

Trends in California Greenhouse Gas Emissions for 2000 to 2008 – by Category as Defined in the Scoping Plan

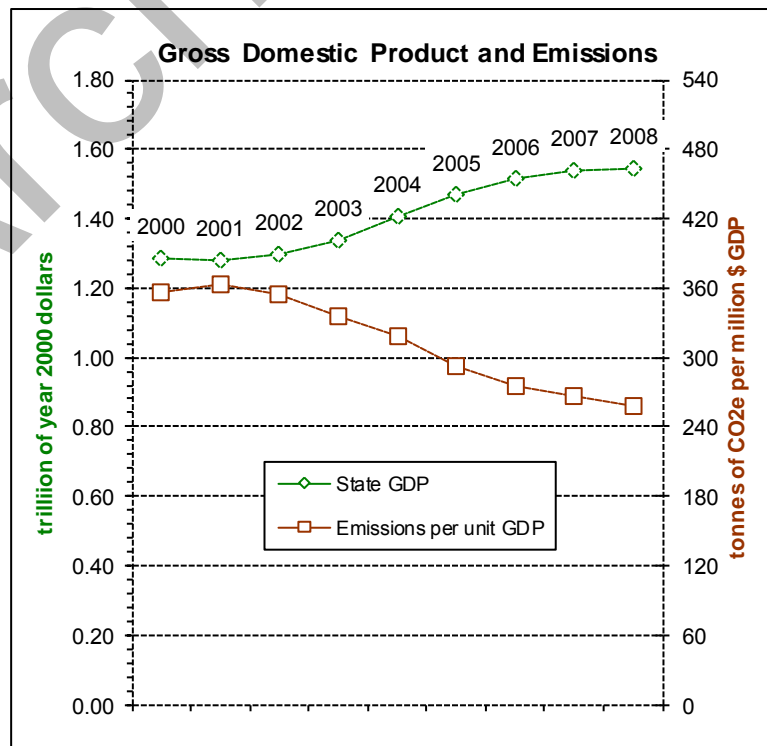
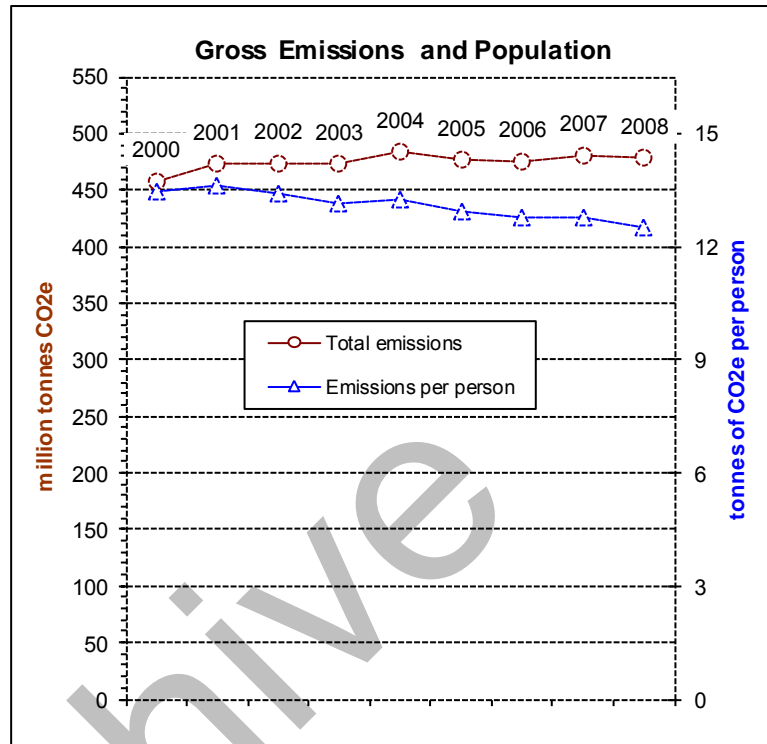
Overview

Annual statewide emission inventories provide the basis for establishing historical emission trends. Trends are useful in tracking progress towards a specific target or goal. There are many factors affecting greenhouse gas (GHG) emissions and year to year changes, including the state of the economy, changes in demography, improved efficiency, and changes in environmental conditions such as drought. Evaluating emission trends requires recognition of these influences across the overall inventory as well as by sector and sub-sector within the inventory.

2008 saw a small decrease in statewide GHG emissions, driven by a noticeable drop in on-road transportation emissions. 2008 also reflects the beginning of the economic recession and fuel price spikes. As the economy recovers, GHG emissions are likely to rise again without other mitigation actions.

California's gross emissions of greenhouse gas increased 4.3% from 458 million metric tonnes of CO₂e in 2000 to 477.7 million in 2008, with a maximum of 483.9 million in 2004.

During the same period, California's population grew by 11.8% from 34.1 to 38.1 million people¹ and GHG emissions per person decreased from 13.4 to 12.5 metric tonnes of CO₂e per person.



California's Gross Domestic Product (GDP) went from \$1.29 trillion in 2000 to \$1.55 trillion (in 2000 dollars)². Thus, the GHG intensity of California's economy decreased from 355.8 metric tonnes CO₂e per million \$ of GDP in 2000 to 258.7 per million \$ of GDP in 2008.

For each major sector of the statewide greenhouse gas inventory, a trend summary is provided below along with a time-series graph.

Transportation

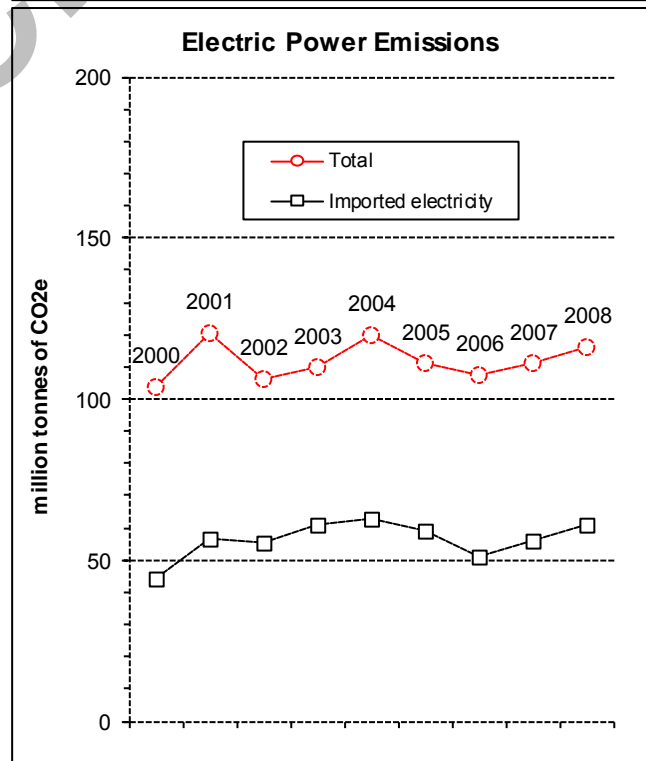
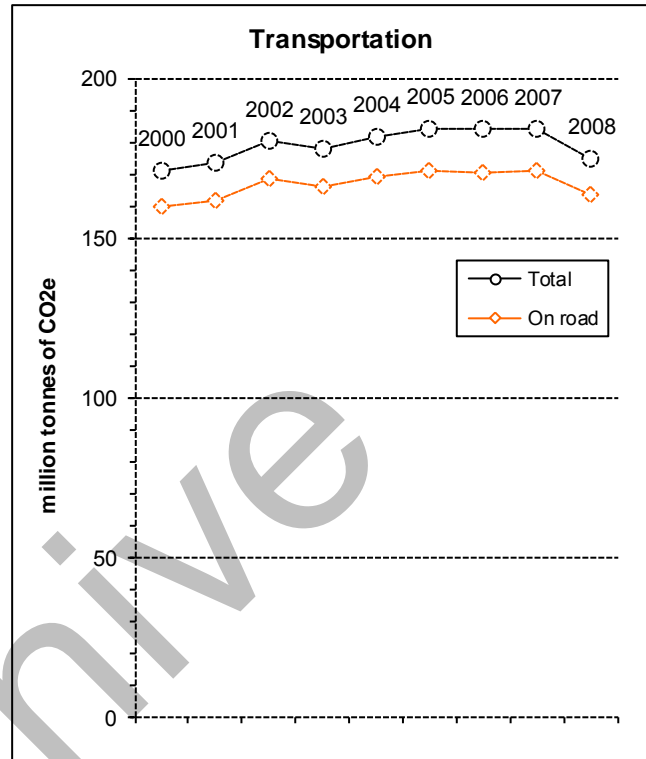
In 2008, GHG emissions from transportation declined noticeably but transportation remained the largest source with 36.5% of California's gross inventory.

On road emissions (from passenger vehicles and heavy duty trucks) constitute 93% of the transportation sector total. On road emissions grew to a maximum of 170.8 million metric tonnes of CO₂e in 2005, plateaued until 2007, and decreased in 2008 to 163.3 million. The amount of gasoline and diesel fuel consumed by on road vehicles followed a similar trend.

Over this inventory period, the retail price of gasoline³ and diesel fuel⁴ in California first decreased, reaching a minimum (\$1.16 per gallon for gasoline and \$1.27 for diesel) in December 2001 before steadily increasing the rest of the period. In the summer of 2008, fuel prices spiked, reaching an historic maximum (\$4.48 per gallon for gasoline and \$4.97 for diesel), before declining substantially in fall of 2008. Interestingly, in 2008 there was a year-to-year decrease of -3.5% in vehicle miles travelled on California highways⁵, the first such decrease since 1974.

Electric Power

Electric power emissions varied from 103.9 million metric tonnes of CO₂e in 2000 to 116.4 million in 2008, without



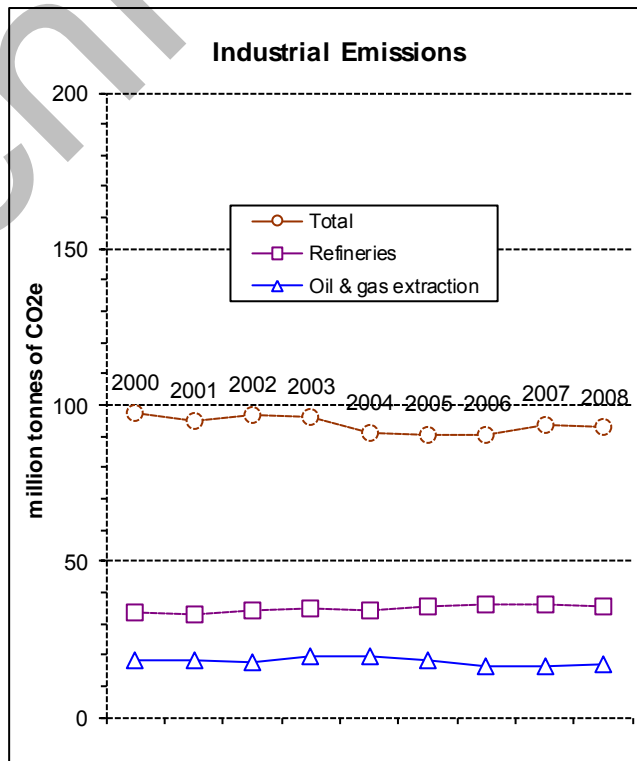
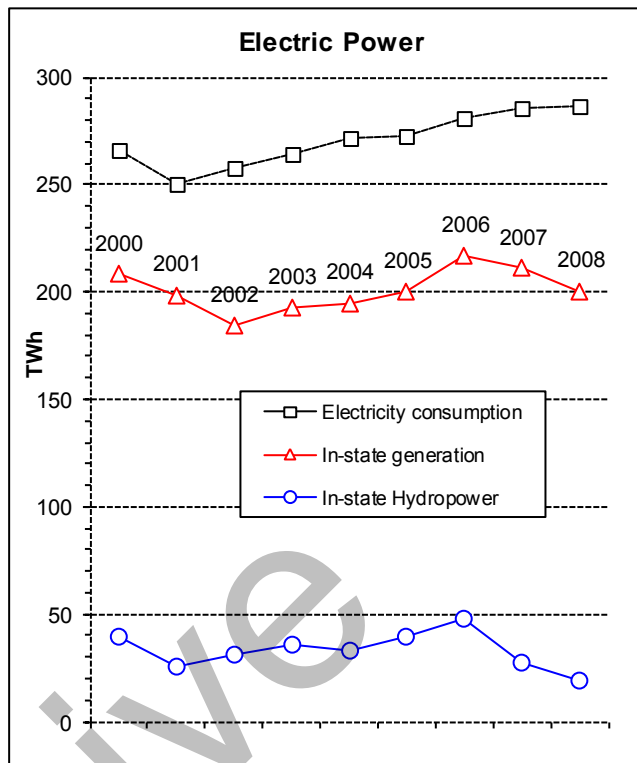
exhibiting a clear trend over the period. California electricity consumption⁶ grew from 265.8 TWh in 2000 to 286.4 TWh in 2008. During the same time the electricity consumed per million \$ of GDP decreased from 206 to 155 MWh.

California produces roughly 70 percent of its electricity from power plants located within the state⁷; the rest is imported from other western states. In-state hydropower production is one of the determinants of how much electricity needs to be imported. In-state hydropower generation varied with hydrologic conditions, from 39.3 TWh in 2000 (an above-normal year) to 19 TWh in 2008 (the second year of a drought). It reached a maximum of 48.1 TWh in 2006 (a wet year).

Industrial

Industrial emissions varied from 97.3 million metric tonnes of CO₂e in 2000 to 92.7 in 2008, with no clear overall trend over the period. Emissions from refineries represent more than a third of the category's total and have been growing from 33.25 to 35.65 million tonnes of CO₂e over the time period, reaching a maximum in 2006, followed by a slight decline. The total net crude oil input by refineries⁸ was 622 million barrels in 2000; it grew to 661 millions in 2005 and declined to 644 million barrels in 2008.

Overall, emissions from oil & gas extraction, the second largest industrial source, have declined slightly: from 18.4 million metric tonnes of CO₂e in 2000 to 17 million in 2008. Oil and gas production in California⁹ declined substantially during the period: from 307 to 239 million barrels of oil and from 379 billion cubic feet of natural gas to 297 billion.

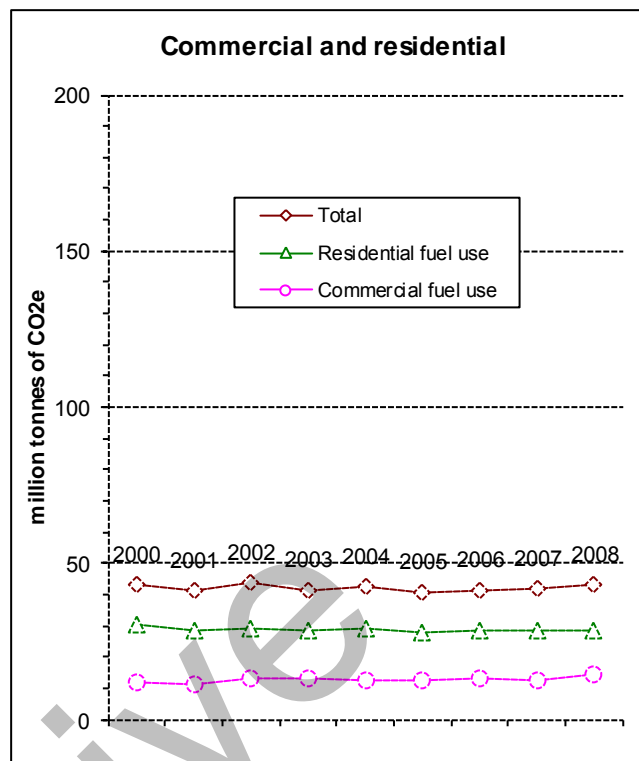


Commercial and Residential

Together, emissions from the commercial and residential sectors have remained about the same over the period, with year-to-year ups and downs. Individually, they exhibit opposite overall trends.

Emissions from residential fuel use declined from 30.1 million metric tonnes of CO₂e in 2000 to 28 million in 2008, mostly from natural gas. At the same time, the number of housing units¹⁰ grew steadily from 12.2 million units in 2000 to 13.4 million in 2008. Thus, the fuel consumption per housing unit has declined, presumably reflecting higher building efficiency standards.

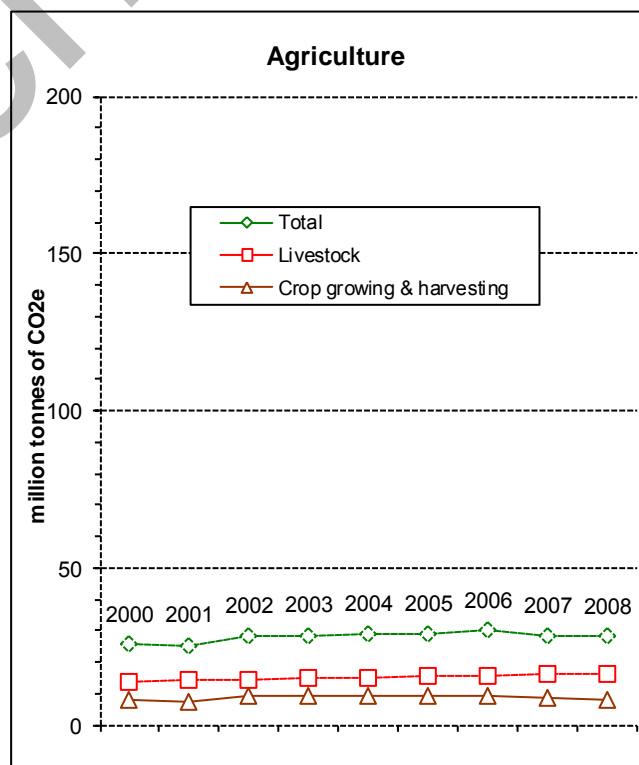
Emissions from commercial (and institutional) fuel use grew from 11.7 million metric tonnes of CO₂e in 2000 to 14.3 million in 2008. Commercial and institutional floor space grew steadily in California¹¹ from 5,862 million square feet to 6,775 million over the period. This sub-category does not exhibit an apparent change in fuel use per unit of space.



Agriculture

Emissions from agriculture grew from 25.4 million metric tonnes of CO₂e in 2000 to 28.1 million in 2008. Over the period, emissions from livestock enteric fermentation and manure management increased from 13.6 million tonnes of CO₂e to 16.3 million. California dairies (the main contributor to this sub-category of emissions) steadily increased their herds from 1.52 million cows in 2000 to 1.84 million in 2008, and their total milk production from 16.1 to 20.6 million tons¹².

Emissions from crop growing and harvesting started at 8 million metric tonnes of CO₂e in 2000, grew to 9.5 million in 2004 and returned to 7.95 million in 2008.

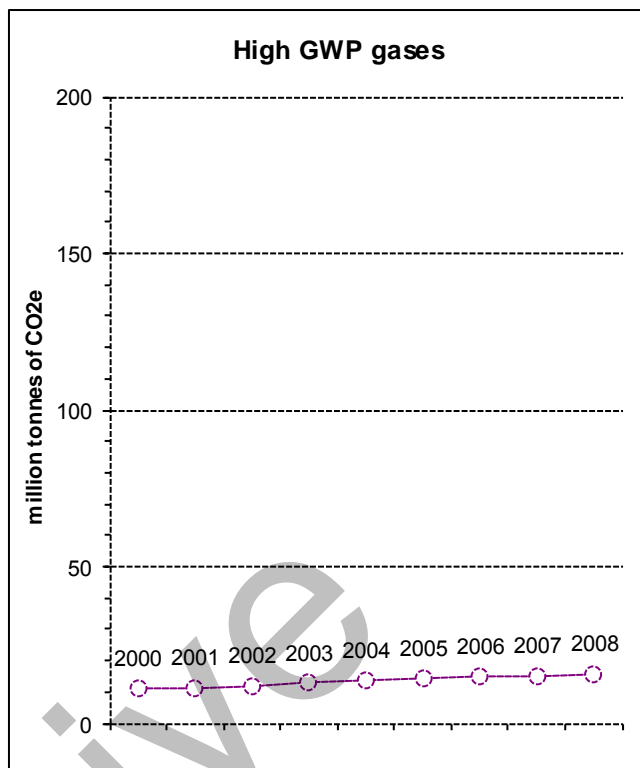


High GWP gases

Since the 1990's, use of ozone depleting substances (ODS) substitutes such as HFCs and PFCs has grown progressively as they are phased in as replacements for now banned CFCs and HCFCs. These gases are used in a variety of applications including refrigeration and air conditioning, solvent cleaning, foam production, sterilization, fire extinguishing, and as aerosol propellants.

Emissions of high global warming potential (GWP) gases grew steadily from 11 million metric tonnes of CO₂e in 2000 to 15.7 million in 2008, driven by the 62% increase in emissions of ODS substitutes.

Fugitive emissions of both SF₆ from electricity grid equipment and GWP gases from semiconductor manufacturing are estimated to have decreased over the time period. However, emissions of GWP gases that are used as ODS substitutes more than offset these reductions.



References

- ¹ California Department of Finance – California Statistical Abstract
- ² U.S. Bureau of Economic Analysis – Gross Domestic Product by State and Metropolitan Area
- ³ California Energy Commission - California Gasoline Statistics & Data
- ⁴ U.S. Energy Information Agency - Weekly Retail On-Highway Diesel Prices
- ⁵ California Department of Transportation - Monthly Vehicle Miles of Travel
- ⁶ California Energy Commission - California Energy Consumption Database
- ⁷ based on California Energy Commission and US Energy Information Agency data
- ⁸ California Energy Commission – Weekly Fuels Watch Reports
- ⁹ California Department of Conservation – Annual Reports of the State Oil & Gas Supervisor
- ¹⁰ U.S. Census Bureau – State Housing Units Estimates
- ¹¹ California Energy Commission – Demand forecasting estimates
- ¹² U.S. Department of Agriculture – National Agricultural Statistics Service