |
| Manure Management - Other Animals | 2.10 | 2.10 | | | | | 2.10 | 0.00% |
| Animals and Runoff | 250.99 | 250.99 | | | | | 250.99 | 0.00% |
| Crop Growth | 1219.67 | 1,219.67 | | | | | 1,219.67 | 0.00% |
| Fertilizer Use | 327.07 | 327.07 | | | | | 327.07 | 0.00% |
| Agricultural Residue Burning | 3.05 | 3.05 | | | | | 3.05 | 0.00% |
| **Total Reduced (MT/year)** | | | | | | | **1,805.99** | **0.01%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **1,806.26** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2020**
**Reduced Inventory**
**Nitrous Oxide**

**D. Summary Table**

| Source Type | | Emissions, MT /yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Direct | Motor vehicles & Aircraft | 45.07 | 13,970.58 |
| | Landscape equipment | 0.00 | 0.28 |
| | Cooling and heating | 1.23 | 381.06 |
| | **Total direct, tons/yr** | **46.30** | **14,351.92** |
| Indirect | Electricity | 0.70 | 216.17 |
| | Potable water | 0.00 | 0.14 |
| | Solid waste | 0.00 | 0.32 |
| | Wastewater | 0.00 | 0.06 |
| | **Total indirect, tons/yr** | **0.70** | **216.69** |
| Agriculture | | 1,805.99 | 559,858.41 |
| | **Total, tons/yr** | **1,852.99** | **574,427.01** |
| | **Global warming potential index** | 310 | |

| Source Type | | Emissions, MT/yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Residential | AG/RAN/ER | 17.85 | 5,533.60 |
| | Low Density Residential | 9.48 | 2,939.10 |
| | Medium Density Residential | 3.37 | 1,044.35 |
| | High Density Residential | 1.37 | 423.77 |
| | **Total Residential** | **32.07** | **9,940.82** |
| Commercial | Park | 0.01 | 1.94 |
| | Commercial | 4.17 | 1,291.92 |
| | Mixed Use | 0.65 | 201.83 |
| | **Total Commercial** | **4.83** | **1,496.31** |
| Industrial | Industrial | 10.10 | 3,131.45 |
| | **Total Industrial** | **10.10** | **3,131.45** |
| Agricultural | | **1,805.99** | **559,858.41** |
| | **Total, tons/yr** | **1,852.99** | **574,426.99** |
| | **Global warming potential index** | 310 | |

# Appendix I: 2030 Reduced URBEMIS Output and GHG Calculations

**Sutter County**
**Emissions by Source**
**2030**
**Reduced Inventory**
**By Source**

| Transportation | | |
|---|---|---|
| | **Source:** | **Metric tons of $CO_2e$** |
| 1 | On-Road Vehicles | 362,245 |
| 2 | Airport Operations | 87 |
| | **Total** | **362,332** |

| Energy | | |
|---|---|---|
| | **Sources:** | **Metric tons of $CO_2e$** |
| 1 | Electric | 60,768 |
| 2 | Natural Gas | 174,018 |
| | **Total** | **234,786** |

| Solid Waste | | |
|---|---|---|
| | **Source** | **Metric tons of $CO_2e$** |
| 1 | Solid Waste Disposal | 15,671 |
| 2 | Green Waste Recycling | Data Not Available |
| 3 | Materials Recycling | Data Not Available |
| | **Total** | **15,671** |

| Landscape Design | | |
|---|---|---|
| | **Sources:** | **Metric tons of $CO_2e$** |
| 1 | Landscape Maintenance Emissions | 40 |
| 2 | Carbon sink from CO2 sequestration | Data Not Available |
| | **Total** | **40** |

| Agriculture | | |
|---|---|---|
| | **Sources:** | **Metric tons of $CO_2e$** |
| 1 | Enteric Fermentation | 22,572 |
| 2 | Manure Management | 27,515 |
| 3 | Rice Cultivation | 120,164 |
| 4 | Agricultural Residue Burning | 3,011 |
| 5 | Crop Growth | 372,557 |
| 6 | Animals and Runoff | 76,704 |
| 7 | Fertilizer Use | 99,760 |
| | **Total** | **722,283** |

| Net Total Emissions | |
|---|---|
| **Category** | **Metric tons of $CO_2e$** |
| Energy | 234,786 |
| Solid Waste | 15,671 |
| Landscape Design | 40 |
| Agriculture | 722,283 |
| Transportation | 362,332 |
| **Total** | **1,335,112** |

**Sutter County**
**Emissions by Land Use**
**2030**
**Reduced Inventory**
**By Land Use Category**

| Source Type | | $CO_2e$ MT/yr | | | |
|---|---|---|---|---|---|
| | | $CO_2$ | $CH_4$ | $N_2O$ | combined $CO_2e$ |
| Residential | AG/RAN/ER | 133,991.87 | 5,376.46 | 4,150.61 | 143,519 |
| | Low Density Residential | 89,478.33 | 3,590.28 | 2,771.70 | 95,840 |
| | Medium Density Residential | 56,775.66 | 2,278.33 | 1,750.53 | 60,805 |
| | High Density Residential | 25,510.77 | 1,023.71 | 786.56 | 27,321 |
| | **Total Residential** | 305,756.64 | 12,268.78 | 9,459.40 | **327,485** |
| Commercial | Park | 56.73 | 1.61 | 1.25 | 60 |
| | Commercial | 67,154.59 | 1,932.68 | 1,508.16 | 70,595 |
| | Mixed Use | 18,084.59 | 520.47 | 406.15 | 19,011 |
| | **Total Commercial** | 85,409.80 | 2,456.78 | 1,916.03 | **89,783** |
| Industrial | Industrial | 186,511.58 | 5,029.37 | 4,019.87 | 195,561 |
| | **Total Industrial** | 186,511.58 | 5,029.37 | 4,019.87 | **195,561** |
| Agriculture | | 0.00 | 170,698.73 | 551,584.68 | 722,283 |
| | **Total** | **577,678.01** | **190,453.66** | **566,979.98** | **1,335,112** |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Carbon Dioxide**

**A. Direct Sources**

**A1-3. Mobile (Construction Equipment, Motor Vehicles, and Landscape Equipment) Unreduced Emissions**

| Con (MT/yr) | Motor Vehicles (MT/yr) | Landscape (MT/yr) ($E_{Cls}$) | Hearth (MT/yr) ($E_{Cwood}$) |
|---|---|---|---|
| | 661,154.84 | 39.33 | 23,991.59 |

**Transportation Emission Reductions**

| | | R1-T 1 | R1-T 2 | R1-T 3 | R1-T 4 | R1-T 5 | R1-T 6 |
|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 19.70% | 14.55% | 7.20% | 0.30% | 0.30% | 1.70% |
| Medium Duty Vehicles | **Unmitigated** | 0.00% | 25.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | 25.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Passenger & Light Duty Vehicles | 546,113.90 | 438,529.46 | 374,723.42 | 347,743.34 | 346,700.11 | 345,660.01 | 339,783.79 |
| Medium Duty Vehicles | 70,743.57 | 70,743.57 | 53,057.68 | 53,057.68 | 53,057.68 | 53,057.68 | 53,057.68 |
| Heavy Duty Vehicles | 44,297.37 | 44,297.37 | 33,223.03 | 33,223.03 | 33,223.03 | 33,223.03 | 33,223.03 |

| | | R1-T 7 | R1-T 8 | R1-T 9 | R1-T 10 | | R2-T 1 |
|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 0.60% | 0.00% | 0.00% | 0.20% | | 4.00% |
| Medium Duty Vehicles | | 0.00% | 1.60% | 0.00% | 0.20% | | 0.00% |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | 1.60% | 1.90% | 0.20% | | 0.00% |
| Passenger & Light Duty Vehicles | 339,783.79 | 337,745.08 | 337,745.08 | 337,745.08 | 337,069.59 | | 323,586.81 |
| Medium Duty Vehicles | 53,057.68 | 53,057.68 | 52,208.75 | 52,208.75 | 52,104.34 | | 52,104.34 |
| Heavy Duty Vehicles | 33,223.03 | 33,223.03 | 32,691.46 | 32,070.32 | 32,006.18 | | 32,006.18 |

| | | R2-T 2 | R2-T 3 | R2-T 4 | R2-T 5 | R2-T 6 | R2-T 7 |
|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 6.00% | 0.88% | 1.50% | 3.00% | 0.07% | 7.00% |
| Medium Duty Vehicles | | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Passenger & Light Duty Vehicles | 323,586.81 | 304,171.60 | 301,510.10 | 296,987.45 | 288,077.83 | 287,879.25 | 267,727.70 |
| Medium Duty Vehicles | 52,104.34 | 52,104.34 | 52,104.34 | 52,104.34 | 52,104.34 | 52,104.34 | 52,104.34 |
| Heavy Duty Vehicles | 32,006.18 | 32,006.18 | 32,006.18 | 32,006.18 | 32,006.18 | 32,006.18 | 32,006.18 |

| | | R2-T 8 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 2.41% | | | | | **Reduced** | |
| Medium Duty Vehicles | | 0.00% | | | | | **MT/yr** | **%** |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | | | | | **(ECele)** | **Reduction** |
| Passenger & Light Duty Vehicles | 267,727.70 | 261,275.67 | | | | | 261,276 | **52.16%** |
| Medium Duty Vehicles | 52,104.34 | 52,104.34 | | | | | 52,104 | **26.35%** |
| Heavy Duty Vehicles | 32,006.18 | 32,006.18 | | | | | 32,006 | **27.75%** |
| ***Reduced Total (MT/yr)*** | | | | | | | **345,386** | **47.76%** |
| ***Unmitigated Total (MT/yr)*** | | | | | | | **661,155** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Carbon Dioxide**

***Airport Fuel Emission Reductions***

| ($U_{AAF}$) | Unmitigated MT/yr ($E_{CWD}$) | R1-T 2 | | | | | Reduced MT/yr (ECele) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Reductions | | 25.00% | | | | | | |
| Annual Fuel Usage | 151.84 | 113.88 | | | | | 113.88 | 25.00% |

**A4. Stationary Sources (Natural Gas) Emission Reductions**

| Unit Type | | R1-E 5 | R1-E 7 | R2-E 1 | R2-E 3 | R2-E 5 | R2-E 7 |
|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 3.18% | 3.90% | 13.06% | 1.77% | 0.00% | 0.00% |
| Multi Family Residential Reduction | | 3.18% | 3.90% | 13.06% | 1.77% | 0.00% | 0.00% |
| Commercial Reduction | Unmitigated | 3.18% | 3.90% | 0.00% | 0.00% | 17.82% | 2.75% |
| Industrial Reduction | MT/yr | 3.18% | 3.90% | 0.00% | 0.00% | 0.00% | 2.75% |
| AG/RAN/ER | 32,144.32 | 31,121.69 | 29,907.95 | 26,002.67 | 25,541.55 | 25,541.55 | 25,541.55 |
| Low Density Residential | 21,465.74 | 20,782.83 | 19,972.30 | 17,364.39 | 17,056.46 | 17,056.46 | 17,056.46 |
| Medium Density Residential | 13,621.47 | 13,188.12 | 12,673.78 | 11,018.89 | 10,823.48 | 10,823.48 | 10,823.48 |
| High Density Residential | 6,120.49 | 5,925.78 | 5,694.67 | 4,951.08 | 4,863.28 | 4,863.28 | 4,863.28 |
| Park | 25.28 | 24.48 | 23.52 | 23.52 | 23.52 | 19.33 | 18.80 |
| Commercial | 29,351.77 | 28,417.99 | 27,309.68 | 27,309.68 | 27,309.68 | 22,443.53 | 21,825.70 |
| Mixed Use | 7,904.21 | 7,652.75 | 7,354.29 | 7,354.29 | 7,354.29 | 6,043.87 | 5,877.50 |
| Industrial | 77,638.95 | 75,168.97 | 72,237.38 | 72,237.38 | 72,237.38 | 72,237.38 | 70,248.82 |

| Unit Type | | R1-I 1 | R1-I 2 | | | | Reduced MT/yr ($E_{Cele}$) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 0.00% | 0.00% | | | | | |
| Multi Family Residential Reduction | | 0.00% | 0.00% | | | | | |
| Commercial Reduction | | 0.00% | 0.00% | | | | | |
| Industrial Reduction | MT/yr ($E_{Cng}$) | 13.00% | 0.50% | | | | | |
| AG/RAN/ER | 25,541.55 | 25,541.55 | 25,541.55 | | | | 25,542 | 20.54% |
| Low Density Residential | 17,056.46 | 17,056.46 | 17,056.46 | | | | 17,056 | 20.54% |
| Medium Density Residential | 10,823.48 | 10,823.48 | 10,823.48 | | | | 10,823 | 20.54% |
| High Density Residential | 4,863.28 | 4,863.28 | 4,863.28 | | | | 4,863 | 20.54% |
| Park | 18.80 | 18.80 | 18.80 | | | | 19 | 25.64% |
| Commercial | 21,825.70 | 21,825.70 | 21,825.70 | | | | 21,826 | 25.64% |
| Mixed Use | 5,877.50 | 5,877.50 | 5,877.50 | | | | 5,877 | 25.64% |
| Industrial | 70,248.82 | 61,116.48 | 60,810.89 | | | | 60,811 | 21.67% |
| **Total Reduced (MT/yr)** | | | | | | | **146,818** | **22.02%** |
| **Total Unmitigated (MT/yr)** | **188,272.24** | | | | | | | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Carbon Dioxide**

**B. Indirect Sources**

**B1. Electricity Emission Reductions**

| Unit Type | | R1-E 1 | R1-E 2 & 3 | R1-E 4 | R1-E 6 | R2-E 1 | R2-E 2 |
|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 21.00% | 10.00% | 10.82% | 7.60% | 13.06% | 13.18% |
| Multi Family Residential Reduction | | 21.00% | 10.00% | 10.82% | 7.60% | 13.06% | 13.18% |
| Commercial Reduction | Unmitigated | 21.00% | 9.29% | 10.82% | 7.60% | 0.00% | 0.00% |
| Industrial Reduction | MT/yr ($E_{Cele}$) | 21.00% | 9.29% | 10.82% | 7.60% | 0.00% | 0.00% |
| AG/RAN/ER | 18,479.24 | 14,598.60 | 13,138.74 | 11,717.13 | 10,826.63 | 9,412.92 | 8,172.52 |
| Low Density Residential | 12,340.30 | 9,748.84 | 8,773.95 | 7,824.61 | 7,229.94 | 6,285.88 | 5,457.55 |
| Medium Density Residential | 7,830.76 | 6,186.30 | 5,567.67 | 4,965.25 | 4,587.89 | 3,988.82 | 3,463.19 |
| High Density Residential | 3,518.57 | 2,779.67 | 2,501.70 | 2,231.02 | 2,061.46 | 1,792.28 | 1,556.10 |
| Park | 19.02 | 15.03 | 13.52 | 12.06 | 11.14 | 11.14 | 11.14 |
| Commercial | 22,082.12 | 17,444.87 | 15,700.39 | 14,001.61 | 12,937.48 | 12,937.48 | 12,937.48 |
| Mixed Use | 5,946.55 | 4,697.77 | 4,228.00 | 3,770.53 | 3,483.97 | 3,483.97 | 3,483.97 |
| Industrial | 58,409.85 | 46,143.78 | 41,859.33 | 37,330.15 | 34,493.06 | 34,493.06 | 34,493.06 |

| Unit Type | | R2-E 3 | R2-E 4 | R2-E 5 | R2-E 6 | R2-E 7 | |
|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 1.77% | 5.91% | 0.00% | 0.00% | 0.00% | |
| Multi Family Residential Reduction | | 1.77% | 5.91% | 0.00% | 0.00% | 0.00% | |
| Commercial Reduction | | 0.00% | 0.00% | 17.82% | 3.32% | 2.75% | |
| Industrial Reduction | MT/yr ($E_{Cele}$) | 0.00% | 0.00% | 0.00% | 3.32% | 2.75% | |
| AG/RAN/ER | 8,172.52 | 8,027.59 | 7,553.07 | 7,553.07 | 7,553.07 | 7,553.07 | |
| Low Density Residential | 5,457.55 | 5,360.77 | 5,043.88 | 5,043.88 | 5,043.88 | 5,043.88 | |
| Medium Density Residential | 3,463.19 | 3,401.77 | 3,200.69 | 3,200.69 | 3,200.69 | 3,200.69 | |
| High Density Residential | 1,556.10 | 1,528.51 | 1,438.15 | 1,438.15 | 1,438.15 | 1,438.15 | |
| Park | 11.14 | 11.14 | 11.14 | 9.16 | 8.85 | 8.61 | |
| Commercial | 12,937.48 | 12,937.48 | 12,937.48 | 10,632.23 | 10,279.20 | 9,996.23 | |
| Mixed Use | 3,483.97 | 3,483.97 | 3,483.97 | 2,863.18 | 2,768.11 | 2,691.91 | |
| Industrial | 34,493.06 | 34,493.06 | 34,493.06 | 34,493.06 | 33,347.76 | 32,429.76 | |

| Unit Type | | R2-E 9 | | | | | Reduced MT/yr ($E_{Cele}$) | % reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 3.18% | | | | | | |
| Multi Family Residential Reduction | | 3.18% | | | | | | |
| Commercial Reduction | | 3.18% | | | | | | |
| Industrial Reduction | MT/yr (ECele) | 3.18% | | | | | | |
| AG/RAN/ER | 7,553.07 | 7,312.70 | | | | | 7,313 | 60.43% |
| Low Density Residential | 5,043.88 | 4,883.37 | | | | | 4,883 | 60.43% |
| Medium Density Residential | 3,200.69 | 3,098.83 | | | | | 3,099 | 60.43% |
| High Density Residential | 1,438.15 | 1,392.39 | | | | | 1,392 | 60.43% |
| Park | 8.61 | 8.34 | | | | | 8 | 56.17% |
| Commercial | 9,996.23 | 9,678.11 | | | | | 9,678 | 56.17% |
| Mixed Use | 2,691.91 | 2,606.24 | | | | | 2,606 | 56.17% |
| Industrial | 32,429.76 | 31,397.71 | | | | | 31,398 | 46.25% |
| **Reduced total (MT/year)** | | | | | | | **60,378** | **53.06%** |
| **Unmitigated total (MT/year)** | | | | | | | **128,626** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Carbon Dioxide**

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Carbon Dioxide**

**B2. Potable Water Emission Reductions**

| Unit Type | | R1-E 8 | R2-E 9 | | | | Reduced MT/yr ($E_{Cele}$) | % reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 21.00% | 30.00% | | | | | |
| Multi Family Residential Reduction | | 21.00% | 30.00% | | | | | |
| Commercial Reduction | Unmitigated | 21.00% | 30.00% | | | | | |
| Industrial Reduction | MT/yr | 21.00% | 30.00% | | | | | |
| AG/RAN/ER | 23.22 | 18.34 | 12.84 | | | | 12.84 | 44.70% |
| Low Density Residential | 15.51 | 12.25 | 8.58 | | | | 8.58 | 44.70% |
| Medium Density Residential | 0.05 | 0.04 | 0.03 | | | | 0.03 | 44.70% |
| High Density Residential | 0.02 | 0.02 | 0.01 | | | | 0.01 | 44.70% |
| Park | 0.00 | 0.00 | 0.00 | | | | 0.00 | 0.00% |
| Commercial | 0.77 | 0.61 | 0.43 | | | | 0.43 | 44.70% |
| Mixed Use | 0.21 | 0.17 | 0.12 | | | | 0.12 | 44.70% |
| Industrial | 2.03 | 1.60 | 1.12 | | | | 1.12 | 44.70% |
| **Reduced total (MT/year)** | | | | | | | **23** | **44.70%** |
| **Unmitigated total (MT/year)** | | | | | | | **42** | |

**B3. Solid Waste**

**Combined: B3a. Anthropogenic Carbon and B3b. Exhaust Emissions Reductions**

| Unit Type | | R1-E 1 | R2-W 1 | R2-W 2 | R2-W 3 | | Reduced MT/yr ($E_{Cele}$) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 21.00% | 14.07% | 5.80% | 10.19% | | | |
| Multi Family Residential Reduction | | 21.00% | 14.07% | 5.80% | 10.19% | | | |
| Commercial Reduction | Unmitigated | 21.00% | 14.07% | 5.80% | 10.19% | | | |
| Industrial Reduction | MT/yr | 21.00% | 14.07% | 5.80% | 10.19% | | | |
| AG/RAN/ER | 551.39 | 435.60 | 374.32 | 352.61 | 316.69 | | 316.69 | 42.56% |
| Low Density Residential | 368.20 | 290.88 | 249.96 | 235.46 | 211.48 | | 211.48 | 42.56% |
| Medium Density Residential | 233.66 | 184.59 | 158.62 | 149.42 | 134.20 | | 134.20 | 42.56% |
| High Density Residential | 104.99 | 82.94 | 71.27 | 67.14 | 60.30 | | 60.30 | 42.56% |
| Park | 0.08 | 0.06 | 0.05 | 0.05 | 0.05 | | 0.05 | 42.56% |
| Commercial | 97.35 | 76.91 | 66.09 | 62.25 | 55.91 | | 55.91 | 42.56% |
| Mixed Use | 26.22 | 20.71 | 17.80 | 16.77 | 15.06 | | 15.06 | 42.56% |
| Industrial | 257.51 | 203.43 | 174.81 | 164.67 | 147.90 | | 147.90 | 42.56% |
| **Total Reduced (MT/year)** | | | | | | | **942** | **42.56%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **1,639.40** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Carbon Dioxide**

**B3c. Exhaust Emissions (Disposal Equipment) Emission Reductions**

| Vehicle Type | Unmitigated MT/yr | | | | | | Reduced MT/yr (ECele) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Reduction | | | | | | | | |
| Excavator | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Grader | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Off-Highway Tractor | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Off-Highway Truck | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Rubber Tired Dozer | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Disposal Facility run by City? | | | | | | | No | |
| **Total Reduced (MT/year)** | | | | | | | **0.00** | **0.00%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **0.00** | |

**B4. Wastewater Emission Reductions**

| Unit Type | Unmitigated MT/yr | R2-E 9 | | | | | Reduced MT/yr ($E_{Cele}$) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 30.00% | | | | | | |
| Multi Family Residential Reduction | | 30.00% | | | | | | |
| Commercial Reduction | | 30.00% | | | | | | |
| Industrial Reduction | | 30.00% | | | | | | |
| AG/RAN/ER | 8.24 | 5.77 | | | | | 5.77 | 30.00% |
| Low Density Residential | 6.94 | 4.86 | | | | | 4.86 | 30.00% |
| Medium Density Residential | 4.41 | 3.08 | | | | | 3.08 | 30.00% |
| High Density Residential | 1.98 | 1.39 | | | | | 1.39 | 30.00% |
| Park | 0.00 | 0.00 | | | | | 0.00 | 30.00% |
| Commercial | 0.30 | 0.21 | | | | | 0.21 | 30.00% |
| Mixed Use | 0.08 | 0.06 | | | | | 0.06 | 30.00% |
| Industrial | 0.89 | 0.62 | | | | | 0.62 | 30.00% |
| **Total Reduced (MT/year)** | | | | | | | **16** | **30.00%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **22.83** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Carbon Dioxide**

**C. AG emissions for $CH_4$ and $N_2O$, not applicable for $CO_2$.**

**D. Summary Table**

| Source Type | | Emissions, MT /yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Direct | Motor vehicles & Aircraft | 345,500.07 | 345,500.07 |
| | Landscape equipment | 39.33 | 39.33 |
| | Cooling and heating | 170,809.26 | 170,809.26 |
| | **Total direct, tons/yr** | **516,348.65** | **516,348.65** |
| Indirect | Electricity | 60,377.67 | 60,377.67 |
| | Potable water | 23.12 | 23.12 |
| | Solid waste | 941.59 | 941.59 |
| | Wastewater | 15.98 | 15.98 |
| | **Total indirect, tons/yr** | **61,358.37** | **61,358.37** |
| Agriculture | | 0.00 | 0.00 |
| | **Total, tons/yr** | **577,707.02** | **577,707.02** |
| | **Global warming potential index** | **1** | |

| Source Type | | Emissions, MT/yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Residential | AG/RAN/ER | 133,991.87 | 133,991.87 |
| | Low Density Residential | 89,478.33 | 89,478.33 |
| | Medium Density Residential | 56,775.66 | 56,775.66 |
| | High Density Residential | 25,510.77 | 25,510.77 |
| | **Total Residential** | **305,756.64** | **305,756.64** |
| Commercial | Park | 56.73 | 56.73 |
| | Commercial | 67,154.59 | 67,154.59 |
| | Mixed Use | 18,084.59 | 18,084.59 |
| | **Total Commercial** | **85,409.80** | **85,409.80** |
| Industrial | Industrial | 186,511.58 | 186,511.58 |
| | **Total Industrial** | **186,511.58** | **186,511.58** |
| Agricultural | | **0.00** | **0.00** |
| | **Total, tons/yr** | **577,678.01** | **577,678.01** |
| | **Global warming potential index** | 1 | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Methane**

**A. Direct Sources**

**A1-3. Mobile (Construction Equipment, Motor Vehicles, and Landscape Equipment) Unreduced Emissions**

| Con (MT/yr) | Motor Vehicles (MT/yr) | Landscape (MT/yr) ($E_{Cls}$) | Hearth (MT/yr) ($E_{Cwood}$) |
|---|---|---|---|
| | 210.11 | 0.0022 | 116.60 |

**Transportation Emission Reductions**

| | | R1-T 1 | R1-T 2 | R1-T 3 | R1-T 4 | R1-T 5 | R1-T 6 |
|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 19.70% | 14.55% | 7.20% | 0.30% | 0.30% | 1.70% |
| Medium Duty Vehicles | | 0.00% | 25.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Heavy Duty Vehicles | MT/yr | 0.00% | 25.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Passenger & Light Duty Vehicles | 173.55 | 139.36 | 119.08 | 110.51 | 110.18 | 109.85 | 107.98 |
| Medium Duty Vehicles | 22.48 | 22.48 | 16.86 | 16.86 | 16.86 | 16.86 | 16.86 |
| Heavy Duty Vehicles | 14.08 | 14.08 | 10.56 | 10.56 | 10.56 | 10.56 | 10.56 |

| | | R1-T 7 | R1-T 8 | R1-T 9 | R1-T 10 | | R2-T 1 |
|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 0.60% | 0.00% | 0.00% | 0.00% | | 4.00% |
| Medium Duty Vehicles | | 0.00% | 1.60% | 0.00% | 0.20% | | 0.00% |
| Heavy Duty Vehicles | MT/yr | 0.00% | 1.60% | 1.90% | 0.20% | | 0.00% |
| Passenger & Light Duty Vehicles | 107.98 | 107.33 | 107.33 | 107.33 | 107.33 | | 103.04 |
| Medium Duty Vehicles | 16.86 | 16.86 | 16.59 | 16.59 | 16.56 | | 16.56 |
| Heavy Duty Vehicles | 10.56 | 10.56 | 10.39 | 10.19 | 10.17 | | 10.17 |

| | | R2-T 2 | R2-T 3 | R2-T 4 | R2-T 5 | R2-T 6 | R2-T 7 |
|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 6.00% | 0.88% | 1.50% | 3.00% | 0.07% | 7.00% |
| Medium Duty Vehicles | | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Heavy Duty Vehicles | MT/yr | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Passenger & Light Duty Vehicles | 103.04 | 96.86 | 96.01 | 94.57 | 91.73 | 91.67 | 85.25 |
| Medium Duty Vehicles | 16.56 | 16.56 | 16.56 | 16.56 | 16.56 | 16.56 | 16.56 |
| Heavy Duty Vehicles | 10.17 | 10.17 | 10.17 | 10.17 | 10.17 | 10.17 | 10.17 |

| | | R2-T 8 | | | | | Reduced MT/yr (ECele) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 2.41% | | | | | | |
| Medium Duty Vehicles | | 0.00% | | | | | | |
| Heavy Duty Vehicles | MT/yr | 0.00% | | | | | | |
| Passenger & Light Duty Vehicles | 85.25 | 83.20 | | | | | 83 | **52.06%** |
| Medium Duty Vehicles | 16.56 | 16.56 | | | | | 17 | **26.35%** |
| Heavy Duty Vehicles | 10.17 | 10.17 | | | | | 10 | **27.75%** |
| ***Reduced Total (MT/yr)*** | | | | | | | **110** | **47.68%** |
| ***Unmitigated Total (MT/yr)*** | 210.11 | | | | | | | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Methane**

***Airport Fuel Emissions Reductions***

| ($U_{AAF}$) | Unmitigated MT/yr ($E_{CWD}$) | R1-T 2 | | | | | Reduced MT/yr (ECele) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Reductions | | 25.00% | | | | | | |
| Annual Fuel Usage | 0.13 | 0.10 | | | | | 0.10 | 25.00% |

**A4. Stationary Sources (Natural Gas) Emission Reductions**

| Unit Type | | R1-E 5 | R1-E 7 | R2-E 1 | R2-E 3 | R2-E 5 | R2-E 7 |
|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 3.18% | 3.90% | 13.06% | 1.77% | 0.00% | 0.00% |
| Multi Family Residential Reduction | | 3.18% | 3.90% | 13.06% | 1.77% | 0.00% | 0.00% |
| Commercial Reduction | | 3.18% | 3.90% | 0.00% | 0.00% | 17.82% | 2.75% |
| Industrial Reduction | MT/yr ($E_{Cng}$) | 3.18% | 3.90% | 0.00% | 0.00% | 0.00% | 2.75% |
| AG/RAN/ER | 3.03 | 2.93 | 2.82 | 2.45 | 2.41 | 2.41 | 2.41 |
| Low Density Residential | 2.02 | 1.96 | 1.88 | 1.64 | 1.61 | 1.61 | 1.61 |
| Medium Density Residential | 1.28 | 1.24 | 1.19 | 1.04 | 1.02 | 1.02 | 1.02 |
| High Density Residential | 0.58 | 0.56 | 0.54 | 0.47 | 0.46 | 0.46 | 0.46 |
| Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Commercial | 2.77 | 2.68 | 2.57 | 2.57 | 2.57 | 2.11 | 2.06 |
| Mixed Use | 0.74 | 0.72 | 0.69 | 0.69 | 0.69 | 0.57 | 0.55 |
| Industrial | 1.46 | 1.42 | 1.36 | 1.36 | 1.36 | 1.36 | 1.32 |

| Unit Type | | R1-I 1 | R1-I 2 | | | | Reduced MT/yr ($E_{Cele}$) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 0.00% | 0.00% | | | | | |
| Multi Family Residential Reduction | | 0.00% | 0.00% | | | | | |
| Commercial Reduction | | 0.00% | 0.00% | | | | | |
| Industrial Reduction | MT/yr ($E_{Cng}$) | 13.00% | 0.50% | | | | | |
| AG/RAN/ER | 2.41 | 2.41 | 2.41 | | | | 2 | 20.54% |
| Low Density Residential | 1.61 | 1.61 | 1.61 | | | | 2 | 20.54% |
| Medium Density Residential | 1.02 | 1.02 | 1.02 | | | | 1 | 20.54% |
| High Density Residential | 0.46 | 0.46 | 0.46 | | | | 0 | 20.54% |
| Park | 0.00 | 0.00 | 0.00 | | | | 0 | 25.64% |
| Commercial | 2.06 | 2.06 | 2.06 | | | | 2 | 25.64% |
| Mixed Use | 0.55 | 0.55 | 0.55 | | | | 1 | 25.64% |
| Industrial | 1.32 | 1.15 | 1.15 | | | | 1 | 21.67% |
| **Total Reduced (MT/yr)** | | | | | | | **9** | **22.19%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **11.89** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Methane**

**B. Indirect Sources**

**B1. Electricity Emission Reductions**

| Unit Type | | R1-E 1 | R1-E 2 & 3 | R1-E 4 | R1-E 6 | R2-E 1 | R2-E 2 |
|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 21.00% | 10.00% | 10.82% | 7.60% | 13.06% | 13.18% |
| Multi Family Residential Reduction | | 21.00% | 10.00% | 10.82% | 7.60% | 13.06% | 13.18% |
| Commercial Reduction | Unmitigated | 21.00% | 9.29% | 10.82% | 7.60% | 0.00% | 0.00% |
| Industrial Reduction | MT/yr ($E_{Cele}$) | 21.00% | 9.29% | 10.82% | 7.60% | 0.00% | 0.00% |
| AG/RAN/ER | 1.07 | 0.84 | 0.76 | 0.68 | 0.62 | 0.54 | 0.47 |
| Low Density Residential | 0.71 | 0.56 | 0.51 | 0.45 | 0.42 | 0.36 | 0.31 |
| Medium Density Residential | 0.45 | 0.36 | 0.32 | 0.29 | 0.26 | 0.23 | 0.20 |
| High Density Residential | 0.20 | 0.16 | 0.14 | 0.13 | 0.12 | 0.10 | 0.09 |
| Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Commercial | 1.27 | 1.01 | 0.90 | 0.81 | 0.75 | 0.75 | 0.75 |
| Mixed Use | 0.34 | 0.27 | 0.24 | 0.22 | 0.20 | 0.20 | 0.20 |
| Industrial | 3.37 | 2.66 | 2.41 | 2.15 | 1.99 | 1.99 | 1.99 |

| Unit Type | | R2-E 3 | R2-E 4 | R2-E 5 | R2-E 6 | R2-E 7 | | |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 1.77% | 5.91% | 0.00% | 0.00% | 0.00% | | |
| Multi Family Residential Reduction | | 1.77% | 5.91% | 0.00% | 0.00% | 0.00% | Reduced | |
| Commercial Reduction | | 0.00% | 0.00% | 17.82% | 3.32% | 2.75% | MT/yr | % |
| Industrial Reduction | MT/yr ($E_{Cele}$) | 0.00% | 0.00% | 0.00% | 3.32% | 2.75% | ($E_{Cele}$) | reduction |
| AG/RAN/ER | 0.47 | 0.46 | 0.44 | 0.44 | 0.44 | 0.44 | 0.4353 | 59.13% |
| Low Density Residential | 0.31 | 0.31 | 0.29 | 0.29 | 0.29 | 0.29 | 0.2907 | 59.13% |
| Medium Density Residential | 0.20 | 0.20 | 0.18 | 0.18 | 0.18 | 0.18 | 0.1845 | 59.13% |
| High Density Residential | 0.09 | 0.09 | 0.08 | 0.08 | 0.08 | 0.08 | 0.0829 | 59.13% |
| Park | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0005 | 54.73% |
| Commercial | 0.75 | 0.75 | 0.75 | 0.61 | 0.59 | 0.58 | 0.5761 | 54.73% |
| Mixed Use | 0.20 | 0.20 | 0.20 | 0.17 | 0.16 | 0.16 | 0.1551 | 54.73% |
| Industrial | 1.99 | 1.99 | 1.99 | 1.99 | 1.92 | 1.87 | 1.8690 | 44.48% |

| Unit Type | MT/yr (ECele) | R2-E 9 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 3.18% | | | | | | |
| Multi Family Residential Reduction | | 3.18% | | | | | Reduced | |
| Commercial Reduction | | 3.18% | | | | | MT/yr | % |
| Industrial Reduction | | 3.18% | | | | | (ECele) | reduction |
| AG/RAN/ER | 0.44 | 0.42146 | | | | | 0.4215 | 60.43% |
| Low Density Residential | 0.29069885 | 0.28145 | | | | | 0.2814 | 60.43% |
| Medium Density Residential | 0.184465142 | 0.17859 | | | | | 0.1786 | 60.43% |
| High Density Residential | 0.082886898 | 0.08025 | | | | | 0.0802 | 60.43% |
| Park | 0.000497953 | 0.00048 | | | | | 0.0005 | 56.17% |
| Commercial | 0.576117772 | 0.55778 | | | | | 0.5578 | 56.17% |
| Mixed Use | 0.155143975 | 0.15021 | | | | | 0.1502 | 56.17% |
| Industrial | 1.86904378 | 1.80956 | | | | | 1.8096 | 46.25% |
| **Reduced total (MT/year)** | | | | | | | **3.48** | **53.06%** |
| **Unmitigated total (MT/year)** | | | | | | | **7.41** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Methane**

**B2. Potable Water Emission Reductions**

| Unit Type | MT/yr ($E_{Cpot}$) | R1-E 8 | R2-E 9 | | | | Reduced MT/yr ($E_{Cele}$) | % reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 21.00% | 30.00% | | | | | |
| Multi Family Residential Reduction | | 21.00% | 30.00% | | | | | |
| Commercial Reduction | | 21.00% | 30.00% | | | | | |
| Industrial Reduction | | 21.00% | 30.00% | | | | | |
| AG/RAN/ER | 0.00134 | 0.001057 | 0.000740 | | | | 0.00074 | 44.70% |
| Low Density Residential | 0.00089 | 0.000706 | 0.000494 | | | | 0.00049 | 44.70% |
| Medium Density Residential | 0.00057 | 0.000448 | 0.000314 | | | | 0.00031 | 44.70% |
| High Density Residential | 0.00025 | 0.000201 | 0.000141 | | | | 0.00014 | 44.70% |
| Park | 0.00000 | 0.000000 | 0.000000 | | | | 0.00000 | 0.00% |
| Commercial | 0.00004 | 0.000035 | 0.000024 | | | | 0.00002 | 44.70% |
| Mixed Use | 0.00001 | 0.000009 | 0.000007 | | | | 0.00001 | 44.70% |
| Industrial | 0.00012 | 0.000093 | 0.000065 | | | | 0.00006 | 44.70% |
| **Reduced total (MT/year)** | | | | | | | **0.00178** | **44.70%** |
| **Unmitigated total (MT/year)** | | | | | | | **0.00323** | |

**B3. Solid Waste**

**Combined: B3a. Anthropogenic Carbon and B3b. Exhaust Emissions Reductions**

| Unit Type | MT/yr ($E_{CWF}$) | R2-W 1 | R2-W 2 | R2-W 3 | | | Reduced MT/yr ($E_{Cele}$) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 14.07% | 5.80% | 10.19% | | | | |
| Multi Family Residential Reduction | | 14.07% | 5.80% | 10.19% | | | | |
| Commercial Reduction | | 14.07% | 5.80% | 10.19% | | | | |
| Industrial Reduction | | 14.07% | 5.80% | 10.19% | | | | |
| AG/RAN/ER | 263.25 | 226.22 | 213.10 | 191.39 | | | 191.39 | 27.30% |
| Low Density Residential | 175.79 | 151.06 | 142.30 | 127.81 | | | 127.81 | 27.30% |
| Medium Density Residential | 111.56 | 95.86 | 90.30 | 81.10 | | | 81.10 | 27.30% |
| High Density Residential | 50.13 | 43.07 | 40.58 | 36.44 | | | 36.44 | 27.30% |
| Park | 0.08 | 0.07 | 0.06 | 0.06 | | | 0.06 | 27.30% |
| Commercial | 92.96 | 79.88 | 75.25 | 67.58 | | | 67.58 | 27.30% |
| Mixed Use | 25.03 | 21.51 | 20.26 | 18.20 | | | 18.20 | 27.30% |
| Industrial | 245.89 | 211.30 | 199.04 | 178.77 | | | 178.77 | 27.30% |
| **Total Reduced (MT/year)** | | | | | | | **701** | **27.30%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **964.69** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Methane**

**B3c. Exhaust Emissions (Disposal Equipment) Reductions**

| Vehicle Type | | | | | | | Reduced MT/yr | % |
|---|---|---|---|---|---|---|---|---|
| Reductions | MT/yr ($E_{CWD}$) | | | | | | (ECele) | Reduction |
| Excavator | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Grader | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Off-Highway Tractor | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Off-Highway Truck | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Rubber Tired Dozer | 0.00 | 0.00 | | | | | 0.00 | 0.00% |
| Disposal Facility run by City? | | | | | | | No | |
| **Total Reduced (MT/year)** | | | | | | | **0.00** | **0.00%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **0.00** | |

**B4. Wastewater Emission Reductions**

| Unit Type | | R2-E 9 | | | | | Reduced MT/yr | % |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 30.00% | | | | | | |
| Multi Family Residential Reduction | | 30.00% | | | | | | |
| Commercial Reduction | | 30.00% | | | | | | |
| Industrial Reduction | MT/yr | 30.00% | | | | | ($E_{Cele}$) | Reduction |
| AG/RAN/ER | 0.0004749 | 0.000332 | | | | | 0.000332 | 30.00% |
| Low Density Residential | 0.0004001 | 0.000280 | | | | | 0.000280 | 30.00% |
| Medium Density Residential | 0.0002539 | 0.000178 | | | | | 0.000178 | 30.00% |
| High Density Residential | 0.0001141 | 0.000080 | | | | | 0.000080 | 30.00% |
| Park | 0.0000000 | 0.000000 | | | | | 0.000000 | 30.00% |
| Commercial | 0.0000172 | 0.000012 | | | | | 0.000012 | 30.00% |
| Mixed Use | 0.0000046 | 0.000003 | | | | | 0.000003 | 30.00% |
| Industrial | 0.0000512 | 0.000036 | | | | | 0.000036 | 30.00% |
| **Total Reduced (MT/year)** | | | | | | | **0.000921** | **30.00%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **0.0013160** | |

**C. AG emissions Reductions for $CH_4$**

| | | R1-A 1 | R2-E 9 | | | | Reduced | % |
|---|---|---|---|---|---|---|---|---|
| Emissions Source | MT/yr | 7.80% | 30.00% | | | | MT/yr | Reduction |
| Enteric Fermentation - Dairy Cows | 1,023.51 | 943.67 | | | | | 943.67 | 7.80% |
| Enteric Fermentation - Other Animals | 131.18 | 131.18 | | | | | 131.18 | 0.00% |
| Manure Management - Dairy Cows | 1,332.76 | 1,228.80 | | | | | 1,228.80 | 7.80% |
| Manure Management - Other Animals | 4.36 | 4.36 | | | | | 4.36 | 0.00% |
| Rice Cultivation | 8174.45 | 8,174.45 | 5,722.11 | | | | 5,722.11 | 30.00% |
| Agricultural Crop Burning | 98.39 | 98.39 | | | | | 98.39 | 0.00% |
| **Total Reduced (MT/year)** | | | | | | | **8,128.51** | **24.49%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **10,764.63** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Methane**

**D. Summary Table**

| Source Type | | Emissions, MT /yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Direct | Motor vehicles & Aircraft | 110.02 | 2,310.50 |
| | Landscape equipment | 0.00 | 0.05 |
| | Cooling and heating | 125.85 | 2,642.85 |
| | **Total direct, tons/yr** | **235.88** | **4,953.40** |
| Indirect | Electricity | 3.48 | 73.08 |
| | Potable water | 0.00 | 0.04 |
| | Solid waste | 701.35 | 14,728.40 |
| | Wastewater | 0.00 | 0.02 |
| | **Total indirect, tons/yr** | **704.83** | **14,801.53** |
| Agriculture | | 8,128.51 | 170,698.73 |
| | **Total, tons/yr** | **9,069.22** | **190,453.66** |
| | **Global warming potential index** | **21** | |

| Source Type | | Emissions, MT/yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Residential | AG/RAN/ER | 256.02 | 5,376.46 |
| | Low Density Residential | 170.97 | 3,590.28 |
| | Medium Density Residential | 108.49 | 2,278.33 |
| | High Density Residential | 48.75 | 1,023.71 |
| | **Total Residential** | **584.23** | **12,268.78** |
| Commercia | Park | 0.08 | 1.61 |
| | Commercial | 92.03 | 1,932.68 |
| | Mixed Use | 24.78 | 520.47 |
| | **Total Commercial** | **116.99** | **2,456.78** |
| Industrial | Industrial | 239.49 | 5,029.37 |
| | **Total Industrial** | **239.49** | **5,029.37** |
| Agricultural | | **8,128.51** | **170,698.73** |
| | **Total, tons/yr** | **9,069.22** | **190,453.66** |
| | **Global warming potential index** | 21 | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Nitrous Oxide**

**A. Direct Sources**

**A1-3. Mobile (Construction Equipment, Motor Vehicles, and Landscape Equipment) Unreduced Emissions**

| Con (MT/yr) | Motor Vehicles (MT/yr) | Landscape (MT/yr) ($E_{Cls}$) | Hearth (MT/yr) ($E_{Cwood}$) |
|---|---|---|---|
| | 89.71 | 0.0009832 | 1.5497605 |

**Transportation Emissions Reductions**

| | | R1-T 1 | R1-T 2 | R1-T 3 | R1-T 4 | R1-T 5 | R1-T 6 | |
|---|---|---|---|---|---|---|---|---|
| Passenger & Light Duty Vehicles | | 19.70% | 14.55% | 7.20% | 0.30% | 0.30% | 1.70% | |
| Medium Duty Vehicles | **Unmitigated** | 0.00% | 25.00% | 0.00% | 0.00% | 0.00% | 0.00% | |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | 25.00% | 0.00% | 0.00% | 0.00% | 0.00% | |
| Passenger & Light Duty Vehicles | 74.10 | 59.50 | 50.85 | 47.18 | 47.04 | 46.90 | 46.10 | |
| Medium Duty Vehicles | 9.60 | 9.60 | 7.20 | 7.20 | 7.20 | 7.20 | 7.20 | |
| Heavy Duty Vehicles | 6.01 | 6.01 | 4.51 | 4.51 | 4.51 | 4.51 | 4.51 | |
| | | | | | | | | |
| | | **R1-T 7** | **R1-T 8** | **R1-T 9** | **R1-T 10** | | **R2-T 1** | |
| Passenger & Light Duty Vehicles | | 0.60% | 0.00% | 0.00% | 0.00% | | 4.00% | |
| Medium Duty Vehicles | | 0.00% | 1.60% | 0.00% | 0.20% | | 0.00% | |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | 1.60% | 1.90% | 0.20% | | 0.00% | |
| Passenger & Light Duty Vehicles | 46.10 | 45.83 | 45.83 | 45.83 | 45.83 | | 43.99 | |
| Medium Duty Vehicles | 7.20 | 7.20 | 7.08 | 7.08 | 7.07 | | 7.07 | |
| Heavy Duty Vehicles | 4.51 | 4.51 | 4.44 | 4.35 | 4.34 | | 4.34 | |
| | | | | | | | | |
| | | **R2-T 2** | **R2-T 3** | **R2-T 4** | **R2-T 5** | **R2-T 6** | **R2-T 7** | |
| Passenger & Light Duty Vehicles | | 6.00% | 0.88% | 1.50% | 3.00% | 0.07% | 7.00% | |
| Medium Duty Vehicles | | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | |
| Passenger & Light Duty Vehicles | 43.99 | 41.35 | 40.99 | 40.38 | 39.17 | 39.14 | 36.40 | |
| Medium Duty Vehicles | 7.07 | 7.07 | 7.07 | 7.07 | 7.07 | 7.07 | 7.07 | |
| Heavy Duty Vehicles | 4.34 | 4.34 | 4.34 | 4.34 | 4.34 | 4.34 | 4.34 | |
| | | | | | | | | |
| | | **R2-T 8** | | | | | **Reduced MT/yr (ECele)** | **% Reduction** |
| Passenger & Light Duty Vehicles | | 2.41% | | | | | | |
| Medium Duty Vehicles | | 0.00% | | | | | | |
| Heavy Duty Vehicles | **MT/yr** | 0.00% | | | | | | |
| Passenger & Light Duty Vehicles | 36.40 | 35.52 | | | | | 36 | **52.06%** |
| Medium Duty Vehicles | 7.07 | 7.07 | | | | | 7 | **26.35%** |
| Heavy Duty Vehicles | 4.34 | 4.34 | | | | | 4 | **27.75%** |
| ***Reduced Total (MT/yr)*** | | | | | | | **47** | **47.68%** |
| ***Unmitigated Total (MT/yr)*** | | | | | | | 89.71 | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Nitrous Oxide**

***Airport Fuel Emissions Reductions***

| ($U_{AAF}$) | Unmitigated MT/yr ($E_{CWD}$) | R1-T 2 | | | | | Reduced MT/yr (ECele) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Reductions | | 25.00% | | | | | | |
| Annual Fuel Usage | 0.0020075 | 0.0015056 | | | | | 0.0015056 | 25.00% |

**A4. Stationary Sources (Natural Gas)**

| Unit Type | Unmitigated MT/yr | R1-E 5 | R1-E 7 | R2-E 1 | R2-E 3 | R2-E 5 | R2-E 7 |
|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 3.18% | 3.90% | 13.06% | 1.77% | 0.00% | 0.00% |
| Multi Family Residential Reduction | | 3.18% | 3.90% | 13.06% | 1.77% | 0.00% | 0.00% |
| Commercial Reduction | | 3.18% | 3.90% | 0.00% | 0.00% | 17.82% | 2.75% |
| Industrial Reduction | | 3.18% | 3.90% | 0.00% | 0.00% | 0.00% | 2.75% |
| AG/RAN/ER | 0.0605700 | 0.0586430 | 0.0563560 | 0.0489972 | 0.0481283 | 0.0481283 | 0.0481283 |
| Low Density Residential | 0.0404480 | 0.0391612 | 0.0376339 | 0.0327198 | 0.0321396 | 0.0321396 | 0.0321396 |
| Medium Density Residential | 0.0256670 | 0.0248504 | 0.0238813 | 0.0207629 | 0.0203947 | 0.0203947 | 0.0203947 |
| High Density Residential | 0.0115330 | 0.0111661 | 0.0107306 | 0.0093294 | 0.0091640 | 0.0091640 | 0.0091640 |
| Park | 0.0000480 | 0.0000465 | 0.0000447 | 0.0000447 | 0.0000447 | 0.0000367 | 0.0000357 |
| Commercial | 0.0553080 | 0.0535484 | 0.0514601 | 0.0514601 | 0.0514601 | 0.0422907 | 0.0411265 |
| Mixed Use | 0.0148940 | 0.0144202 | 0.0138578 | 0.0138578 | 0.0138578 | 0.0113885 | 0.0110750 |
| Industrial | 0.1462950 | 0.1416408 | 0.1361168 | 0.1361168 | 0.1361168 | 0.1361168 | 0.1323698 |

| Unit Type | MT/yr ($E_{Cng}$) | R1-I 1 | R1-I 2 | | | | Reduced MT/yr ($E_{Cele}$) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 0.00% | 0.00% | | | | | |
| Multi Family Residential Reduction | | 0.00% | 0.00% | | | | | |
| Commercial Reduction | | 0.00% | 0.00% | | | | | |
| Industrial Reduction | | 13.00% | 0.50% | | | | | |
| AG/RAN/ER | 0.0481283 | 0.0481283 | 0.0481283 | | | | 0.0481283 | 20.54% |
| Low Density Residential | 0.0321396 | 0.0321396 | 0.0321396 | | | | 0.0321396 | 20.54% |
| Medium Density Residential | 0.0203947 | 0.0203947 | 0.0203947 | | | | 0.0203947 | 20.54% |
| High Density Residential | 0.0091640 | 0.0091640 | 0.0091640 | | | | 0.0091640 | 20.54% |
| Park | 0.0000357 | 0.0000357 | 0.0000357 | | | | 0.0000357 | 25.64% |
| Commercial | 0.0411265 | 0.0411265 | 0.0411265 | | | | 0.0411265 | 25.64% |
| Mixed Use | 0.0110750 | 0.0110750 | 0.0110750 | | | | 0.0110750 | 25.64% |
| Industrial | 0.1323698 | 0.1151617 | 0.1145859 | | | | 0.1145859 | 21.67% |
| **Total Reduced (MT/yr)** | | | | | | | **0.2766498** | **22.02%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **0.3547630** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Nitrous Oxide**

**B. Indirect Sources**

**B1. Electricity Emissions Reductions**

| Unit Type | | R1-E 1 | R1-E 2 & 3 | R1-E 4 | R1-E 6 | R2-E 1 | R2-E 2 |
|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 21.00% | 10.00% | 10.82% | 7.60% | 13.06% | 13.18% |
| Multi Family Residential Reduction | | 21.00% | 10.00% | 10.82% | 7.60% | 13.06% | 13.18% |
| Commercial Reduction | Unmitigated | 21.00% | 9.29% | 10.82% | 7.60% | 0.00% | 0.00% |
| Industrial Reduction | MT/yr | 21.00% | 9.29% | 10.82% | 7.60% | 0.00% | 0.00% |
| AG/RAN/ER | 0.2856500 | 0.2256635 | 0.2030972 | 0.1811220 | 0.1673568 | 0.1455039 | 0.1263299 |
| Low Density Residential | 0.1907565 | 0.1506976 | 0.1356279 | 0.1209529 | 0.1117605 | 0.0971672 | 0.0843629 |
| Medium Density Residential | 0.0552935 | 0.0436819 | 0.0393137 | 0.0350599 | 0.0323954 | 0.0281653 | 0.0244538 |
| High Density Residential | 0.0248449 | 0.0196275 | 0.0176647 | 0.0157534 | 0.0145561 | 0.0126555 | 0.0109878 |
| Park | 0.0002940 | 0.0002323 | 0.0002090 | 0.0001864 | 0.0001722 | 0.0001722 | 0.0001722 |
| Commercial | 0.3413458 | 0.2696632 | 0.2426969 | 0.2164371 | 0.1999878 | 0.1999878 | 0.1999878 |
| Mixed Use | 0.0919219 | 0.0726183 | 0.0653565 | 0.0582849 | 0.0538552 | 0.0538552 | 0.0538552 |
| Industrial | 0.9029003 | 0.7132912 | 0.6470621 | 0.5770500 | 0.5331942 | 0.5331942 | 0.5331942 |

| Unit Type | | R2-E 3 | R2-E 4 | R2-E 5 | R2-E 6 | R2-E 7 | Reduced MT/yr ($E_{Cele}$) | % reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 1.77% | 5.91% | 0.00% | 0.00% | 0.00% | | |
| Multi Family Residential Reduction | | 1.77% | 5.91% | 0.00% | 0.00% | 0.00% | | |
| Commercial Reduction | | 0.00% | 0.00% | 17.82% | 3.32% | 2.75% | | |
| Industrial Reduction | MT/yr ($E_{Cele}$) | 0.00% | 0.00% | 0.00% | 3.32% | 2.75% | | |
| AG/RAN/ER | 0.1263299 | 0.1240896 | 0.1167545 | 0.1167545 | 0.1167545 | 0.1167545 | 0.1167545 | 59.13% |
| Low Density Residential | 0.0843629 | 0.0828668 | 0.0779684 | 0.0779684 | 0.0779684 | 0.0779684 | 0.0779684 | 59.13% |
| Medium Density Residential | 0.0244538 | 0.0240201 | 0.0226003 | 0.0226003 | 0.0226003 | 0.0226003 | 0.0226003 | 59.13% |
| High Density Residential | 0.0109878 | 0.0107929 | 0.0101549 | 0.0101549 | 0.0101549 | 0.0101549 | 0.0101549 | 59.13% |
| Park | 0.0001722 | 0.0001722 | 0.0001722 | 0.0001416 | 0.0001369 | 0.0001331 | 0.0001331 | 54.73% |
| Commercial | 0.1999878 | 0.1999878 | 0.1999878 | 0.1643532 | 0.1588960 | 0.1545219 | 0.1545219 | 54.73% |
| Mixed Use | 0.0538552 | 0.0538552 | 0.0538552 | 0.0442591 | 0.0427895 | 0.0416116 | 0.0416116 | 54.73% |
| Industrial | 0.5331942 | 0.5331942 | 0.5331942 | 0.5331942 | 0.5154901 | 0.5012997 | 0.5012997 | 44.48% |

| Unit Type | | R2-E 9 | | | | | Reduced MT/yr (ECele) | % reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 3.18% | | | | | | |
| Multi Family Residential Reduction | | 3.18% | | | | | | |
| Commercial Reduction | | 3.18% | | | | | | |
| Industrial Reduction | MT/yr (ECele) | 3.18% | | | | | | |
| AG/RAN/ER | 0.1167545 | 0.11304 | | | | | 0.1130389 | 60.43% |
| Low Density Residential | 0.077968414 | 0.07549 | | | | | 0.0754871 | 60.43% |
| Medium Density Residential | 0.02260026 | 0.02188 | | | | | 0.021881 | 60.43% |
| High Density Residential | 0.010154922 | 0.00983 | | | | | 0.0098318 | 60.43% |
| Park | 0.000133089 | 0.00013 | | | | | 0.0001289 | 56.17% |
| Commercial | 0.154521896 | 0.1496 | | | | | 0.1496044 | 56.17% |
| Mixed Use | 0.041611604 | 0.04029 | | | | | 0.0402873 | 56.17% |
| Industrial | 0.501299676 | 0.48535 | | | | | 0.4853462 | 46.25% |
| **Reduced total (MT/year)** | | | | | | | **0.90** | **52.69%** |
| **Unmitigated total (MT/year)** | | | | | | | **1.89** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Nitrous Oxide**

**B2. Potable Water Emissions Reductions**

| Unit Type | Unmitigated MT/yr | R1-E 8 | R2-E 9 | | | | Reduced MT/yr ($E_{Cele}$) | % reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 21.00% | 30.00% | | | | | |
| Multi Family Residential Reduction | | 21.00% | 30.00% | | | | | |
| Commercial Reduction | | 21.00% | 30.00% | | | | | |
| Industrial Reduction | | 21.00% | 30.00% | | | | | |
| AG/RAN/ER | 0.0003589 | 0.0002835 | 0.0001985 | | | | 0.0001985 | 44.70% |
| Low Density Residential | 0.0002397 | 0.0001893 | 0.0001325 | | | | 0.0001325 | 44.70% |
| Medium Density Residential | 0.0001521 | 0.0001202 | 0.0000841 | | | | 0.0000841 | 44.70% |
| High Density Residential | 0.0000683 | 0.0000540 | 0.0000378 | | | | 0.0000378 | 44.70% |
| Park | 0.0000000 | 0.0000000 | 0.0000000 | | | | 0.0000000 | 44.70% |
| Commercial | 0.0000119 | 0.0000094 | 0.0000066 | | | | 0.0000066 | 44.70% |
| Mixed Use | 0.0000032 | 0.0000025 | 0.0000018 | | | | 0.0000018 | 44.70% |
| Industrial | 0.0000314 | 0.0000248 | 0.0000174 | | | | 0.0000174 | 44.70% |
| **Reduced total (MT/year)** | | | | | | | **0.0004787** | **44.70%** |
| **Unmitigated total (MT/year)** | | | | | | | **0.0008656** | |

**B3. Solid Waste**

**Combined: B3a. Anthropogenic Carbon and B3b. Exhaust Emissions Reductions**

| Unit Type | Unmitigated MT/yr | R2-W 1 | R2-W 2 | R2-W 3 | | | Reduced MT/yr ($E_{Cele}$) | % Reduction |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 14.07% | 5.80% | 10.19% | | | | |
| Multi Family Residential Reduction | | 14.07% | 5.80% | 10.19% | | | | |
| Commercial Reduction | | 14.07% | 5.80% | 10.19% | | | | |
| Industrial Reduction | | 14.07% | 5.80% | 10.19% | | | | |
| AG/RAN/ER | 0.0007640 | 0.0006565 | 0.0006184 | 0.0005555 | | | 0.0005555 | 27.30% |
| Low Density Residential | 0.0005102 | 0.0004384 | 0.0004130 | 0.0003709 | | | 0.0003709 | 27.30% |
| Medium Density Residential | 0.0003238 | 0.0002782 | 0.0002621 | 0.0002354 | | | 0.0002354 | 27.30% |
| High Density Residential | 0.0001455 | 0.0001250 | 0.0001178 | 0.0001058 | | | 0.0001058 | 27.30% |
| Park | 0.0000001 | 0.0000001 | 0.0000001 | 0.0000001 | | | 0.0000001 | 27.30% |
| Commercial | 0.0001349 | 0.0001159 | 0.0001092 | 0.0000981 | | | 0.0000981 | 27.30% |
| Mixed Use | 0.0000363 | 0.0000312 | 0.0000294 | 0.0000264 | | | 0.0000264 | 27.30% |
| Industrial | 0.0003568 | 0.0003066 | 0.0002888 | 0.0002594 | | | 0.0002594 | 27.30% |
| **Total Reduced (MT/year)** | | | | | | | **0.0016515** | **27.30%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **0.0022716** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Nitrous Oxide**

**B3c. Exhaust Emissions (Disposal Equipment) Reductions**

| Vehicle Type | | | | | | | Reduced MT/yr | % |
|---|---|---|---|---|---|---|---|---|
| Reductions | MT/yr ($E_{CWD}$) | | | | | | (ECele) | Reduction |
| Excavator | 0.0000000 | 0.0000000 | | | | | 0.0000000 | 0.00% |
| Grader | 0.0000000 | 0.0000000 | | | | | 0.0000000 | 0.00% |
| Off-Highway Tractor | 0.0000000 | 0.0000000 | | | | | 0.0000000 | 0.00% |
| Off-Highway Truck | 0.0000000 | 0.0000000 | | | | | 0.0000000 | 0.00% |
| Rubber Tired Dozer | 0.0000000 | 0.0000000 | | | | | 0.0000000 | 0.00% |
| Disposal Facility run by City? | | | | | | | No | |
| **Total Reduced (MT/year)** | | | | | | | **0.0000000** | **0.00%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **0.0000000** | |

**B4. Wastewater Emissions Reduction**

| Unit Type | | R2-E 9 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Single Family Residential Reduction | | 30.00% | | | | | | |
| Multi Family Residential Reduction | | 30.00% | | | | | Reduced | |
| Commercial Reduction | Unmitigated | 30.00% | | | | | MT/yr | % |
| Industrial Reduction | MT/yr | 30.00% | | | | | ($E_{Cele}$) | Reduction |
| AG/RAN/ER | 0.0001274 | 0.0000892 | | | | | 0.0000892 | 30.00% |
| Low Density Residential | 0.0001073 | 0.0000751 | | | | | 0.0000751 | 30.00% |
| Medium Density Residential | 0.0000311 | 0.0000218 | | | | | 0.0000218 | 30.00% |
| High Density Residential | 0.0000140 | 0.0000098 | | | | | 0.0000098 | 30.00% |
| Park | 0.0000000 | 0.0000000 | | | | | 0.0000000 | 30.00% |
| Commercial | 0.0000046 | 0.0000032 | | | | | 0.0000032 | 30.00% |
| Mixed Use | 0.0000012 | 0.0000009 | | | | | 0.0000009 | 30.00% |
| Industrial | 0.0000137 | 0.0000096 | | | | | 0.0000096 | 30.00% |
| **Total Reduced (MT/year)** | | | | | | | **0.0002095** | **30.00%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **0.0002994** | |

**C. AG Emissions Reductions for $N_2O$.**

| Emissions Source | Unmitigated | R1-A 1 | | | | | Reduced | % |
|---|---|---|---|---|---|---|---|---|
| Reductions | MT/yr | 7.80% | | | | | MT/yr | Reduction |
| Manure Management - Dairy Cows | 3.39 | 3.13 | | | | | 3.13 | 7.80% |
| Manure Management - Other Animals | 2.10 | 2.10 | | | | | 2.10 | 0.00% |
| Animals and Runoff | 247.43 | 247.43 | | | | | 247.43 | 0.00% |
| Crop Growth | 1201.80 | 1,201.80 | | | | | 1,201.80 | 0.00% |
| Fertilizer Use | 321.81 | 321.81 | | | | | 321.81 | 0.00% |
| Agricultural Residue Burning | 3.05 | 3.05 | | | | | 3.05 | 0.00% |
| **Total Reduced (MT/year)** | | | | | | | **1,779.31** | **0.01%** |
| **Total Unmitigated (MT/yr)** | | | | | | | **1,779.57** | |

**Sutter County**
**Input data for Green House Gas Emissions**
**2030**
**Reduced Inventory**
**Nitrous Oxide**

**D. Summary Table**

| Source Type | | Emissions, MT /yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Direct | Motor vehicles & Aircraft | 46.94 | 14,550.44 |
| | Landscape equipment | 0.00 | 0.30 |
| | Cooling and heating | 1.83 | 566.19 |
| | **Total direct, tons/yr** | **48.76** | **15,116.93** |
| Indirect | Electricity | 0.90 | 277.64 |
| | Potable water | 0.00 | 0.15 |
| | Solid waste | 0.00 | 0.51 |
| | Wastewater | 0.00 | 0.06 |
| | **Total indirect, tons/yr** | **0.90** | **278.36** |
| Agriculture | | 1,779.31 | 551,584.68 |
| | **Total, tons/yr** | **1,828.97** | **566,979.98** |
| | **Global warming potential index** | 310 | |

| Source Type | | Emissions, MT/yr | $CO_2e$ metric tons/yr |
|---|---|---|---|
| Residential | AG/RAN/ER | 13.39 | 4,150.61 |
| | Low Density Residential | 8.94 | 2,771.70 |
| | Medium Density Residential | 5.65 | 1,750.53 |
| | High Density Residential | 2.54 | 786.56 |
| | **Total Residential** | **30.51** | **9,459.40** |
| Commercial | Park | 0.00 | 1.25 |
| | Commercial | 4.87 | 1,508.16 |
| | Mixed Use | 1.31 | 406.15 |
| | **Total Commercial** | **6.18** | **1,916.03** |
| Industrial | Industrial | 12.97 | 4,019.87 |
| | **Total Industrial** | **12.97** | **4,019.87** |
| Agricultural | | **1,779.31** | **551,584.68** |
| | **Total, tons/yr** | **1,828.97** | **566,979.98** |
| | **Global warming potential index** | 310 | |