EMFAC2011

Technical Documentation

California Environmental Protection Agency

Air Resources Board

September 19, 2011

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1 INTRODUCTION

EMFAC2011 represents the next step in the ongoing improvement of the EMFAC series of emissions estimation models. The EMFAC2011 release is needed to support the Air Resources Board's (ARB) regulatory and air quality planning efforts and to meet the Federal Highway Administration's transportation planning requirements. EMFAC2011 includes the latest data on California's car and truck fleets and travel activity. The model also reflects the emissions benefits of ARB's recent rulemakings including on-road diesel fleet rules, Pavley Clean Car Standards, and the Low Carbon Fuel Standard.

In order to incorporate the new detailed data and methods to estimate emissions from diesel trucks and buses and future improvements, staff used a modular emissions modeling approach for EMFAC2011 that departs from past EMFAC versions. The first module, named EMFAC2011-LDV, estimates passenger vehicles emissions. A second module, called EMFAC2011-HD, estimates emissions from diesel trucks and buses. A third module integrates the output of EMFAC2011-LDV and EMFAC2011-HD and provides users with the ability to conduct scenario assessments for air quality and transportation planning. This third module is called EMFAC2011-SG. Together the three modules comprise EMFAC2011.

This section describes and summarizes the major updates to this version of the model. The rest of the document provides a complete discussion of all the updates, revisions, and additions to EMFAC2011, and to the new ARB on-line data tool. Most importantly, the on-line tool is designed to cover most data needs for both summarized and detailed emissions and emission rates. The vast majority of EMFAC users will no longer have to download, learn, and run the model to get the data they need. Much simpler data queries across the internet will suffice.

<u>New Data</u>

The most important improvement in EMFAC2011 is the integration of the new data and methods to estimate emissions from diesel trucks and buses. EMFAC2011 uses the same diesel truck and bus vehicle populations, miles traveled and other emissions-related factors developed for the Truck and Bus Rule approved by the Air Resources Board in 2010. EMFAC2011 still provides the same traditional emissions rate detail for these vehicles that user are familiar with in previous EMFAC versions. The model includes the emissions benefits of the truck and bus rule and the previously adopted rules for other on-road diesel equipment. Finally, the impacts of the recession on emissions that were quantified as part of the truck and bus rulemaking are included.

Light-duty motor vehicle fleet age, vehicle type, and vehicle population in EMFAC2011 is based on 2009 California Department of Motor Vehicles data. These data along with the new diesel truck and bus data, satisfies guidance issued by the U.S. Department of Transportation, Federal Highway Administration that requires that vehicle fleet data used in transportation conformity analyses be no older than 5 years.

As in previous releases of EMFAC, travel activity data (which includes vehicle miles traveled, trips, and distributions of vehicle miles traveled by speed and time period) are provided by metropolitan planning organizations (MPOs) that conduct travel demand modeling for the transportation planning process. For EMFAC2011, updated travel activity data was provided by the Southern California Association of Governments (SCAG) for the greater Los Angeles region, by the San Diego Association of Governments (SANDAG) for San Diego County, by the eight San Joaquin Valley MPOs, by the Metropolitan Transportation Commission (MTC) for the Bay Area, and by the Sacramento Area Council of Governments (SACOG) for the greater Sacramento region.

New Modular Model Structure

The new EMFAC2011 comprises a suite of three modules that estimates emissions from diesel trucks, buses, and gasoline powered vehicles. Staff has moved to a modular model structure to accommodate more detailed information about the truck and bus fleet than has been in prior EMFAC versions. The modular structure will also more easily accommodate future model enhancements that are necessary to support on-going program development associated with criteria and greenhouse gas emissions.

The first module, named EMFAC2011-LDV, is used as the basis for estimating emissions from gasoline powered on-road vehicles, diesel vehicles below 14,000 pounds gross vehicle weight rating, and urban transit buses. The algorithms used in EMFAC2011-LDV for passenger cars are the same as used in EMFAC2007

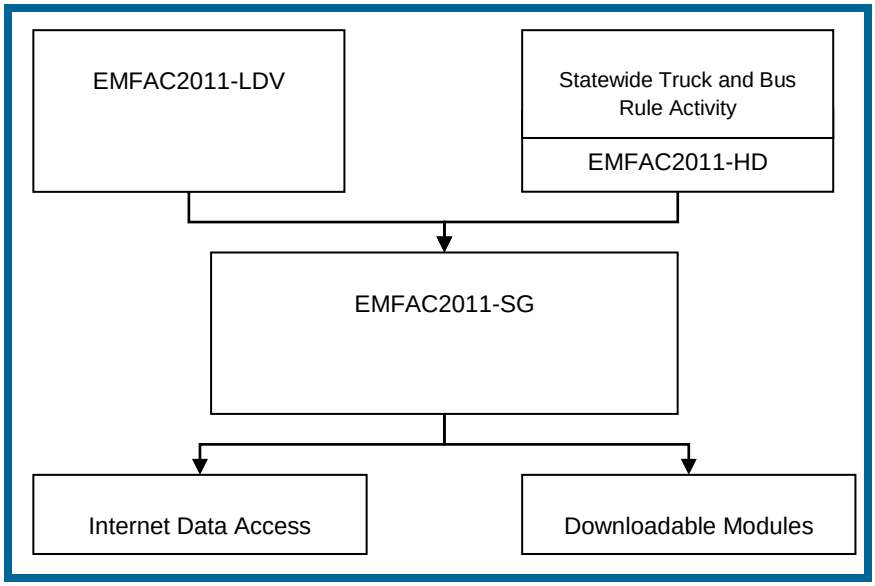
The second module, called EMFAC2011-HD, is the basis for emissions estimates for diesel trucks and buses with a gross vehicle weight rating greater than 14,000 pounds operating in California. This model is based upon the Statewide Truck and Bus Rule emissions inventory that was developed between 2007 and 2010 and approved by the Air Resources Board in December 2010. The truck and bus population and vehicle miles traveled estimates in EMFAC2011-HD are identical to those presented to the Board. Emission factors in the Statewide Truck and Bus Rule inventory were based on statewide, annual average emission factors and adjusted for improvements to fuel economy, medium-heavy duty truck emission factors, and other new information. EMFAC2011-HD emissions estimates include all of the improvements made as part of the Statewide Truck and Bus Rule inventory and then add the traditional detailed EMFAC methods that provide emission rates for annual, summer, and winter seasons on a regional basis.

Finally, EMFAC2011 contains a new simplified tool, called EMFAC2011-SG, that provides air quality planners, transportation planners, and other EMFAC users a tool for assessing emissions under different future growth scenarios. This includes conformity analyses of transportation plans and programs with the State Implementation Plans required by federal law, State Implementation Plan inventories, alternative growth scenarios associated with regional transportation planning for greenhouse gas reductions (SB375), and the like.

EMFAC2011-SG takes the output from EMFAC2011-LDV and EMFAC2011-HD and applies scaling factors to estimate emissions consistent with user-defined vehicle miles of travel (VMT) and speeds. The EMFAC2011-SG module also estimates the benefits of Pavley and Low Carbon Fuel Standard regulations.

EMFAC2011's enhanced modular structure and computation requirements can make running the model more resource-intensive than the previous EMFAC release. Therefore, ARB is enhancing data availability by providing a new database through the ARB mobile source emissions inventory web site that provides regional population, activity, emissions, and emission rates at varying levels of detail. Most current EMFAC users will find the new database sufficient for obtaining emissions data to support California Environmental Quality Act (CEQA) assessments and other types of analyses for which the EMFAC model is currently used and will not need to run the model. The model executable files will also remain publicly available on our website, which is located at **http://www.arb.ca.gov/msei/msei.htm**. Figure 1-1 provides a schematic that describes how the modules fit together.

Figure 1-1. EMFAC2011 Schematic



<u>Beyond EMFAC2011</u>

EMFAC2011 is a transition step to a future EMFAC emissions modeling system under development to meet the increasingly demanding needs for data in both the regulatory and planning arenas. Some of the areas of focus for the future EMFAC system that staff is developing over the next two to three years include:

Population, activity, and forecasting:

- Improved capture of recession and fuel price spikes.
- Reflect planned GHG emissions standards and their impact on future year fleet mix.

New Smog Check Algorithms

- Reflect the new Smog Check mandated by State law starting in 2013.

Flexibility for air quality planning better support for long-term scenario assessment

- Scenario development support for tighter National Ambient Air Quality Standards.
- SB375 –Model structure to better support for smart growth planning.
- Better conformity methods to support MPO conformity determinations.

Improved documentation and public availability of model output:

Future model output will be available in raw and processed form over the internet in ways that require minimal processing to understand.

2 USING THE MODULES AND ACCESSING DATA

The EMFAC model has always been used by a wide cross-section of air quality professionals. Typical uses include:

- ARB and air district staff routinely develop emissions inventories to support air quality planning and to meet air quality standards;
- Regional transportation planning agencies that use EMFAC to test whether or not new transportation plans fall within conformity budgets;
- Statewide and Regional transportation planning agencies evaluating land-use changes that impact regional VMT estimates and their impact on emissions;
- ARB staff developing assessments to support regulatory program development;
- ARB and regional air district staff developing emissions inventories to support health risk assessments; and
- Consultants developing fleet average or by model year emission rates for local scale modeling to support project level assessments.

With EMFAC2011, staff has tried to anticipate data needs and to serve common data requests in the form of a web site data serving tool instead of relying solely upon executable models. These tools provide several different ways to access and summarize both emissions and emission rates to the desired level of detail.

The mobile source emissions inventory website is located at

http://www.arb.ca.gov/msei/msei.htm

On the website the user will find EMFAC2011 including each inventory module, technical documentation, and training resources. The website also contains similar information associated with the myriad of different types of mobile sources from cars and trucks to lawnmowers, construction equipment, and other sources.

Instructions on operating each EMFAC2011 module as well as technical documentation of the modules and data improvements are available in this document; locations and information are described in documentation below for each module in the EMFAC2011 suite.

3 EMFAC2011-LDV

3.1 WHEN THE MODULE SHOULD BE USED

EMFAC2011-LDV estimates emissions for gasoline vehicles, urban transit buses, and diesel vehicles less than 14,000 pounds GVWR. This represents a change from EMFAC2007 when a single tool covered all on-road categories. As a result, EMFAC2011-LDV cannot be used by itself to develop a comprehensive statewide on-road vehicle emissions inventory.

To obtain a comprehensive inventory, a user must use additional modules in the EMFAC2011 suite. The easiest way to access EMFAC2011 emissions is to use the new web based data tools available through our website. Alternatively, a user may choose to run EMFAC2011-LDV and EMFAC2011-SG separately, or to run EMFAC2011-SG. In most cases, data served through the internet should be sufficient to answer many user questions without running the model.

EMFAC2011-LDV may be run to obtain emission rates for specific meteorological and speed conditions, and to generate input files for photochemical modeling.

3.2 USER'S GUIDE TO RUNNING THE MODULE

The fundamental design of the EMFAC2011-LDV executable file is the same as EMFAC2007. A comprehensive user's guide was developed for EMFAC2007 and may be used; it is available on our website.

3.3 MODULE IMPROVEMENTS

Many improvements have been made to the EMFAC model between the release of EMFAC2007 and the updated EMFAC2011-LDV. Population, vehicle miles traveled (VMT), speed distributions, vehicle survival curves, and portions of emission rates have all been updated. This section provides an overview to improvements; major improvements are discussed in greater detail in the technical appendices to this document.

3.3.1 POPULATION

In the EMFAC2011-LDV module, vehicle populations are estimated using registration data from the Department of Motor Vehicles. Data from the 2009 registration year was used to update the populations in each vehicle class for 45 age groups and 69 geographic areas. Based on the 2009 registration data, there are approximately 25 million registered vehicles operating in California.

Staff developed an improved methodology for classifying vehicles among vehicle classes. This methodology involves matching DMV registration information to Smog Check data from the Bureau of Automotive Repair and using two different vehicle identification number (VIN) decoders to interpret registration data. The more extensive use of VIN decoders led to a marked improvement in the classification of vehicles among the light-duty truck categories, which are for the most part sport utility vehicles and lighter pick-up trucks. These improvements are apparent in the model from calendar year 2009 and into the future.

Staff retained the historical fleet mix and population estimates embedded in the model for calendar year 2000 and into the past. For calendar year 2000 through 2008, staff connected the historical population estimates based on the previous DMV processing methodology with the new population estimates developed using the updated DMV processing methodology. The impact of this methodology on emissions is not significant when viewed across all vehicle categories. However for a few categories, most notably light-heavy duty vehicles, the difference in fleet mix is significant between before and after calendar year 2009.

3.3.2 VMT AND SPEED DISTRIBUTIONS

For air quality and transportation planning purposes, EMFAC2011-LDV uses the VMT provided by regional transportation planning agencies (RTPA). For EMFAC 2011, ARB received VMT and speed submittals from the Southern California Association of Governments (SCAG), Bay Area Metropolitan Transportation Commission (MTC), San Diego Association of Governments (SANDAG), and San Joaquin Valley Councils of Government. In the absence of recent RTPA data, the model contains default speed distributions and estimated VMT as a function of vehicle population (from DMV) and mileage accrual rates (from the Bureau of Automotive Repair SmogCheck program).

In general regional transportation planning agencies did not reflect the impact of the economic cycle on VMT, and instead dampened future VMT forecasts in light of the slower economic recovery from the recent economic recession. As a result the recession is generally handled through long term rather than short-term forecasts in EMFAC2011-LDV.

Unlike previous versions of EMFAC, VMT estimates from medium and heavy heavy-duty diesel trucks and diesel bus categories are estimated directly from EMFAC2011-HD. When developing these VMT estimates staff accounted for both the short and long term impacts of the economic recession.

3.3.3 EMISSION RATES

3.3.3.1 CARBON DIOXIDE

EMFAC2007 outputs carbon dioxide (CO2) emissions and estimated fuel use using results from chassis dynamometer exhaust tests on the federal test procedure (FTP) assuming fuels oxygenated with MtBE. To update these assumptions for EMFAC2011-LDV, staff analyzed test data from the Unified Cycle (UC) using modern ethanol/gasoline blends consistent with RFG3. The update results in a small change in predicted CO2 emission rates. Details are available in Section 8.

3.3.3.2 CARBON DIOXIDE DISBENEFIT WITH AIR CONDITIONING USE

EMFAC2011-LDV estimates carbon dioxide emissions as a function of the use of air conditioning systems among other factors. The assumed use of vehicle air conditioning is a function of the temperature and relative humidity in the geographical area being modeled. In developing EMFAC2011, staff re-evaluated the algorithm to correctly reference the factors in the calculation.

EMFAC2011-LDV uses a correlation between emissions results on the FTP with 10% additional aerodynamic load and the UC with air conditioning turned on. The correlation has a slope and an intercept term. The intercept (as the ratio of intercept to slope) is added to the BER (basic emission rate) in the model. For LDVs, MDVs and MCs, UC bag 2 (hot, stabilized) emission factors are used as BERs. For all other vehicle types, the average of the FTP Bag 2 (hot, stabilized) and Bag 3 (warm start) results is used. The program was applying the BER twice for LDVs, MDVs, and MCs, rather than only applying the UC Bag 2 BER. This change led to a decrease of 30,000 tons/day CO2 statewide which is a 5% decrease in emissions from what was previously estimated.

3.3.3.3 EVAPORATIVE DIURNAL BASIC EMISSION RATE COEFFICIENTS

In EMFAC2011-LDV, hydrocarbon evaporative diurnal emission rates are modeled as polynomial equations dependent on ambient temperature and other factors. The polynomial equations generate a conversion factor that converts an evaporative base emission rate to an emission rate at a given temperature. In updating EMFAC2011-LDV, staff determined that several polynomial coefficients in the model were very small and the EMFAC model was not carrying sufficient significant figures in the coefficients. EMFAC2011 now uses additional significant figures in this calculation, which results in an increase of ROG emissions of 0.3 tpd statewide in 2007. The effect is larger in later years (because more zero evap vehicles are present), but it is still a very small effect.

3.3.3.4 EVAPORATIVE RESTING TIME IN HOT SOAK ALGORITHM

In EMFAC, hydrocarbon evaporative emissions generated through the hot soak process are calculated for both full hot soak events (the engine fully cools back to ambient) and partial hot soaks (the engine partially cools until the next start event) using a matrix of resting time values. During evaluation of the evaporative emissions processes for development of EMFAC2011, staff identified that hot soak emissions in EMFAC had been programmed using the time-off matrix of soak times before a cold start. This matrix represented the pre-start soak time as a function of time of day. EMFAC should have been programmed with the time-rest matrix of soak times after a key-off event by time of day. This correction results in an increase of ROG emissions of 8.5 tons/day statewide, which is a 1% increase in emissions.

3.3.3.5 BRAKE WEAR PM

EMFAC2007 estimated total particulate matter for brake wear using an emission factor of 12.8 mg/mile. This emission factor was applied to all vehicle classes on a per mile basis, and reflected emissions testing of asbestos friction-materials from automobile disc brakes. To update EMFAC2011-LDV, staff used two more recent studies performed on new brake materials that replaced the older asbestos based materials. Results from these studies were correlated with wheel load, braking speed, material, and number of brakes per vehicle.

In addition to updating the emission rate during braking events, staff used the same driving cycles upon which exhaust emission rates are derived to estimate the frequency and severity of braking events during driving in California. Staff used the unified cycle for light-duty vehicles, and the transient and cruise cycles for heavy-duty vehicles. Overall, brake wear emissions increase substantially in EMFAC2011-LDV as a result of this update. Details are available in Section 9.

3.3.3.6 GASOLINE EXHAUST PARTICULATE MATTER

Basic emission rates for light duty gasoline vehicles have been updated using data from EPA's project titled 'The Kansas City PM Characterization Study'. These vehicles were certified to Federal Standards. Emissions data was collected under conditions prescribed in the Federal Test Procedures, and vehicles were operated over the LA92 Unified Driving Cycle. Data for newer model years was supplemented by testing conducted at ARB's Haagen Smit Laboratory.

The current LEV II standard for PM is 10 mg/mi and will be in effect until 2016. As these standards are further reduced, we expect various engine technologies to penetrate in the fleet. For example, the percentage of gasoline direct injection (GDI) engines is expected to increase from current levels in order to meet the GHG emission targets. These effects and other results are detailed in Section 10.

3.3.4 OTHER IMPROVEMENTS

3.3.4.1 ELIMINATION OF TRUCK AND BUS CATEGORIES

The vehicle classes in EMFAC2011-LDV that are covered by EMFAC2011-HD are depopulated and effectively turned off in EMFAC2011-LDV since the official inventory for truck and bus categories will be generated by EMFAC2011-HD.

3.3.4.2 VEHICLE SURVIVAL

In the process of developing revised assumptions, staff evaluated vehicle survival curves in EMFAC2007 against curves that were derived using more recent DMV data. In most cases the survival curves derived from the new DMV data were similar to those in EMFAC2007 and as a result no changes were required. However, in two categories (light duty automobiles and light duty trucks 2) survival curves developed using 2005-2009 data were different than those included in EMFAC2007. Survival curves for those two categories were updated in EMFAC2011-LDV as a result. A comparison of old and new survival curves for these categories are shown in Figure 3-1 and Figure 3-2 below.

Figure 3-1. Light Duty Automobile Vehicle Survival Curves: EMFAC2007 vs. EMFAC2011-LDV

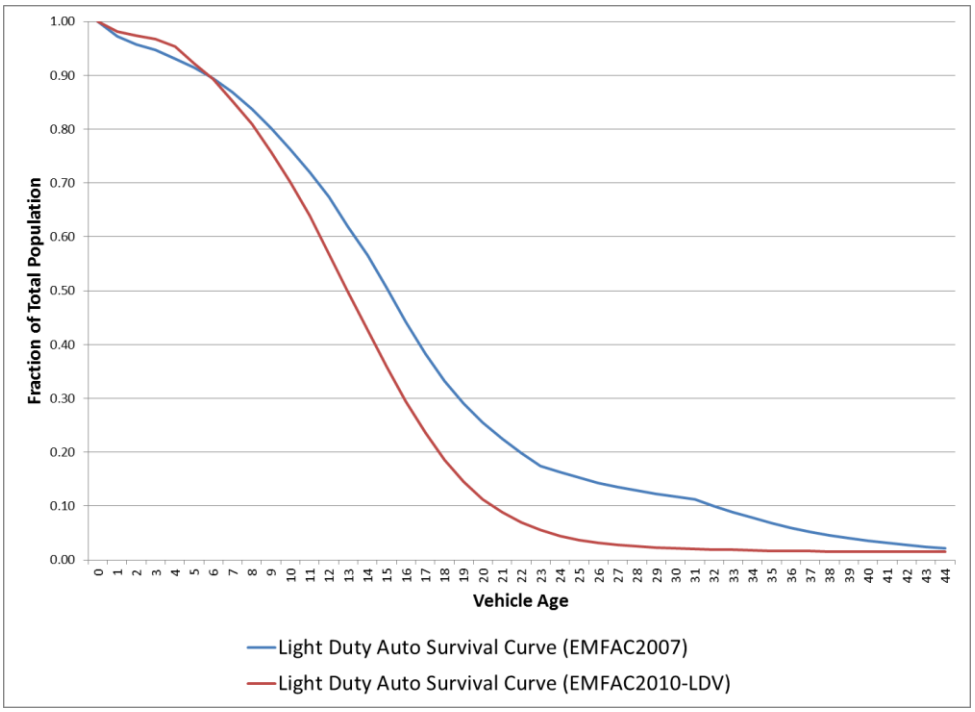
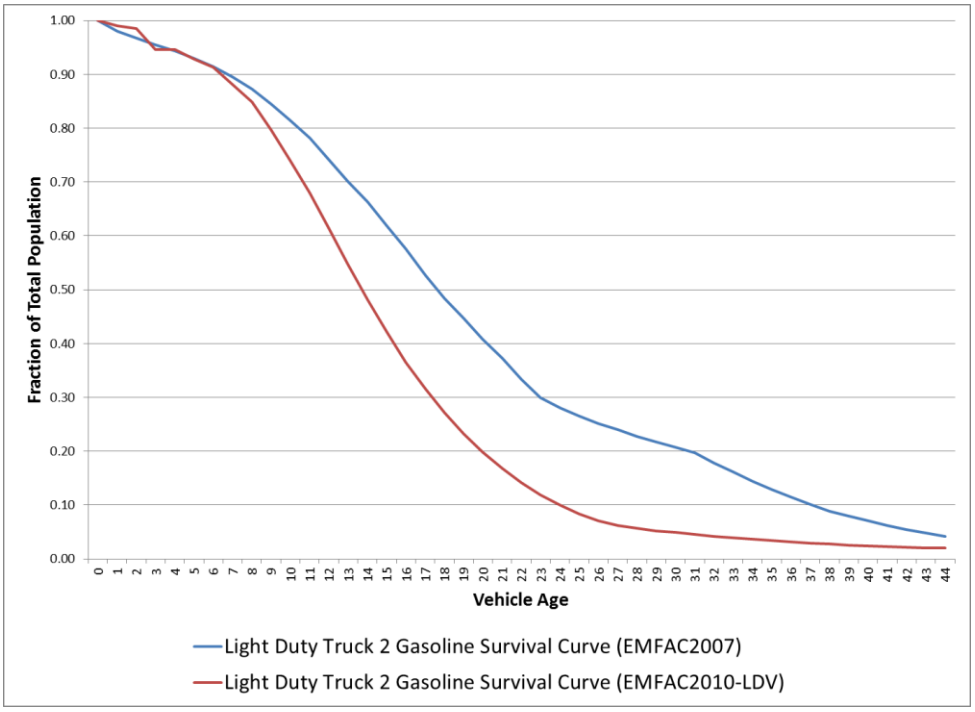


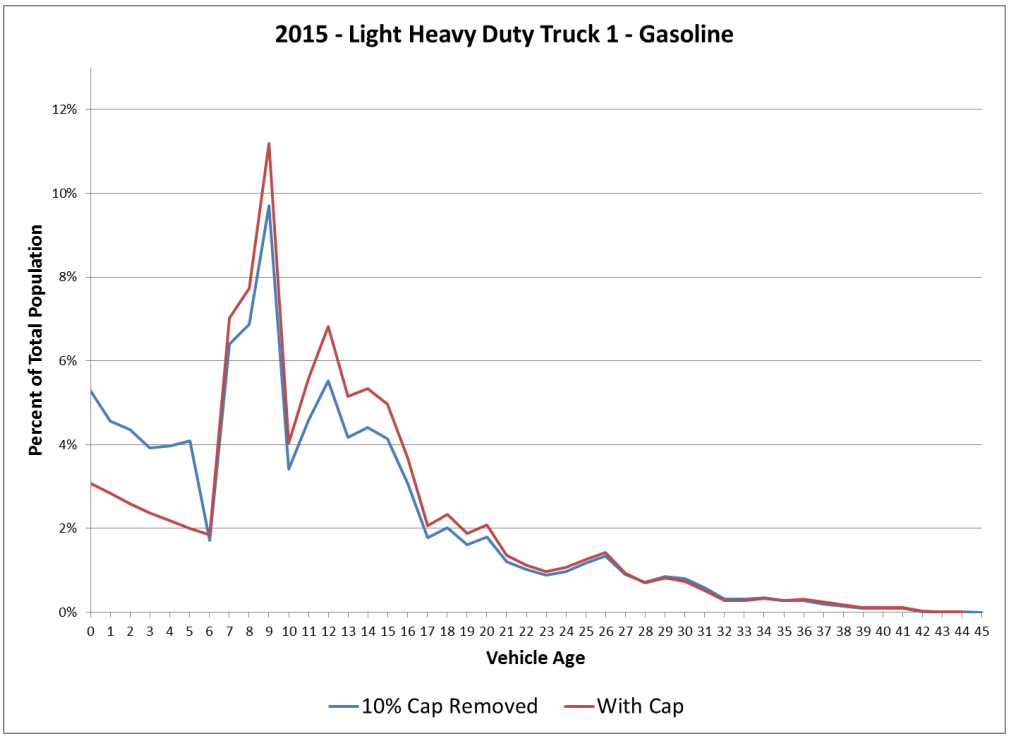
Figure 3-2. Light Duty Truck 2 Vehicle Survival Curves: EMFAC2007 vs. EMFAC2011-LDV



In EMFAC2007 and prior versions of the EMFAC model, new vehicle sales in a given calendar year and vehicle class were a function of the overall population growth rate, the total population in the vehicle class and calendar year, the survival curve for the vehicle class, and a 10% limit on increase in year to year new vehicle sales in any vehicle class. If the 10% cap were calculated to be exceeded, the algorithm capped the increase in new vehicle sales at 10% and allocated the remaining new vehicles to older ages.

One of the impacts of the 2007-2009 economic recession was a major decrease in new vehicle sales with the lowest level of vehicle sales occurring in calendar year 2009. New vehicle sales decreased 20% in light duty automobiles and 75% in light heavy duty trucks relative to 2007. When evaluating EMFAC2011-LDV, it became clear that the 10% cap on increase in new vehicle sales was artificially depressing new vehicle sales in the future and as a result artificially aging the fleet in an unrealistic manner. As a result, that cap was removed. This is illustrated in Figure 3-3. Without the cap, new vehicle sales cannot rise above 10% resulting in a slow smooth increase from 2009, and enhanced survival in older ages. With the cap removed, the survival curve is impacting the population as it should in older ages, and new vehicle sales are more in-line with historical trends.

Figure 3-3. 2015 Light Heavy Duty Truck 1 – Gasoline: Comparison Using EMFAC2007 Approach (10% Cap in Place) Against EMFAC2011-LDV Approach (Cap Removed)



3.3.4.3 LIFETIME MILEAGE

In the EMFAC model, emission rates are a function of the cumulative mileage on the vehicle through an emissions process called deterioration. Cumulative mileage was calculated in EMFAC2007 assuming that a vehicle's cumulative lifetime mileage, which can generally be measured using an odometer, is the sum of the average vehicle's mileage accrual schedule over time. Analysis of available odometer data and academic studies[1] for cars and trucks demonstrated that this assumption is incorrect. The reason for this difference is that when a vehicle is young, the average odometer of a group of similarly aged vehicles in a class is the average of some high accruing and some low accruing vehicles. As vehicles age, higher mileage vehicles are scrapped more quickly than lower mileage vehicles. So, surviving vehicles are more likely to have accrued fewer miles than average when those vehicles were younger. The net result is that the modeled average odometer at a given age is a function of both accrual rates up to that age, and survival rates up to that age for the vehicle class. Observed odometer readings in practice tend to level out to a constant level for older vehicles.

To make this change in the model, staff updated the way in which odometer is calculated in EMFAC. In the new method integrated into EMFAC2011, modeled odometer or lifetime mileage is a function of both mileage accrual rates and vehicle survival rates in the following equation:

$$\text{ODOMETER (10)} = \sum_{i=1}^{10} accrual(i) * survival(i)$$

This change leads to a small change in emissions in any calendar year, but effectively places a cap on deteriorated emission factors in older vehicles. Details on the emissions impact are available in Section 12.16.

3.3.4.4 TEMPERATURE AND RELATIVE HUMIDITY PROFILES

Due to the importance of environmental conditions on emissions, correction factors are used in EMFAC to adjust the laboratory-based emissions rates when actual ambient environmental conditions differ from the standard laboratory conditions under which emissions testing is conducted. More specifically, correction factors for ambient temperature and relative humidity are used to adjust base-rate exhaust emissions (running and starts, especially starts) and evaporative emissions (i.e., diurnal, hot-soak, running loss and resting loss) for non-standard conditions. Emission rates are adjusted for ambient temperature conditions that vary from 75 degrees Fahrenheit or absolute humidity that varies from 75 grains of water per pound of dry air (gr/lb). The default profiles are based on region-specific meteorological conditions that have occurred on days that ambient pollutant concentrations challenge attainment and maintenance of air

[1] Greenspan, A., Cohen, D, (1996). Motor Vehicle Stocks, Scrappage, and Sales. October 30, 1996. Available at: http://www.federalreserve.gov/pubs/feds/1996/199640/199640pap.pdf.

quality standards in a region, specifically the new federal 8-hour standard and the federal 24-hour $PM_{2.5}$ standards.

For each region, approximately 24 total days over 12 years (1996-2007) were selected for analysis. Key differences between this update and prior updates to the default temperature and relative humidity profiles in the models are as follows:

Profile Scenarios. The current update addresses four scenarios of environmental conditions:

- **ozone** exceedance conditions based on the new federal 8hr ozone standard;
- **PM** exceedance conditions based on the new federal 24-hour $PM_{2.5}$ standard;
- **monthly** average ambient environmental conditions; and
- **annual** average (based on monthly average data).

The last update to default temperature and relative humidity profiles occurred in late 2006, which only addressed summertime conditions based on data analyses spanning March through October.

Spatial-Weighting Schemes. In the last update, EMFAC summer profiles were developed with VMT weighting and simple averaging. In this current update, the spatial weighting by VMT is still used for EMFAC profile development.

Relative Humidity Calculation. Previously, temperature (T) and relative humidity (RH) profiles were developed independent from each other using the same selected days of simultaneously-collected T and RH data. Thus, these matched pairs of T and RH were dissociated and then averaged independently. A deficiency with this approach is that it allows the known, dependent relationship between temperature and pressure to be broken. To fix this methodological deficiency and better maintain the site- and day-specific relationship between temperature and relative humidity in this update, a different methodology was used. With this new method and for a specific monitoring location, hourly temperature averages are calculated first from simultaneously-collected pairs of T and RH values. Next, a relative humidity value for each of the resulting averaged temperature values is selected or interpolated from the original, matched pairs of T and RH via cross-referencing on temperature values. Because NOx emissions are sensitive to humidity, this change in methodology affects NOx emission estimates.

Data Period of Record and Screening Criterion. The Federal 8-hour ozone standard and 24-hour $PM_{2.5}$ standard have been revised since the previous update of temperature and relative humidity profiles. This update utilizes the present Federal 8-hour ozone and 24-hour $PM_{2.5}$ standards.

Use of Imputed Data. Missing data at one site are imputed if the data at that site are systematically related to the data measured for at least one other site. Using imputed data helped raise the number of sites with “complete” data from 1996 to 2007 from less than 100 to 156 sites.

Overall, the updated temperature and relative humidity profiles lead to +/- 5% change for ROG and NOx for ozone (summer) and PM (winter) profiles relative to previous estimates in EMFAC2007.

3.3.4.5 UPDATE TO NUMBER OF LIGHT-HEAVY DUTY VEHICLE STARTS

Emissions from gasoline powered vehicles during starts are higher than during normal vehicle operation because control equipment does not function optimally when a vehicle is cold. EMFAC2007 assumed 33 trips per day for gasoline powered light-heavy duty trucks, which are defined as having a gross vehicle weight rating between 8500 and 10,000 pounds. Staff reviewed this assumption, and found that given the uses for these vehicles the number of starts was excessive, leaving roughly 2 miles of driving per start and a mean time between trips of 15 minutes or less.

Staff re-evaluated the original data that were used to develop vehicle start estimates and found that Federal Express and United Parcel Service trucks seemed to be over-represented in the gasoline vehicle sample. When data were evaluated across both diesel and gasoline vehicles, staff estimated 15 starts per day. That value was used to update EMFAC2011-LDV.

3.3.4.6 UPDATE TO ASSUMED TO COMPLIANCE WITH THE LEV2 REGULATION

In November 1998 staff adopted new light duty vehicle emission standards (LEV2) that began implementation in 2004. In EMFAC2000 staff integrated the compliance pathways into EMFAC based on assumptions developed during rulemaking. The LEV2 standards set an average emissions target across vehicle classes, which allowed vehicle manufacturers some room to manufacturer different combination of vehicle technologies to meet the standard. In developing EMFAC2011 staff reviewed these assumptions.

Three updates were made. First, staff identified that when compared to certification data EMFAC assumed that by 2010 about 70% of new passenger cars would be certified to the partial zero emission vehicle (PZEV) standard, and be partially offset by a small fraction of dirtier vehicles. In reality, vehicle manufacturers sold 20% PZEV and 70% ultra-low emission vehicles or ULEV. In essence vehicle manufacturers sold a different mix of cars than assumed in EMFAC2007, but that met the same LEV2 emissions standards. Second, staff updated light-duty diesel sales fractions based on actual sales data. Since diesel cars sold after 2004 had to meet gasoline vehicle emissions standards, this had no impact on emissions. Finally, staff integrated new assumptions about penetration of zero-emission vehicles. EMFAC2007 had assumed a small fraction of ZEVs would be sold in the previous decade. Those sales were overestimated, and staff updated ZEV sales with actual sales data. Staff also updated ZEV forecasts between 2010 and 2017. Some electric vehicles are expected to be available because of the advent of plug-in hybrids that provide a relatively long all-electric range. Details are available in Sections 12.12 and 12.18.

4 EMFAC2011-HD

4.1 INTRODUCTION AND DESIGN

Commercial heavy-duty diesel trucks and buses are defined as commercial diesel buses and trucks exceeding 14,000 pounds gross vehicle weight rating (GVWR). Combined these categories are the single largest source of NOx and diesel PM2.5 in California.

Beginning in 2007, staff began the process of redesigning the truck and bus emissions inventory in order to support development of the Drayage Truck and Statewide Truck and Bus Rules. These rules were ultimately adopted and amended between 2008 and 2010. In developing this new analysis, staff integrated new data and assumptions into an expanded methodology that builds upon modeling techniques in embedded EMFAC2007. The expanded approach accounts for the differences in trucking and busing operations which are a function of vehicle registration type, body type, and vocation.

EMFAC2011-HD is written in two parts. The activity portion of the inventory, which includes current, back-casted, and forecasted population / VMT is written in Microsoft Access. These activity estimates are the same as those assumed for the Truck and Bus Rule Amendments adopted in December 2010. The emission factor portion of EMFAC2011-HD is written in Visual Basic and MySQL. Whereas the December 2010 regulatory inventory relied upon statewide annual average emission rates adjusted for several updates, EMFAC2011-HD incorporates the same updates (as well as additional updates to temperature, relative humidity profiles, and regional speed distributions) into the full programming breadth that was previously included in the EMFAC model.

4.2 BASIC METHODOLOGY

Emissions are calculated as the product of a population of vehicles, the number of miles each vehicle travels, and emission rates per mile as shown below. Beneath this simple equation lies a series of data and assumptions about the population, miles traveled, and emission rates per vehicle model year in a given calendar year, growth and attrition estimates, deterioration, and other factors that affect emissions estimates, all of which is described in documentation developed for the Truck and Bus Rule or in this document. We applied the concept separately for each analysis category of trucks that shares similar travel, service, size, age or other characteristics.

$$\sum_{MY,\,C} \left(POP_{MY,\,C} \times AC_{MY,\,C} \times ER_{MY,\,C,\,R}\right) = EMS_{CY},$$

where: $POP_{MY,\,C}$ is the population of trucks for model year MY within each analysis category C for a given calendar year;

$AC_{MY,\,C}$ is the accrual rate (miles traveled per year) per truck by model year MY and analysis category C in a given calendar year;

$ER_{MY,\,C}$ is the calculated emission rate, in grams pollutant per mile driven, assuming regional speed distributions, regional temperature and relative humidity profiles by hour of day, and category specific cumulative mileage accrual over the life of the truck, by model year MY, analysis category C, and region R;

EMS_{CY} is the emissions calculated in tons per day for a given calendar year.

4.3 WHEN THE MODULE SHOULD BE USED

EMFAC2011-HD estimates emissions for commercial vehicles equipped with medium heavy or heavy-heavy duty diesel engines. The module outputs emissions from these categories assuming the benefits of recently adopted Rules. A user can run EMFAC2011-HD separately, or to obtain emissions estimates across all vehicle categories within a region, a user can use the new on-line database of EMFAC2011 output available through our website, may use the EMFAC2011-SG, or may run EMFAC2011-LDV and EMFAC2011-HD separately. In most cases, data served through the internet should be sufficient to answer many user questions without running the model.

4.4 RELATIONSHIP TO REGULATORY INVENTORIES

Population and activity estimates for years covered by the regulatory inventory are identical to those assumed for the Truck and Bus Rule amendments that were adopted by the Board in December 2010. Additional activity estimates have been made for the prior to 2000 and after 2025 so that emissions can be provided from the model for the full intended range of EMFAC2011: 1990-2035. EMFAC2011-HD generates emission rates using the same algorithm as EMFAC2007, but incorporates all of the emission factor related updates made as part of the regulatory inventory (chip reflash, updated medium heavy-duty base emission factors, etc.), and includes updated speed, temperature, and relative humidity profiles developed for EMFAC2011. More information on the truck and bus rules is available at: http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm.

4.5 ACTIVITY

Activity estimates are identical to those assumed for the Statewide Truck and Bus Rule Amendments in 2010 and cover the years 2000, 2002, 2004, 2005-2025. Detailed documentation on the methods and assumptions used are available at: **http://www.arb.ca.gov/regact/2010/truckbus10/truckbusappg.pdf**; **http://www.arb.ca.gov/msprog/onrdiesel/ab1085compliance.htm**; and **http://www.arb.ca.gov/regact/2008/truckbus08/appg.pdf**.

4.5.1 FORECAST/BACKCAST OUTSIDE OF REGULATORY INVENTORY

For forecasting activity beyond 2025, the methodology for growth trend follows the same approach as the regulatory inventory. For most of the medium and heavy-heavy duty diesel truck inventory, we assumed the same year to year growth rates as in EMFAC2007. Growth of Statewide construction truck fleets activity is based on the construction activity growth and the activity distributions to air basins are based on population growth. For activity prior to 2000, we used the trend of California diesel fuel sales to on-highway consumers between 1990 and 2000 from Energy Information Administration (EIA, California No 2 Diesel Adjusted Sales/Deliveries to On-Highway Consumers). The back-casted statewide activities for construction truck fleets followed the EIA fuel sales trends as most other truck fleets and distributed to air basin based on population growth. The activities outside of regulatory inventory for buses, drayage trucks, agricultural trucks, public and utility fleets and solid collection vehicles are assumed to follow their respective long term growth trends. As in the regulatory inventory, sales adjustment factors developed based on new truck sales were used to adjust the average age distribution in the baseline. We assume sales adjustment factors are 1 for all pre-1985 models and used the average of the newest five model year sales adjustments in the regulatory inventory for all additional forecast model years.

4.6 EMISSION FACTORS

In developing the Statewide Truck and Bus Rule emissions inventory, staff revised the emission factors for medium heavy-duty diesel trucks (MHDDT), made adjustment to the NOx emission rates of 2006-2011 model year heavy heavy-duty diesel trucks (HHDDT) and MHDDT, and updated the HHDDT and MHDDT CO2 emission rates as well as the HHDDT NOx idle emission rates. These adjustments were made outside of EMFAC2007. In developing EMFAC2011-HD, staff integrated these adjustments that were not included in EMFAC2007 but were included in the Statewide Truck and Bus Rule emissions inventory. Details are available in Section 11, and the following describes at a high level the revision and update of truck emission factors in EMFAC2011 relative to EMFAC2007.

4.6.1 MEDIUM HEAVY-DUTY TRUCK EMISSION RATES

In EMFAC2007, staff did not update the emission factors for medium heavy-duty trucks (MHDDT). Since the release of EMFAC2007, emission test data for MHDDT were made available by the Coordinating Research Council (CRC) through its E55/59 project final report. As a result, staff revised the MHDDT emission factors using the new test data in EMFAC2011.

The method of calculating MHDDT ZMR and DR is the same as that used for deriving emission factors of heavy heavy-duty trucks (HHDDT) in EMFAC2007. The test data were divided into a number of model year groups based on the general emission trends as well as changes in heavy-duty diesel engine emission standard and emission control technology. For each model year group, the zero-mile emission rates and deterioration rates for HC, CO, NOx, and PM were calculated.

4.6.2 2006-2011 MODEL YEAR NOX EMISSION RATE ADJUSTMENT

A review of the certification data shows that some engine manufacturers introduced 1.2 g/bhp-hr NOx heavy-duty engines one year earlier than required and one manufacturer chooses to meet USEPA 2010 NOx standard without using selective catalytic reduction. Staff updated the 2006-2011 model year HHDDT and MHDDT emission factors in EMFAC2011 to reflect how engine manufacturers complied with the 2007 engine standards and how they comply with the 2010 engine standards between 2007 and 2011.

4.6.3 HHDDT AND MHDDT CO2 EMISSION RATES

In EMFAC2007, CO2 emission rates of diesel trucks were assumed to remain constant regardless of model year, technology, activity, and other factors. However, with the emphasis on greenhouse gas emissions control over the past few years, staff decided to update CO2 emission rates for individual model years in EMFAC2011. During the Board's In-Use On-Road Diesel Vehicle rulemaking, staff evaluated available data to determine how improvements in engine technology and increasingly stringent criteria pollutant emission control requirements have affected the fuel economy of trucks. Staff reviewed multiple data sources to characterize the variations in the fuel economy values of trucks in California. After fuel economy was estimated, fuel usage was then converted to CO2 emissions.

4.6.4 MHDDT IDLE EMISSION RATES

As with the revision of MHDDT running exhaust emission rates, the available CRC E55/59 idle emission test data allowed staff to revise the MHDDT idle emission rates in EMFAC2011. The method of analysis is the same as that used for calculating HHDDT idle emission rates in EMFAC2007. The high idle correction factors for HHDDT in EMFAC2007 are also applicable to MHDDT.

4.6.5 HHDDT NOX AND CO2 IDLE EMISSION RATES

The EMFAC2007 NOx idle emission rates of HHDDT for 2007 and subsequent model years were projected based on the then prevailing assumption that engine manufacturers would adopt a 5-minute shut-off mechanism to comply with ARB's anti-idle rules. However, the certification data show that all engine manufacturers have instead chosen to meet the ARB requirements with the 30 g/hour NOx idle emission rate option. As a result, staff revised the NOx idle emission rates of 2008+ model year trucks in EMFAC2011 to reflect the engine certification data.

The CO2 idle emission rates of HHDDT were also updated in EMFAC2011. In EMFAC2007, an average CO2 idle emission rate was used for all model years. To be consistent with the revision to the CO2 exhaust emission rates of HHDDT, in EMFAC2011 idle emission rates of CO2 were calculated for individual model year groups.

5 EMFAC2011-SG

5.1 BACKGROUND ON CONFORMITY

State and federal law require regional planning agencies prepare both a transportation plan to benefit public mobility and an air quality plan to benefit public health. Under the federal Clean Air Act, transportation activities that receive federal funding or approval must be found to be fully consistent with the plan developed to meet federal clean air standards, known as the State Implementation Plan, or SIP. The requirement that federal activities--especially transportation plans and projects--be shown to help communities attain federal air quality standards is known as conformity.

Conformity applies to federal transportation decisions in all areas that are designated "nonattainment" for specific pollutants (ozone, carbon monoxide, particulate matter) by the U.S. EPA. These are areas that have recorded violations of the National Ambient Air Quality Standards. "Attainment" areas that have adopted air quality maintenance plans are also subject to conformity. Areas that have exceeded the more stringent California air quality standards but are within national standards are not subject to conformity (however, the California Environmental Quality Act applies to all projects in the state).

Adoption by a metropolitan planning organization (MPO) of a 20-year regional transportation plan (RTP), or a short-term federal transportation improvement program (TIP), must include a conformity analysis prepared by the MPO. In addition, sponsors of transportation projects that require a federal approval are responsible for assessing project conformity. Final determinations of conformity for RTPs, TIPs and projects are made by the Federal Highway Administration and the Federal Transit Administration.

Conformity assessments are part of a broader regional transportation planning process carried out by the MPO, or by another transportation agency in less urbanized areas. Because joint transportation and air quality planning assists both conformity assessments and air pollution reduction efforts, local air districts and transportation planning agencies regularly consult with each other and with involved state and federal agencies. Local transportation and air quality planning processes are also open to interested organizations and members of the public.

For RTP and TIP demonstrations, conformity first involves an emissions test. The air quality plan (SIP) forecasts levels of pollutant emissions that will enable steady progress toward attainment of air quality standards by Clean Air Act deadlines, backed up by control strategies that will enable these levels to be reached. Such forecasts are divided by emissions source. The on-road mobile source portion of the forecast is known as a motor vehicle emissions budget. To be found in conformity with the SIP, a

region's transportation plan and program must be found to result in emissions that are within each emissions budget.

5.2 THE EMFAC2011-SG TOOL

The EMFAC2011 modeling package contains a suite of modules for modeling different vehicle categories including:

- EMFAC2011-LDV, a Fortran-based module mainly representing light-duty fleet (an update to the original EMFAC model), and
- EMFAC2011-HD, a Visual Basic/SQL-based module representing the heavy-duty diesel trucks/vehicles.

Since the two modules are written on two different software platforms, and each contains a different portion of the motor vehicle fleet, outputs from both modules are needed to be processed externally to create the entire motor vehicle fleet inventory. Therefore, the EMFAC WIS processor (in the EMFAC LDV model) is no longer adequate to perform a complete regional transportation conformity analyses.

Staff developed a new module called EMFAC2011-SG. EMFAC2011-SG is developed in Microsoft® Access platform, and replaces the functionalities of the WIS module in EMFAC for transportation conformity purposes. EMFAC2011-SG is an external module that uses the inventory from EMFAC2011-LDV and EMFAC2011-HD modules and scales the emissions based on changes in total VMT, VMT distribution by vehicle class, and speed distribution. EMFAC2011-SG processes data only at a sub-area level. A sub-area is defined as a county that is split by county, air basin, and air district boundaries. Each sub-area within the county is a GAI. In order to process regional scenarios (State, Air Basin, Air District, MPO, County), the module needs to process all sub-Areas in its domain and aggregate the results. Therefore, for a single “Statewide” regional modeling scenario, the module will need to run and aggregate the results of all 69 sub-areas (GAIs). Regional-level outputs are aggregated as part of module output. Therefore, the module will produce individual outputs for each GAI, but also produce the aggregated region-level output (Statewide output). EMFAC2011-SG uses the VMT-weighted speed distribution at the daily level, and allows users to generate MPO-level outputs, in addition to the Statewide, Air Basin, Air District, County, and Sub-Area level outputs. EMFAC2011-SG inputs and outputs are generated in Microsoft Excel format (*.xls).

5.3 MODULE LOGIC

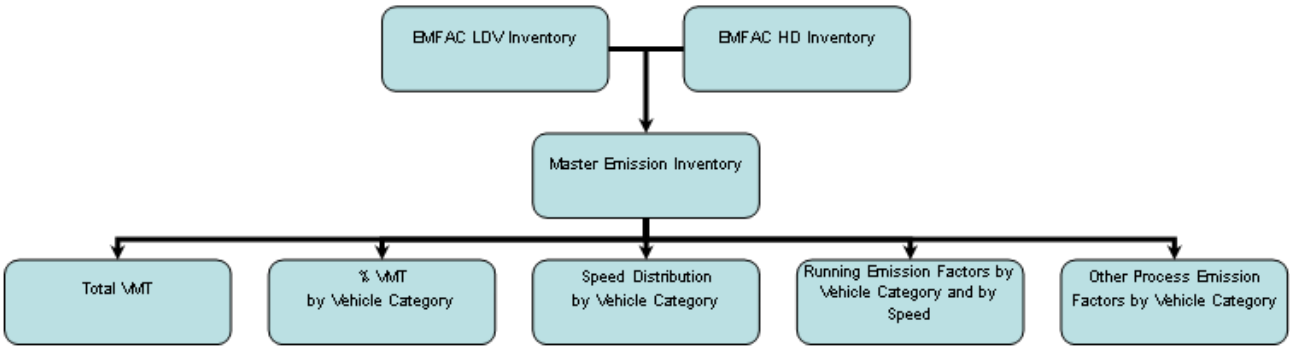
Since transportation plans and policies are created by the local governments, the vehicle usage and speed profiles vary greatly at the sub-area level. Therefore, the

EMFAC2011-SG module was also developed to process speed data at the sub-area level.

EMFAC2011-SG uses the combined Burden-level outputs from the two modules (EMFAC2011-LDV and EMFAC2011-HD) disaggregated by Model-year and Speed (5-MPH increments) as the base inventory. The base inventories are pre-processed by sub-area, calendar year and season, and are available to download along with the SG package. Users are required to download the inventories for the regions of interest to their computers.

Each sub-area modeling case is called a 'Scenario' (defined by sub-area, calendar year, and season). When a user models a scenario, the EMFAC2011-SG module imports the data from the corresponding base inventory file, and disaggregates the data into different parameters as shown in Figure 5-1.

Figure 5-1. Schematic of EMFAC2011-SG Logic



Based on the modeling parameters, SG uses the following equations to calculate the emissions by Vehicle Category (VC):

$$\text{Running Emissions}_{\text{VC}} = \text{Total VMT} \times \text{VMT Fraction}_{\text{VC}} \times \left[\sum_{\text{Speed}=5}^{70} \text{Speed Fraction}_{\text{Speed,VC}} \times \text{Running Emission Factor}_{\text{Speed,VC}} \right]$$

$$\text{Other Process Emissions}_{\text{VC}} = \text{Total VMT} \times \text{VMT Fraction}_{\text{VC}} \times \text{Process Emission Factors}_{\text{VC}}$$

Where:

$$VMT\ Fraction_{VC} = \frac{VMT_{\ VC}}{Total\ VMT}$$

$$Speed\ Fraction\ (\%\ VMT_{\ Speed}) = \frac{VMT_{\ Speed,\ VC}}{Total\ VMT_{\ VC}}$$

$$Running\ Emission\ Factor\ (g/mile) = \frac{Default\ Running\ Emissions_{\ Speed,\ VC}}{Default\ VMT_{\ Speed,\ VC}}$$

$$Process\ Emission\ Factor\ (g/mile) = \frac{Default\ Process\ Emissions_{\ VC}}{Default\ Total\ VMT_{\ VC}}$$

5.4 MODULE OVERVIEW

The EMFAC2011-SG module has three main inputs, and one optional input:

- Base Inputs
- VMT Distribution by Vehicle Category
- Speed Profiles
- Regional Scenario (optional)

The modeling parameters in all three inputs are defined at the sub-area level. In order to correlate the data in the three input sheets, the module identifies each case as a "Scenario". In order to process regional scenarios, users are required to classify all the "scenarios" into groups; the module processes each scenario individually and aggregates data by groups at the end of module execution.

<u>User Input #1: Base Inputs</u>

- This is the most important input for the module. It contains scenario definitions that include sub-area, calendar year and season, and selections for VMT profile (module defaults or user defined), VMT by Vehicle Category (module defaults or user defined), and Speed distribution type (module defaults or user defined) for each scenario.
    - If the "VMT profile" entry for the scenario is *User* defined, then the user also needs to enter the "New Total VMT" data (miles/day)
- *Input Variables:*
    a. Group (Integer) – Identifier for grouping/aggregating the scenarios
    b. Area (Text) – Denotes the Area/Region name for each group
    c. Scenario (Integer) – Index representing order of modeling scenario
    d. Sub-Area (Text)
        - Options: Selected from a list of 69 sub-areas (CoABDis or GAI)
    e. CalYr (Calendar year)
        - Options: Any calendar year between 1990 and 2035
    f. Season (Text)
        - Options: "Annual", "Summer", or "Winter"
    g. Title (Text)
    h. VMT Profile (Text)
        - Options: "Default" (module default) or "User"(user-defined)
    i. VMT by Vehicle Category (Text)
        - Options: "Default" (module default) or "User"(user-defined)
    j. Speed Profile (Text)
        - Options: "Default" (module default) or "User"(user-defined)

k. New Total VMT (Numeric) – Represents user-defined total daily VMT (miles/day)
    - If the scenario VMT Profile is designated as “Default”, then the “New Total VMT” cell can be empty (user entry for “New Total VMT” will be ignored)
    - If the scenario ‘VMT Profile’ and the ‘VMT by Vehicle Category’ are designated as “User” (user-defined), then the “New Total VMT” cell can be empty (the VMT from the “VMT by Vehicle Category” table will be used in the calculations; user entry for “New Total VMT” will be ignored)
    - If the scenario VMT Profile is designated as “User” (user-defined), and the ‘VMT by Vehicle Category’ is designated as “Default” (module default), only then the “New Total VMT” cell needs to be populated (here, the Default VMT fractions by Vehicle Class are used to apportion the User provided “New Total VMT”)

<u>User Input #2: VMT by Vehicle Category</u>

- Contains daily VMT data by Vehicle Category, and is a required input if the “VMT by Vehicle Category” entry for the scenario is *User* defined,
    - Data entered in the “VMT_by_VehCat” worksheet (in miles/day)
- *Input Variables:*
    a. Group
    b. Area
    c. Scenario
    d. Sub-Area
    e. CalYr
    f. Season
    g. Title
    h. Veh & Tech: EMFAC2011 Vehicle Category
    i. New VMT: Daily VMT by Vehicle Category

<u>User Input #3: Speed Profile</u>

- Contains the speed distribution by vehicle category (represented by % VMT in each speed bin for an average day), and is a required input if the “Speed Profile” entry for the scenario is *User* defined
    - Data entered in the “Speed_Profile” worksheet
- *Input Variables:*
    a. Group
    b. Area
    c. Scenario

d. Sub-Area
e. CalYr
f. Season
g. Title
h. Veh & Tech: EMFAC2011 Vehicle Category
i. EMFAC2007 Veh & Tech: EMFAC2007 Vehicle Category
j-w. 5MPH-70MPH: Speed Distribution (% VMT at each speed bin) for Speeds 5 - 70 MPH @ 5 MPH increments

<u>Optional User Input: Regional Scenarios</u>

- This is an optional input for modeling
  - Allows users to create Regional (multi-GAI) scenarios outside the module, and import them into the module
- *Input Variables:*
  a. Group
  b. Group Type
  c. Area
  d. Calendar Year
  e. Season
- *Regional Scenario Groups*
  - All scenarios that need to be aggregated together should be classified in the same "Group" in the Scenario_Base_Inputs table
    - So if the user needs to run "Statewide 2008 Annual" and "Statewide 2010 Annual", then user should create two "Groups"
      - All scenarios related to Statewide Sub-Areas that relate to 2008 Annual period in one group
      - All scenarios related to Statewide Sub-Areas that relate to 2010 Annual period in another group
    - All input tables (Scenario_Base_Inputs, Scenario_VMT_by_VehCat, and Scenario_Speed_Profiles) need to identify the Group, Area name, Scenario, Sub-Area, CalYr, Season, and Title for each Scenario
  - If users only need Sub-Area (GAI) runs, then
    - All scenarios should be grouped in the 'Default' Group # (1)
    - Area name category should be "-" [Area name "-" denotes that it is not part of any "regional" run, and these results will not be aggregated by Group (results will still be generated))
  - For any scenarios where Area name <> "-", outputs will be aggregated based on Group ID
  - Module allows Regional Scenario table to be imported using the "Load/Run Regional Scenarios (External Files)" option

5.5 ASSESSING CO2 BENEFITS FOR THE PAVLEY RULE AND LOW CARBON FUEL STANDARD

EMFAC2011-SG outputs carbon dioxide (CO2) emissions both with and without the Pavley Rule and Low Carbon Fuel Standard. The method for calculating benefits is consistent with the Pavley-I and LCFS post-processor used for analysis for SB375, and estimates benefits only for CO2, not criteria pollutants. The method requires applying correction factors to by model year emissions inventory output. Because EMFAC2011-SG runs on emissions inventories summed across model years, the correction was applied to CO2 emissions estimates when developing the input inventory files for SG. The correction is not embedded in the EMFAC2011-SG module code; it is embedded in the emissions data that are input to EMFAC2011-SG.

The calculation used to adjust CO2 emissions is very simple, and derived from assessments developed during staff regulatory support efforts for the two programs.

- Pavley-I: A clean-car standard to reduce greenhouse gas (GHG) emissions from new passenger vehicles (LDA-MDV) from 2009 through 2016 (reduction factors are presented in Table 5-1).
- Low Carbon Fuel Standard: A fuel standard that requires a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020 (reduction factors are presented in Table 5-2).

Table 5-1. Pavely I Reduction Factors

Model Year	LDA/LDT1	LDT2/MDV
2008 and older	0.00%	0.00%
2009	0.00%	0.90%
2010	3.50%	5.20%
2011	14.40%	12.00%
2012	25.30%	18.50%
2013	27.20%	19.90%
2014	28.80%	21.00%
2015	31.70%	23.00%
2016 +	34.30%	25.10%

Table 5-2. LCFS Reduction Factors

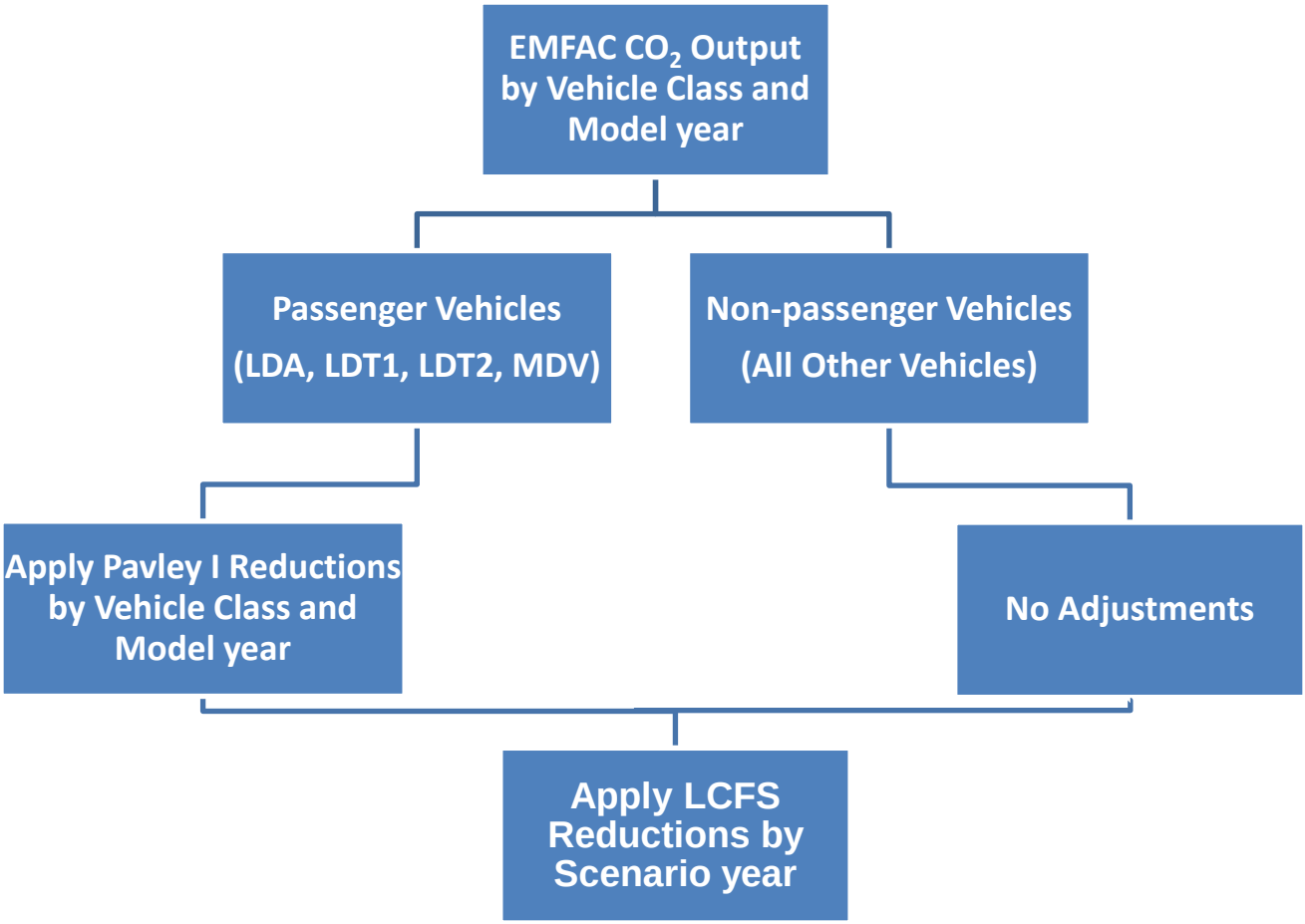
Calendar Year	Reduction Factor
2010	Reporting Only
2011	0.25%
2012	0.50%
2013	1.00%
2014	1.50%
2015	2.50%
2016	3.50%
2017	5.00%
2018	6.50%
2019	8.00%
2020 +	10.00%

LCFS reduction factors are based on the carbon intensity reductions required by the LCFS Regulation for transportation fuels used in California as provided from the Staff Report titled "California's Low Carbon Fuel Standard" dated October 2009.

Measured on a lifecycle basis, the carbon intensity represents the equivalent amount of carbon dioxide (CO_2e) emitted from each stage of producing, transporting, and using the fuel in a motor vehicle.

In order to calculate the CO2 emissions reductions from the two regulations, the following five-step process was used:

1. Extract CO_2 emission data from EMFAC by Vehicle Class and Model Year
2. Disaggregate the data into two groups:
    a. Passenger vehicles (LDA, LDT1, LDT2, MDV)
    b. Non-passenger vehicles (All other vehicles)
3. Apply the Pavley I reduction factors to the Passenger vehicles CO_2 emissions by vehicle class and model year
4. Aggregate the total CO_2 emissions for each vehicle class
5. Apply the Low Carbon Fuel Standard reduction factors to all vehicles based on the calendar year


EMFAC CO_2 Output by Vehicle Class and Model year
Passenger Vehicles (LDA, LDT1, LDT2, MDV)
Non-passenger Vehicles (All Other Vehicles)
Apply Pavley I Reductions by Vehicle Class and Model year
No Adjustments
Apply LCFS Reductions by Scenario year

5.6 MODULE OUTPUTS

The model outputs are denoted by “EMFAC2011-SG Output” and contain the Input Filename (e.g. if the Input Filename is “Sample”, the Output file will be called “EMFAC2011-SG Output - Sample”). The output files are created in Microsoft® Excel format (.xls), and contain the following variables:

- Group
- Area
- Scenario
- Sub-Area
- Calendar Year
- Season
- Title
- Veh & Tech
- EMFAC2007 Category
- Vehicle Population
- VMT (miles/average weekday)
- Trips (trips/average weekday)
- TOG Emissions (tons/average weekday)
- ROG Emissions (tons/average weekday)
- CO Emissions (tons/average weekday)
- NO_x Emissions (tons/average weekday)
- CO2 Emissions (tons/average weekday)
- CO2 Emissions (including Pavley I and LCFS adjustments) (tons/average weekday)
- PM_{10} Emissions (tons/average weekday)
- $PM_{2.5}$ Emissions (tons/average weekday)
- SO_x Emissions (tons/average weekday)
- Fuel Consumption – Gas and Diesel (1,000 gallons/average weekday; not adjusted for Pavley-I or LCFS)

The following process emissions are generated for each pollutant:

- All Pollutants - Running, Idling, Starting, and Total Exhaust
- ROG and TOG - Diurnal, Hot-Soak; Running and Resting Losses; Total
- PM10 and PM2.5 - Break wear, Tire wear, Total

The model appends the outputs for all scenarios defined in an input file in the same output file. The model also aggregates the results of all the scenarios that are classified in the same group, and appends the aggregated output for the group in the same file (along with the outputs for all sub-areas).

- For a single statewide regional case, the model will create a single Excel output table containing 70 sets of outputs (69 sub-area/GAI results, and 1 Statewide-totals result). The number of data rows will depend on number of Vehicle Categories applicable to each sub-area.

Table 5-3 provides sub-area classifications that can be run in EMFAC2011-SG. Table 5-4 provides vehicle categories classified by several vehicle category classification schemes that can be summarized using EMFAC2011.

Table 5-3. Sub-Area Classifications

Sub-Area	County	Air Basin	Air District	MPO
Alameda (SF)	Alameda	San Francisco Bay Area	Bay Area AQMD	MTC
Alpine (GBV)	Alpine	Great Basin Valley	Great Basin Unified APCD	
Amador (MC)	Amador	Mountain Counties	Amador County APCD	
Butte (SV)	Butte	Sacramento Valley	Butte County AQMD	BCAG
Calaveras (MC)	Calaveras	Mountain Counties	Calaveras County APCD	
Colusa (SV)	Colusa	Sacramento Valley	Colusa County APCD	
Contra Costa (SF)	Contra Costa	San Francisco Bay Area	Bay Area AQMD	MTC
Del Norte (NC)	Del Norte	North Coast	North Coast Unified AQMD	
El Dorado (LT)	El Dorado	Lake Tahoe	El Dorado County APCD	TMPO
El Dorado (MC)	El Dorado	Mountain Counties	El Dorado County APCD	SACOG
Fresno (SJV)	Fresno	San Joaquin Valley	San Joaquin Valley Unified APCD	COFCG
Glenn (SV)	Glenn	Sacramento Valley	Glenn County APCD	
Humboldt (NC)	Humboldt	North Coast	North Coast Unified AQMD	
Imperial (SS)	Imperial	Salton Sea	Imperial County APCD	SCAG
Inyo (GBV)	Inyo	Great Basin Valley	Great Basin Unified APCD	
Kern (MD)	Kern	Mojave Desert	Kern County APCD	KCOG
Kern (SJV)	Kern	San Joaquin Valley	San Joaquin Valley Unified APCD	KCOG
Kings (SJV)	Kings	San Joaquin Valley	San Joaquin Valley Unified APCD	KCAG
Lake (LC)	Lake	Lake County	Lake County APCD	
Lassen (NEP)	Lassen	Northeast Plateau	Lassen County APCD	
Los Angeles (MD)	Los Angeles	Mojave Desert	Antelope Valley APCD	SCAG
Los Angeles (SC)	Los Angeles	South Coast	South Coast AQMD	SCAG
Madera (SJV)	Madera	San Joaquin Valley	San Joaquin Valley Unified APCD	MCTC
Marin (SF)	Marin	San Francisco Bay Area	Bay Area AQMD	MTC
Mariposa (MC)	Mariposa	Mountain Counties	Mariposa County APCD	
Mendocino (NC)	Mendocino	North Coast	Mendocino County APCD	
Merced (SJV)	Merced	San Joaquin Valley	San Joaquin Valley Unified APCD	MCAG

Sub-Area	County	Air Basin	Air District	MPO
Modoc (NEP)	Modoc	Northeast Plateau	Modoc County APCD	
Mono (GBV)	Mono	Great Basin Valley	Great Basin Unified APCD	
Monterey (NCC)	Monterey	North Central Coast	Monterey Bay Unified APCD	AMBAG
Napa (SF)	Napa	San Francisco Bay Area	Bay Area AQMD	MTC
Nevada (MC)	Nevada	Mountain Counties	Northern Sierra AQMD	
Orange (SC)	Orange	South Coast	South Coast AQMD	SCAG
Placer (LT)	Placer	Lake Tahoe	Placer County APCD	TMPO
Placer (MC)	Placer	Mountain Counties	Placer County APCD	SACOG
Placer (SV)	Placer	Sacramento Valley	Placer County APCD	SACOG
Plumas (MC)	Plumas	Mountain Counties	Northern Sierra AQMD	
Riverside (MD/MDAQMD)	Riverside	Mojave Desert	Mojave Desert AQMD	SCAG
Riverside (MD/SCAQMD)	Riverside	Mojave Desert	South Coast AQMD	SCAG
Riverside (SC)	Riverside	South Coast	South Coast AQMD	SCAG
Riverside (SS)	Riverside	Salton Sea	South Coast AQMD	SCAG
Sacramento (SV)	Sacramento	Sacramento Valley	Sacramento Metropolitan AQMD	SACOG
San Benito (NCC)	San Benito	North Central Coast	Monterey Bay Unified APCD	AMBAG
San Bernardino (MD)	San Bernardino	Mojave Desert	Mojave Desert AQMD	SCAG
San Bernardino (SC)	San Bernardino	South Coast	South Coast AQMD	SCAG
San Diego (SD)	San Diego	San Diego	San Diego County APCD	SANDAG
San Francisco (SF)	San Francisco	San Francisco Bay Area	Bay Area AQMD	MTC
San Joaquin (SJV)	San Joaquin	San Joaquin Valley	San Joaquin Valley Unified APCD	SJCOG
San Luis Obispo (SCC)	San Luis Obispo	South Central Coast	San Luis Obispo County APCD	SLOCOG
San Mateo (SF)	San Mateo	San Francisco Bay Area	Bay Area AQMD	MTC
Santa Barbara (SCC)	Santa Barbara	South Central Coast	Santa Barbara County APCD	SBCAG
Santa Clara (SF)	Santa Clara	San Francisco Bay Area	Bay Area AQMD	MTC
Santa Cruz (NCC)	Santa Cruz	North Central Coast	Monterey Bay Unified APCD	AMBAG
Shasta (SV)	Shasta	Sacramento Valley	Shasta County AQMD	SCRTPA
Sierra (MC)	Sierra	Mountain Counties	Northern Sierra AQMD	

Sub-Area	County	Air Basin	Air District	MPO
Siskiyou (NEP)	Siskiyou	Northeast Plateau	Siskiyou County APCD	
Solano (SF)	Solano	San Francisco Bay Area	Bay Area AQMD	MTC
Solano (SV)	Solano	Sacramento Valley	Yolo/Solano AQMD	MTC
Sonoma (NC)	Sonoma	North Coast	Northern Sonoma County APCD	MTC
Sonoma (SF)	Sonoma	San Francisco Bay Area	Bay Area AQMD	MTC
Stanislaus (SJV)	Stanislaus	San Joaquin Valley	San Joaquin Valley Unified APCD	StanCOG
Sutter (SV)	Sutter	Sacramento Valley	Feather River AQMD	SACOG
Tehama (SV)	Tehama	Sacramento Valley	Tehama County APCD	
Trinity (NC)	Trinity	North Coast	North Coast Unified AQMD	
Tulare (SJV)	Tulare	San Joaquin Valley	San Joaquin Valley Unified APCD	TCAG
Tuolumne (MC)	Tuolumne	Mountain Counties	Tuolumne County APCD	
Ventura (SCC)	Ventura	South Central Coast	Ventura County APCD	SCAG
Yolo (SV)	Yolo	Sacramento Valley	Yolo/Solano AQMD	SACOG
Yuba (SV)	Yuba	Sacramento Valley	Feather River AQMD	SACOG

Table 5-4. EMFAC2011 Vehicle Category Classifications

Index	EMFAC2011 Veh & Tech	EMFAC2011 Vehicle	Source	EMFAC2007 Vehicle	EMFAC2007 Veh & Tech	CTEMFAC Vehicle
1	LDA - DSL	LDA	EMFAC2011-LDV	LDA	LDA - DSL	Non-Trucks
2	LDA - GAS	LDA	EMFAC2011-LDV	LDA	LDA - GAS	Non-Trucks
3	LDT1 - DSL	LDT1	EMFAC2011-LDV	LDT1	LDT1 - DSL	Non-Trucks
4	LDT1 - GAS	LDT1	EMFAC2011-LDV	LDT1	LDT1 - GAS	Non-Trucks
5	LDT2 - DSL	LDT2	EMFAC2011-LDV	LDT2	LDT2 - DSL	Non-Trucks
6	LDT2 - GAS	LDT2	EMFAC2011-LDV	LDT2	LDT2 - GAS	Non-Trucks
7	LHD1 - DSL	LHD1	EMFAC2011-LDV	LHDT1	LHDT1 - DSL	Trucks
8	LHD1 - GAS	LHD1	EMFAC2011-LDV	LHDT1	LHDT1 - GAS	Trucks
9	LHD2 - DSL	LHD2	EMFAC2011-LDV	LHDT2	LHDT2 - DSL	Trucks
10	LHD2 - GAS	LHD2	EMFAC2011-LDV	LHDT2	LHDT2 - GAS	Trucks
11	MCY - GAS	MCY	EMFAC2011-LDV	MCY	MCY - GAS	Non-Trucks
12	MDV - DSL	MDV	EMFAC2011-LDV	MDV	MDV - DSL	Trucks
13	MDV - GAS	MDV	EMFAC2011-LDV	MDV	MDV - GAS	Trucks
14	MH - DSL	MH	EMFAC2011-LDV	MH	MH - DSL	Non-Trucks
15	MH - GAS	MH	EMFAC2011-LDV	MH	MH - GAS	Non-Trucks
16	T6 Ag - DSL	T6 Ag	EMFAC2011-HDV	MHDT	MHDT - DSL	Trucks
17	T6 CAIRP heavy - DSL	T6 CAIRP heavy	EMFAC2011-HDV	MHDT	MHDT - DSL	Trucks

Index	EMFAC2011 Veh & Tech	EMFAC2011 Vehicle	Source	EMFAC2007 Vehicle	EMFAC2007 Veh & Tech	CTEMFAC Vehicle
18	T6 CAIRP small - DSL	T6 CAIRP small	EMFAC2011-HDV	MHDT	MHDT - DSL	Trucks
19	T6 instate construction heavy - DSL	T6 instate construction heavy	EMFAC2011-HDV	MHDT	MHDT - DSL	Trucks
20	T6 instate construction small - DSL	T6 instate construction small	EMFAC2011-HDV	MHDT	MHDT - DSL	Trucks
21	T6 instate heavy - DSL	T6 instate heavy	EMFAC2011-HDV	MHDT	MHDT - DSL	Trucks
22	T6 instate small - DSL	T6 instate small	EMFAC2011-HDV	MHDT	MHDT - DSL	Trucks
23	T6 OOS heavy - DSL	T6 OOS heavy	EMFAC2011-HDV	MHDT	MHDT - DSL	Trucks
24	T6 OOS small - DSL	T6 OOS small	EMFAC2011-HDV	MHDT	MHDT - DSL	Trucks
25	T6 Public - DSL	T6 Public	EMFAC2011-HDV	MHDT	MHDT - DSL	Trucks
26	T6 utility - DSL	T6 utility	EMFAC2011-HDV	MHDT	MHDT - DSL	Trucks
27	T6TS - GAS	T6TS	EMFAC2011-LDV	MHDT	MHDT - GAS	Trucks
28	T7 Ag - DSL	T7 Ag	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks
29	T7 CAIRP - DSL	T7 CAIRP	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks
30	T7 CAIRP construction - DSL	T7 CAIRP construction	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks
31	T7 NNOOS - DSL	T7 NNOOS	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks
32	T7 NOOS - DSL	T7 NOOS	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks
33	T7 other port - DSL	T7 other port	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks
34	T7 POAK - DSL	T7 POAK	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks

Index	EMFAC2011 Veh & Tech	EMFAC2011 Vehicle	Source	EMFAC2007 Vehicle	EMFAC2007 Veh & Tech	CTEMFAC Vehicle
35	T7 POLA - DSL	T7 POLA	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks
36	T7 Public - DSL	T7 Public	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks
37	T7 Single - DSL	T7 Single	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks
38	T7 single construction - DSL	T7 single construction	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks
39	T7 SWCV - DSL	T7 SWCV	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks
40	T7 tractor - DSL	T7 tractor	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks
41	T7 tractor construction - DSL	T7 tractor construction	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks
42	T7 utility - DSL	T7 utility	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks
43	T7IS - GAS	T7IS	EMFAC2011-LDV	HHDT	HHDT - GAS	Trucks
44	PTO - DSL	PTO	EMFAC2011-HDV	HHDT	HHDT - DSL	Trucks
45	SBUS - DSL	SBUS	EMFAC2011-HDV	SBUS	SBUS - DSL	Non-Trucks
46	SBUS - GAS	SBUS	EMFAC2011-LDV	SBUS	SBUS - GAS	Non-Trucks
47	UBUS - DSL	UBUS	EMFAC2011-LDV	UBUS	UBUS - DSL	Non-Trucks
48	UBUS - GAS	UBUS	EMFAC2011-LDV	UBUS	UBUS - GAS	Non-Trucks
49	Motor Coach - DSL	Motor Coach	EMFAC2011-HDV	OBUS	OBUS - DSL	Non-Trucks
50	OBUS - GAS	OBUS	EMFAC2011-LDV	OBUS	OBUS - GAS	Non-Trucks
51	All Other Buses - DSL	All Other Buses	EMFAC2011-HDV	OBUS	OBUS - DSL	Non-Trucks

6 OVERVIEW OF INCREMENTAL CHANGES

EMFAC2011 emissions estimates are the sum of emissions estimated using the EMFAC2011-LDV and EMFAC2011-HD modules. While there have been many improvements to the EMFAC modeling system for EMFAC2011, overall activity and emissions are generally similar to those estimated using EMFAC2007.

6.1 POPULATION

To understand the differences in estimated population between EMFAC2007 and EMFAC2011, it is useful to recall differences between the population data in the two models. EMFAC2011 was updated with 2009 DMV data and 2010 commercial diesel truck population estimates. Both of these population data sources are impacted by the 2007-2009 economic recession, which substantially reduced new vehicle sales, and to a limited degree, vehicle populations. In contrast, EMFAC2007 contained 2005 population data; 2009 population estimates were forecasted using VMT forecasts provided by regional transportation agencies prior to the EMFAC2007 release.

EMFAC2007 contained 2000-2005 DMV data and backcast populations prior to 2000. The DMV data input to EMFAC contained anomalies in the 2004 and 2005 data that led the 2004 population to be underestimated and the 2005 population to be overestimated, primarily for heavy-duty trucks. The inconsistency in population and activity data in EMFAC2007 led to an increase in estimated population in 2005, coupled with an estimated decrease in population between 2005 and 2006 in most areas, primarily but not exclusively for heavy-duty trucks.

EMFAC2011 contains 2009 DMV data in EMFAC2011-LDV, and 2010 estimated truck populations developed from multiple data sources in EMFAC2011-HD. The process of using of multiple data sources to model populations in the HD module started with the Statewide Truck and Bus Rule inventory, and was developed specifically to correct for anomalies in truck data provided by DMV in their registration database. 1990-2008 calendar year populations are backcast using historical regional VMT trends in EMFAC2011. The anomaly present in EMFAC2007 has been removed for EMFAC2011.

Population comparisons are shown in Figure 6-1, Figure 6-2, and Figure 6-3 for Statewide, South Coast, and San Joaquin Valley respectively.

Figure 6-1. Statewide Population: EMFAC2011 vs EMFAC2007

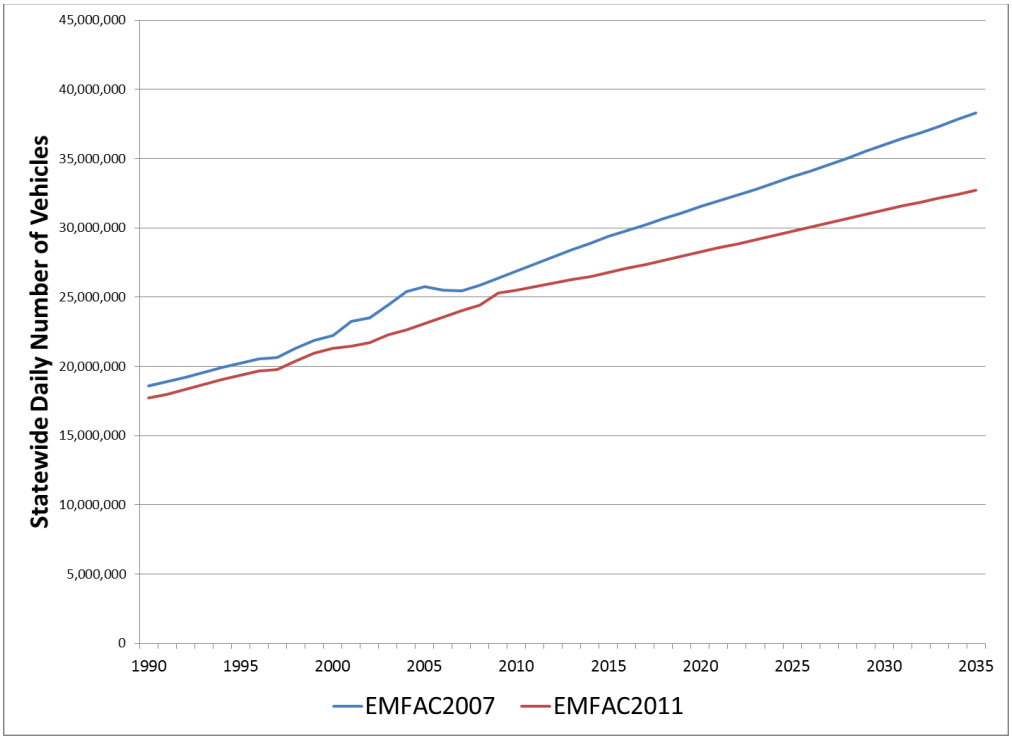


Figure 6-2. South Coast Population: EMFAC2011 vs EMFAC2007

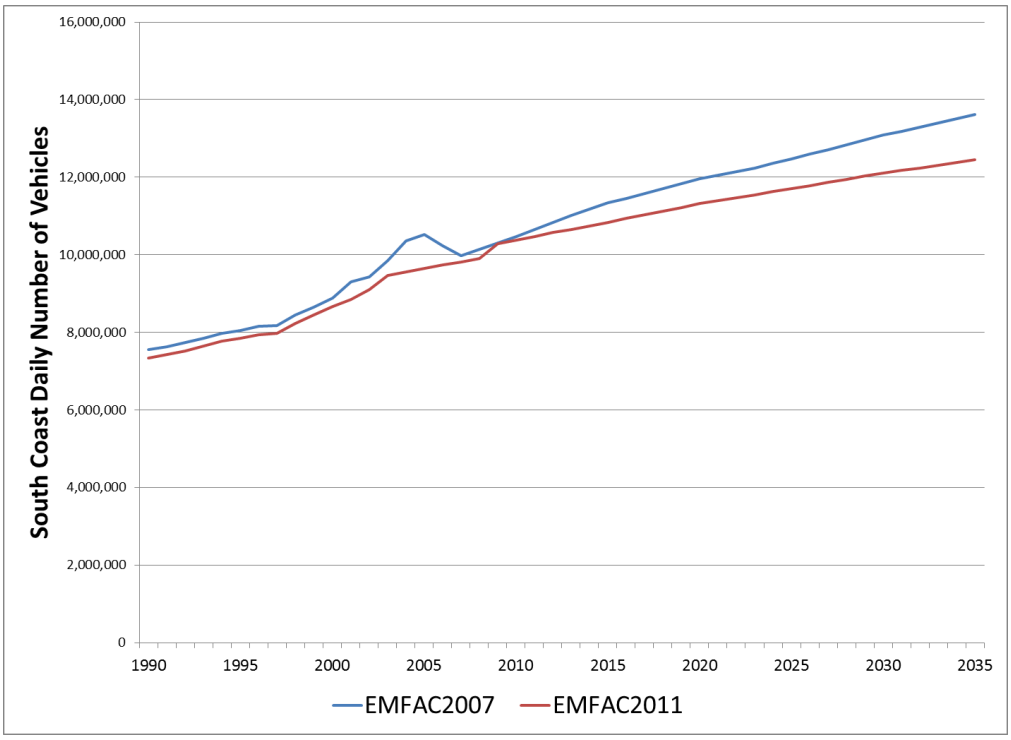
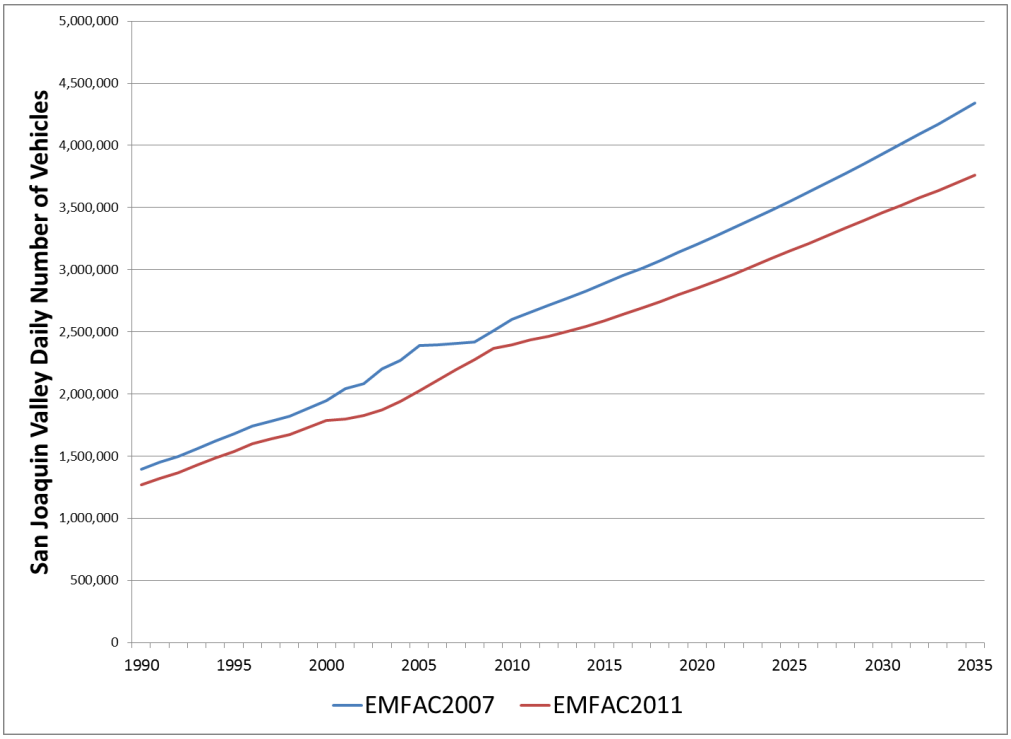


Figure 6-3 San Joaquin Valley Population: EMFAC2011 vs EMFAC2007



6.2 ACTIVITY

EMFAC2011 contains VMT estimates that have been updated by regional transportation planning agencies relative to what was submitted for EMFAC2007. In evaluating the data, long term forecasted VMT is lower in the new data than the submittals for EMFAC2007, which is reflective of the impact of the economic recession. However the full immediate impact of the recession is not generally reflected in the submitted activity data, and not all agencies provided updated data. As a result, on a statewide basis, VMT estimates from 1990-2008 are very similar between EMFAC2011 and EMFAC2007, with the exception of the population anomaly in EMFAC2007 discussed above. This is shown in Figure 6-4. Both South Coast and San Joaquin Valley VMT estimates are slightly lower in 2009, which results in a slightly lower VMT backcast between 1990 and 2008. The EMFAC2007 anomaly in VMT in both South Coast and the San Joaquin Valley has been corrected in EMFAC2011. Forecast VMT is slightly lower due to the recession. This is shown in Figure 6-5 and Figure 6-6.

Figure 6-4. Statewide VMT Estimates: EMFAC2011 vs. EMFAC2007

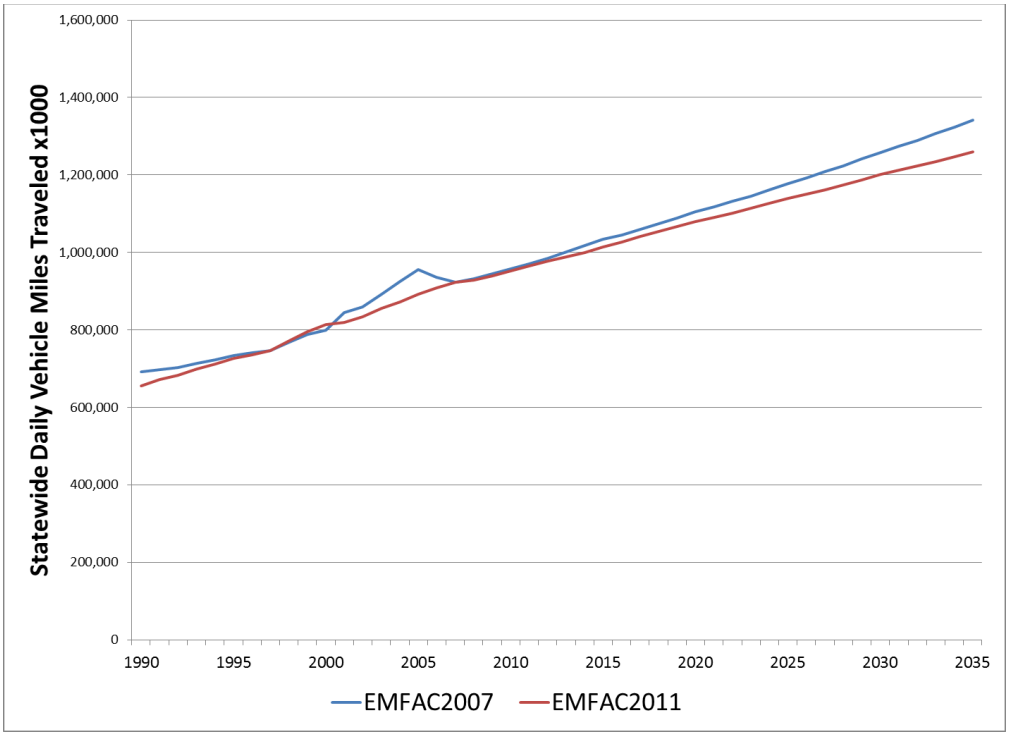


Figure 6-5. South Coast VMT Estimates: EMFAC2011 vs. EMFAC2007

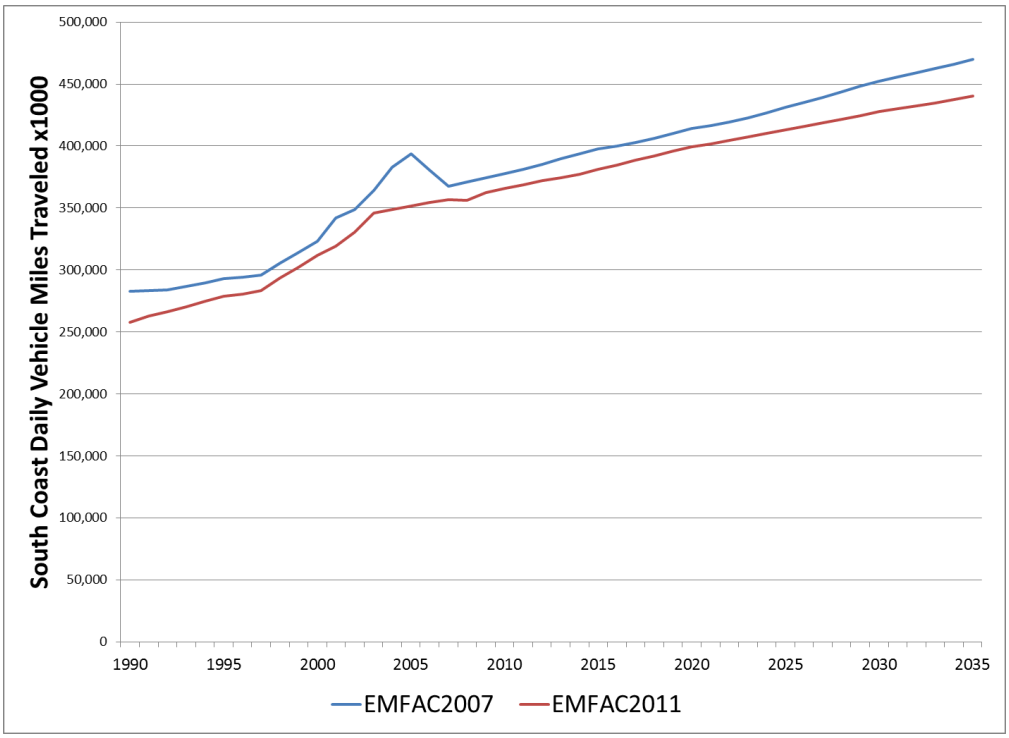
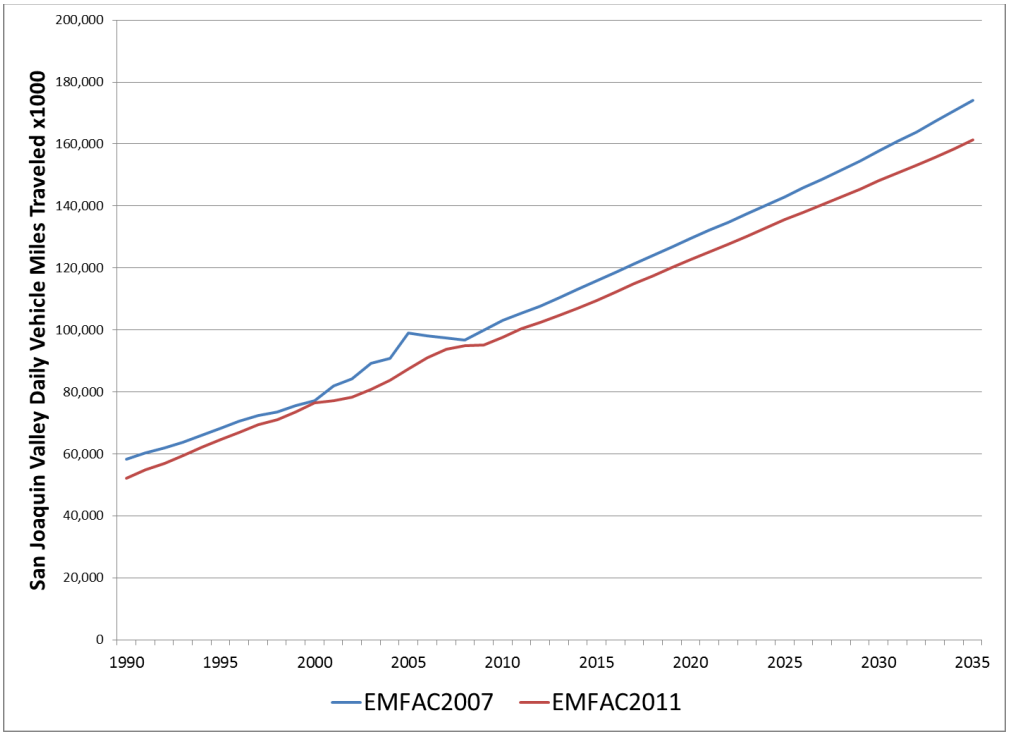


Figure 6-6. San Joaquin Valley VMT Estimates: EMFAC2011 vs. EMFAC2007



6.3 CARBON DIOXIDE EMISSIONS

Carbon dioxide emissions estimates are reduced by reductions in VMT that occur regionally as a result of updated VMT estimates, and as a result of minor improvements to CO2 emission rates described in Sections 3.3.3.1, 3.3.3.2 and 4.6.3. Estimated CO2 emissions are shown in Figure 6-7, Figure 6-8, and Figure 6-9 for Statewide, South Coast, and the San Joaquin Valley respectively.

All three charts show the significant impact that the Pavley-I Clean Car Standards and the Low Carbon Fuel Standard are projected to have in reducing fossil carbon dioxide emissions in the future. All three charts also show that the population anomaly in EMFAC2007 led to an anomaly in CO2 emissions which has been corrected in EMFAC2011.

In the San Joaquin Valley, the estimated heavy-duty truck VMT fraction relative to VMT from all vehicles decreased between EMFAC2007 and EMFAC2011. As a result, the projected light duty vehicle VMT increased between EMFAC2007 and EMFAC2011. Because light duty vehicles are more fuel efficient than heavy-duty vehicles, this led to an incremental decrease in projected CO2 emissions in the San Joaquin Valley per mile driven.

Figure 6-7. Statewide CO2 Emissions: EMFAC2011 vs. EMFAC2007

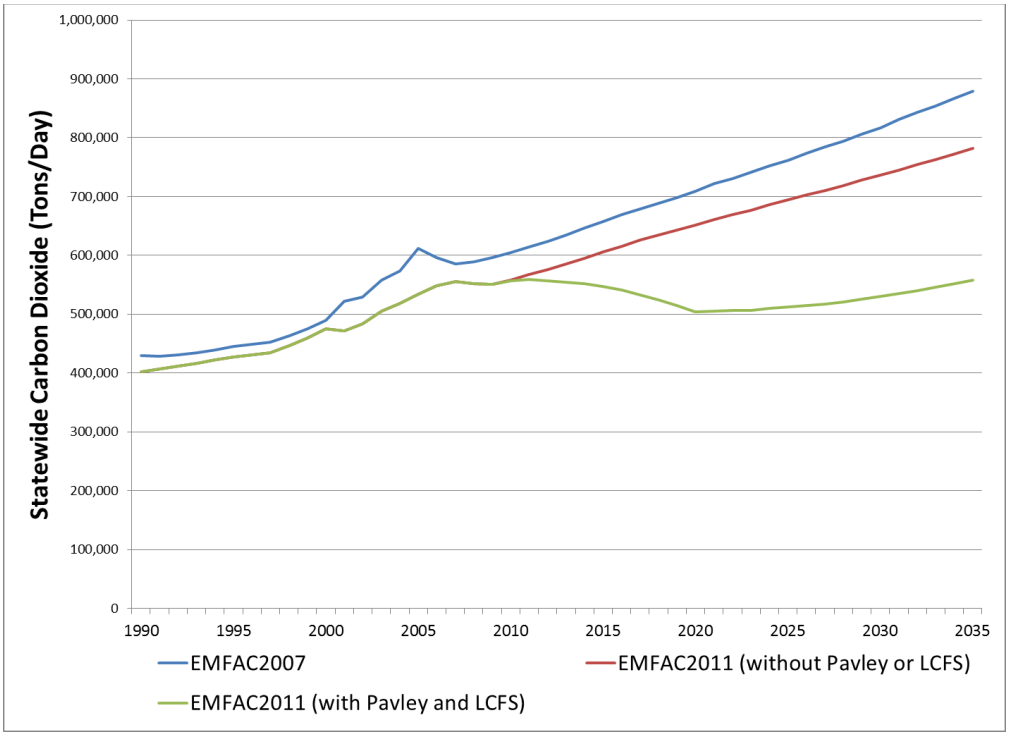


Figure 6-8. South Coast CO2 Emissions: EMFAC2011 vs EMFAC2007

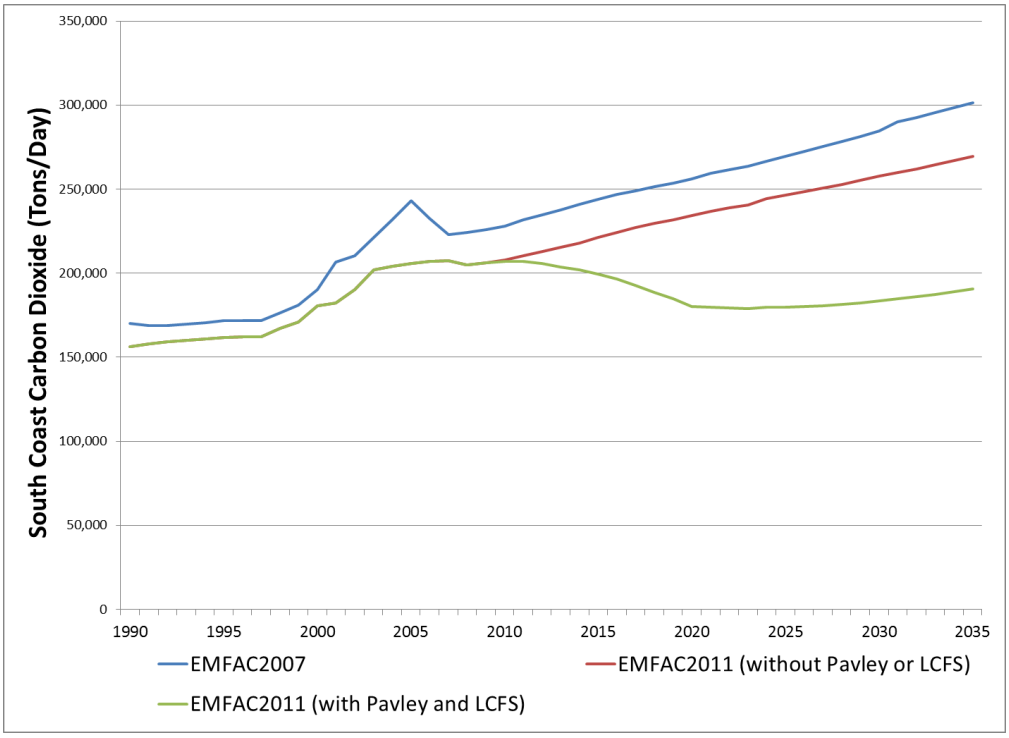
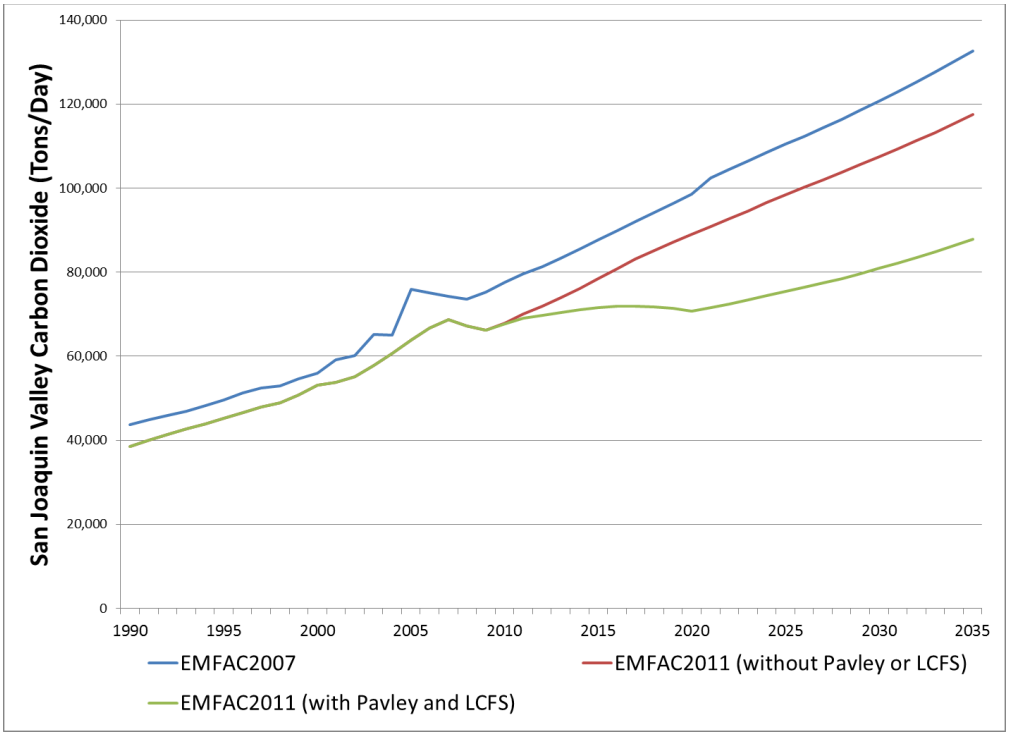


Figure 6-9. San Joaquin Valley CO2 Emissions: EMFAC2011 vs. EMFAC2007



6.4 NOX AND ROG EMISSIONS

NOx and ROG emissions show the continuing downward trend caused by decades of ARB rules designed to reduce emissions from cars and trucks. Statewide results are shown in Figure 6-10 and Figure 6-11 below. Several trends are apparent. The NOx anomaly caused by heavy-duty truck population estimates in EMFAC2007 is corrected for EMFAC2011. NOx emissions are driven by trucks and are lower due in part to the impact of the recession on heavy-duty truck emissions, the impact of ARB rules designed to reduce NOx emissions from diesel trucks and buses, and the impact of reduced out-year forecasts for truck VMT. ROG emissions are driven by gasoline vehicles, and are marginally lower due to improvements in emission rates, updates to vehicle survival algorithms that have the impact of slightly increasing vehicle turnover, and updated temperature and relative humidity estimates. These changes are discussed in Sections 3.3.3.3, 3.3.3.4, 3.3.4.2, and 3.3.4.4.

Figure 6-10. Statewide NOx Emissions: EMFAC2011 vs. EMFAC2007

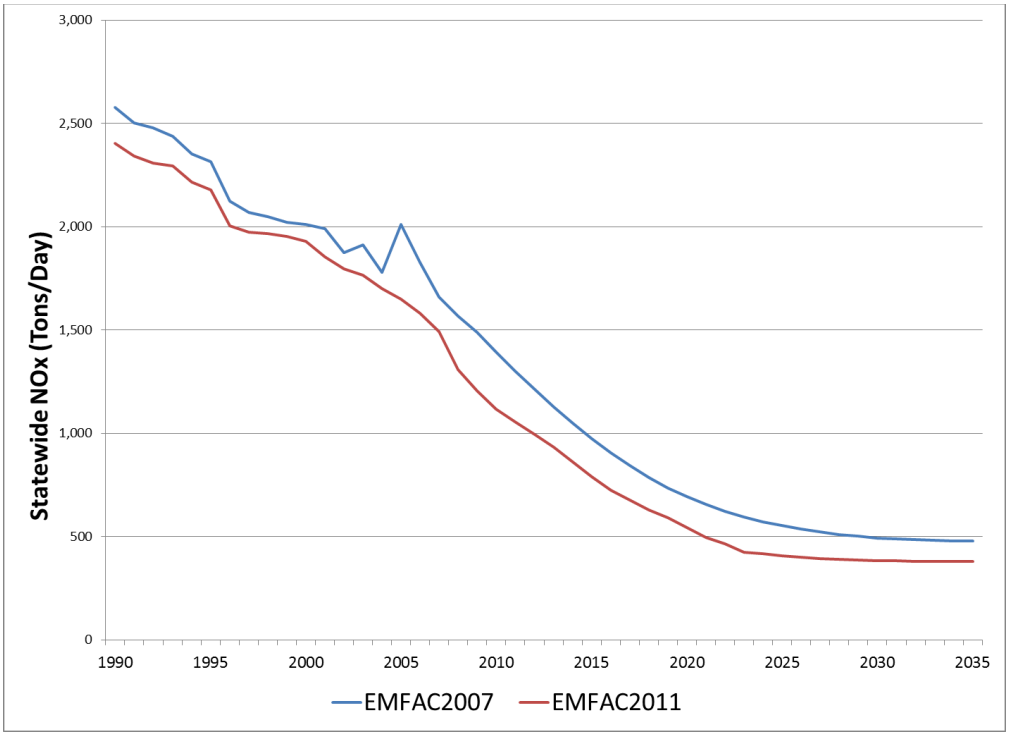
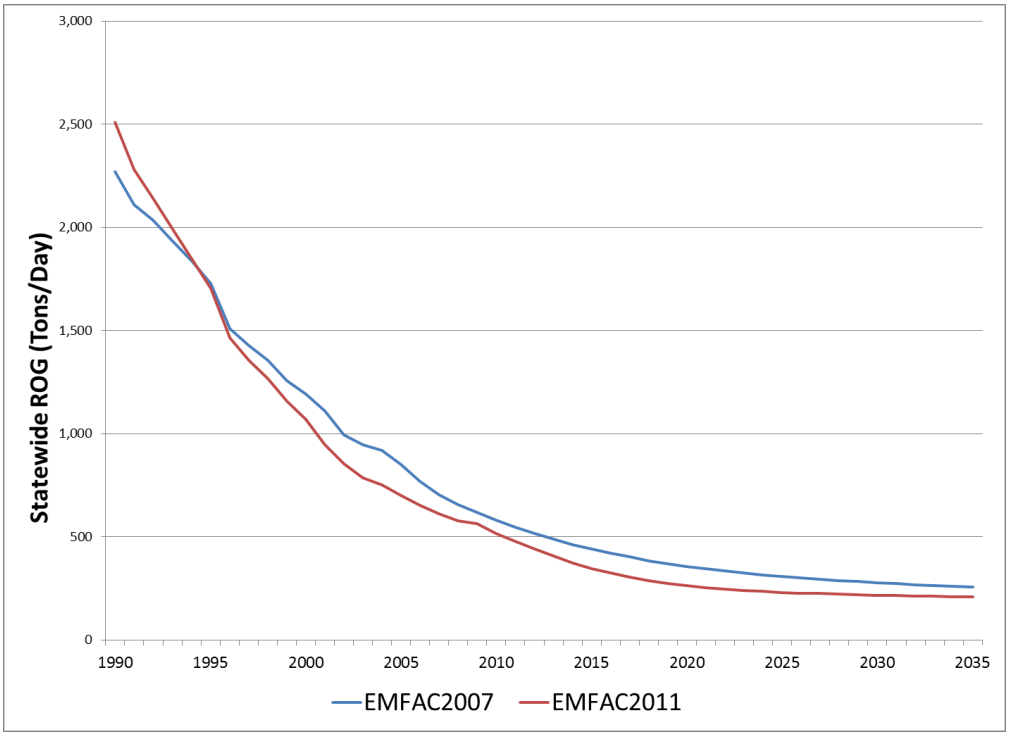


Figure 6-11. Statewide ROG Emissions: EMFAC2011 vs EMFAC2007



Results for the South Coast Air Basin are shown in Figure 6-12 and Figure 6-13. Results are very similar in the South Coast as on a Statewide basis, and differences between EMFAC2011 and EMFAC2007 are caused by the same factors discussed above.

Results for the San Joaquin Valley are shown in Figure 6-14 for NOx. In the figure NOx emissions are flat between 1990 and 2005, which is different than the trend seen Statewide or in the South Coast. These trends differ because the San Joaquin Valley is less densely populated and so historically cars, which used to have higher NOx emission rates but are today well controlled, played less of a role in overall San Joaquin Valley emissions than they did in South Coast or Statewide. NOx emissions are reduced in the San Joaquin Valley due to the penetration of newer trucks with cleaner technologies that is caused both by natural turnover and the Statewide Truck and Bus rule. Figure 6-15 shows ROG emissions in the San Joaquin Valley. ROG emissions are dominated by cars and so emissions in the San Joaquin Valley are much lower in total than in the South Coast. The reduction in emissions between EMFAC2011 and EMFAC2007 is caused by the same factors affecting differences in statewide ROG emissions.

Figure 6-12. South Coast NOx Emissions: EMFAC2011 vs EMFAC2007

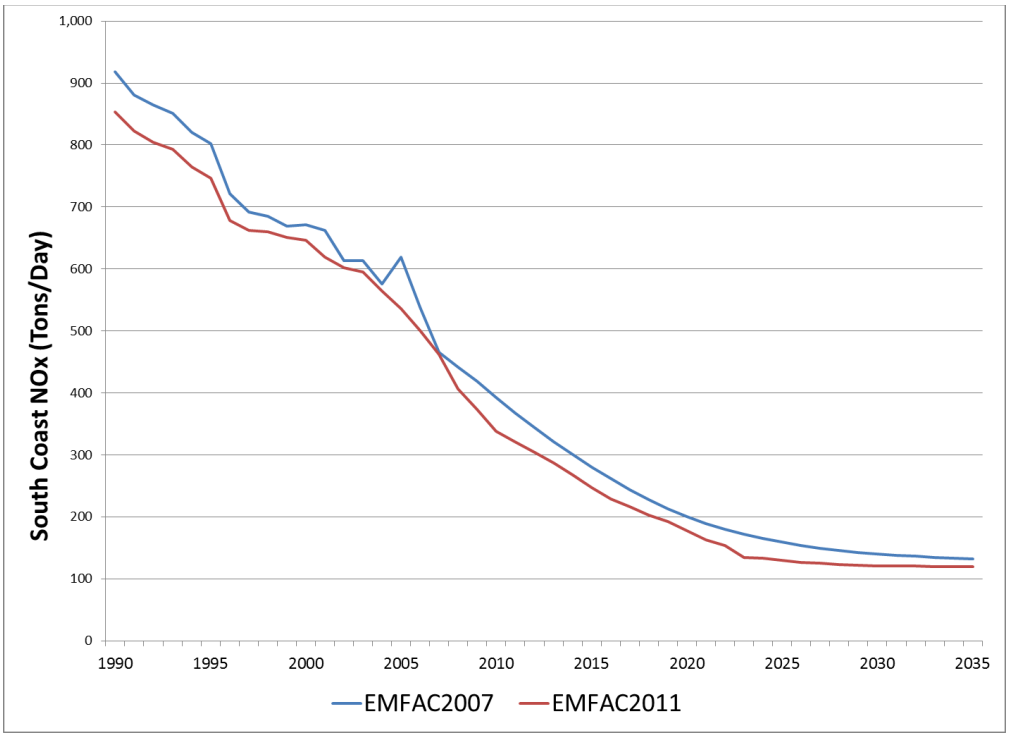


Figure 6-13. South Coast ROG Emissions: EMFAC2011 vs. EMFAC2007

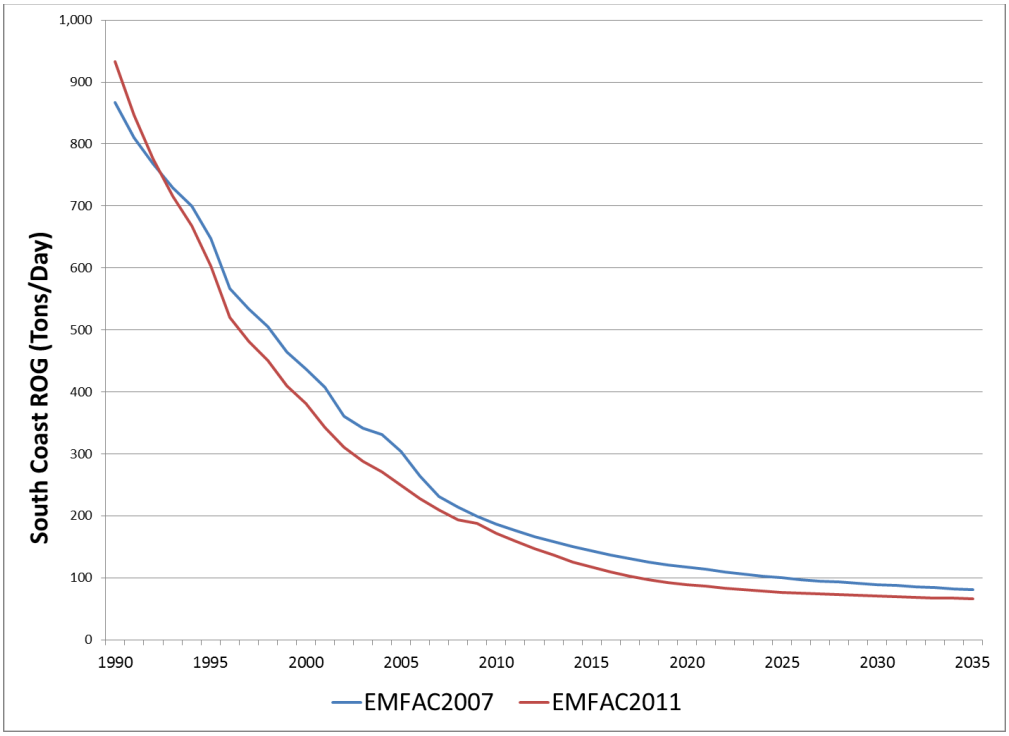


Figure 6-14. San Joaquin Valley NOx Emissions: EMFAC2011 vs. EMFAC2007

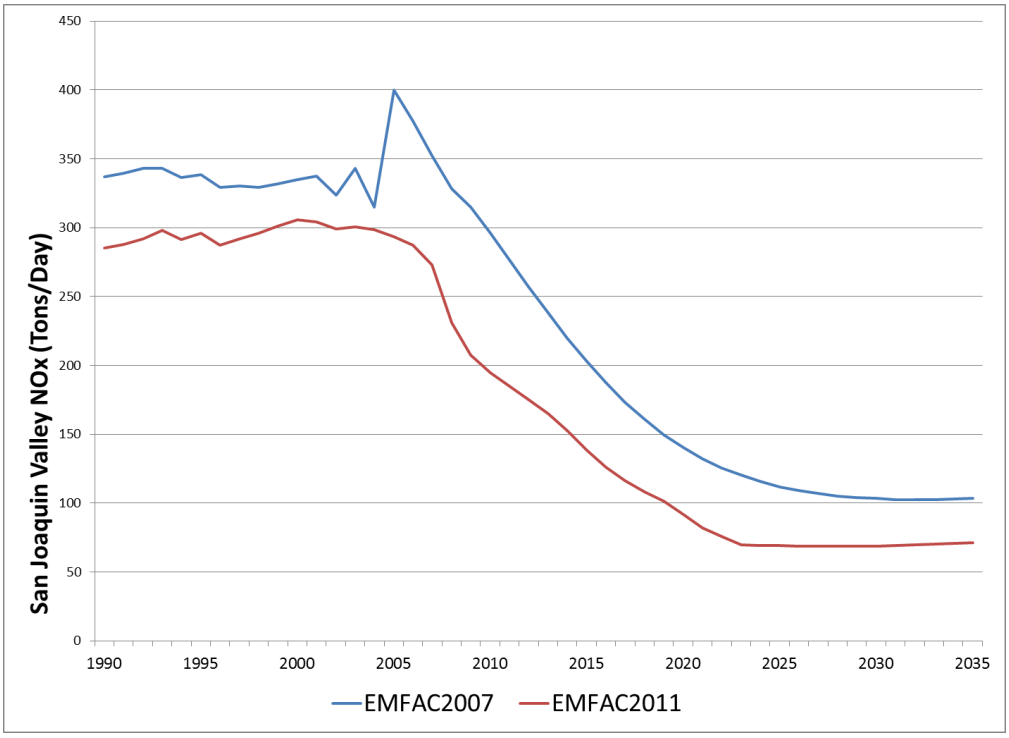
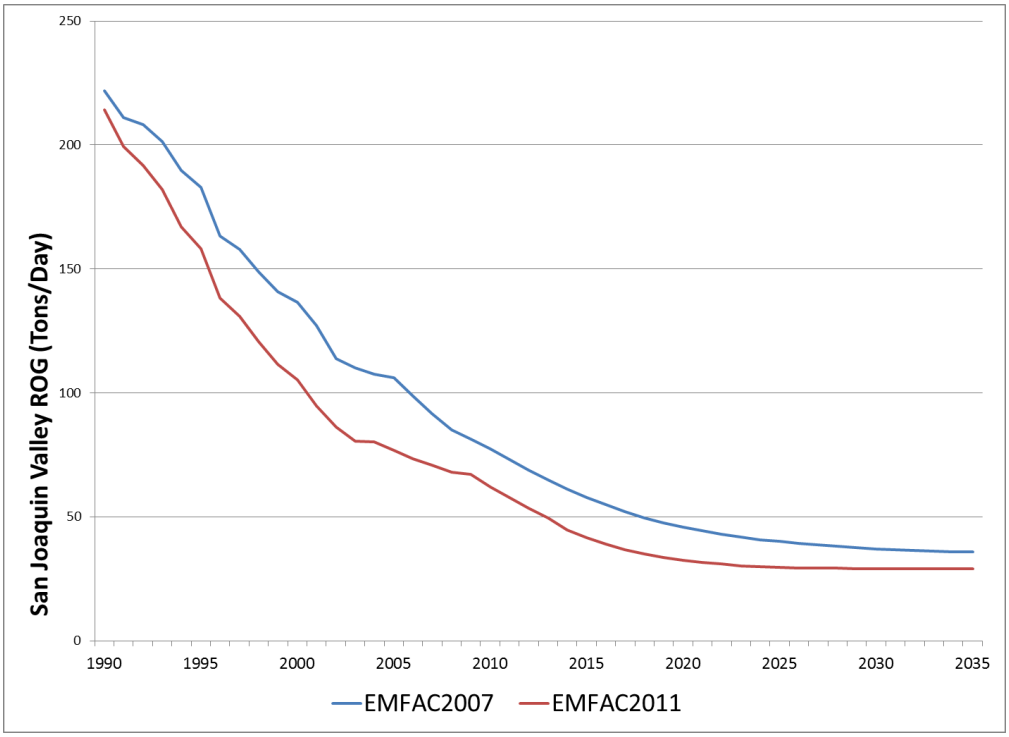


Figure 6-15. San Joaquin Valley ROG Emissions: EMFAC2011 vs. EMFAC2007



6.5 PM2.5 EMISSIONS

Statewide PM2.5 emissions are shown in Figure 6-16. Backcast emissions are higher because of new test data suggesting exhaust PM2.5 emission factors were higher for older vehicles historically than thought in EMFAC2007, which is discussed in Section 3.3.3.6. The anomaly in DMV population data led to an artificial increase in PM2.5 emissions in 2005 in EMFAC2007, which has been corrected in EMFAC2011. Forecast PM2.5 emissions are lower in EMFAC2011 than in EMFAC2007 because of the Statewide Truck and Bus Rule that drastically reduces diesel PM2.5 emissions from diesel trucks,and updates to future gasoline vehicle PM emission rates. Those decreases are partially offset by increases to brake wear PM emission rates.

Trends in South Coast, shown in Figure 6-17 are similar to those seen Statewide and caused by the same factors. Forecasted trends in the San Joaquin Valley, shown in Figure 6-18, are similar, however backcast emissions are lower in EMFAC2011 than in EMFAC2007 because EMFAC2011 assumes less total truck VMT than assumed in EMFAC2007, which has the effect of reducing PM2.5 emissions historically in the region.

Figure 6-16. Statewide PM2.5 Emissions: EMFAC2011 vs. EMFAC2007

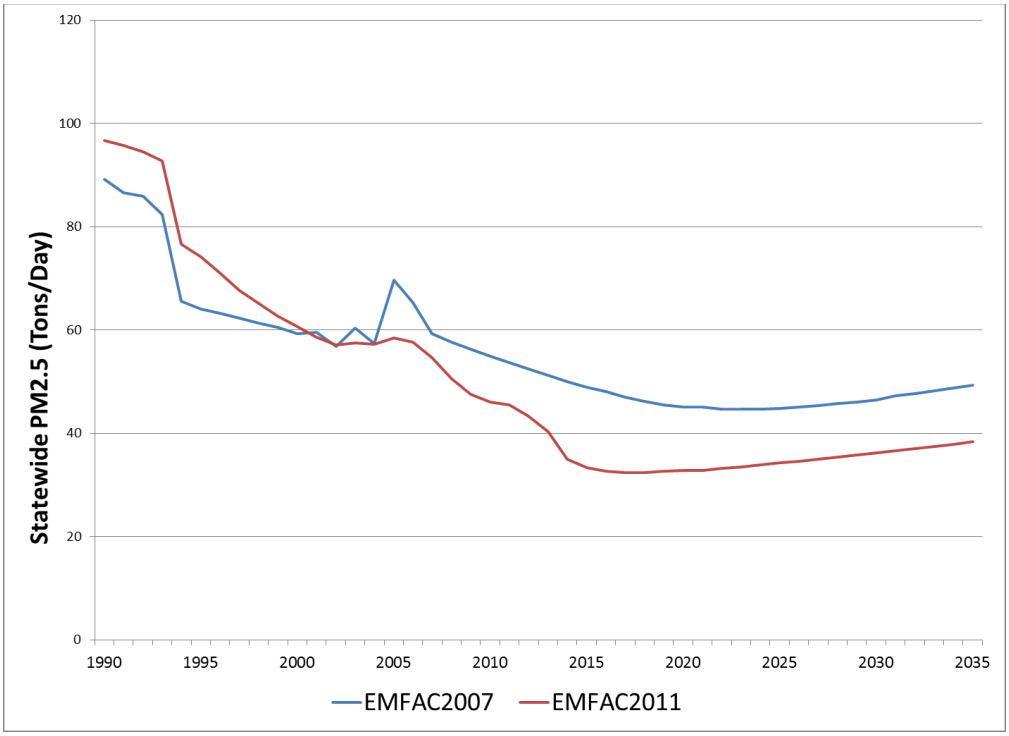


Figure 6-17. South Coast PM2.5 Emissions: EMFAC2011 vs. EMFAC2007

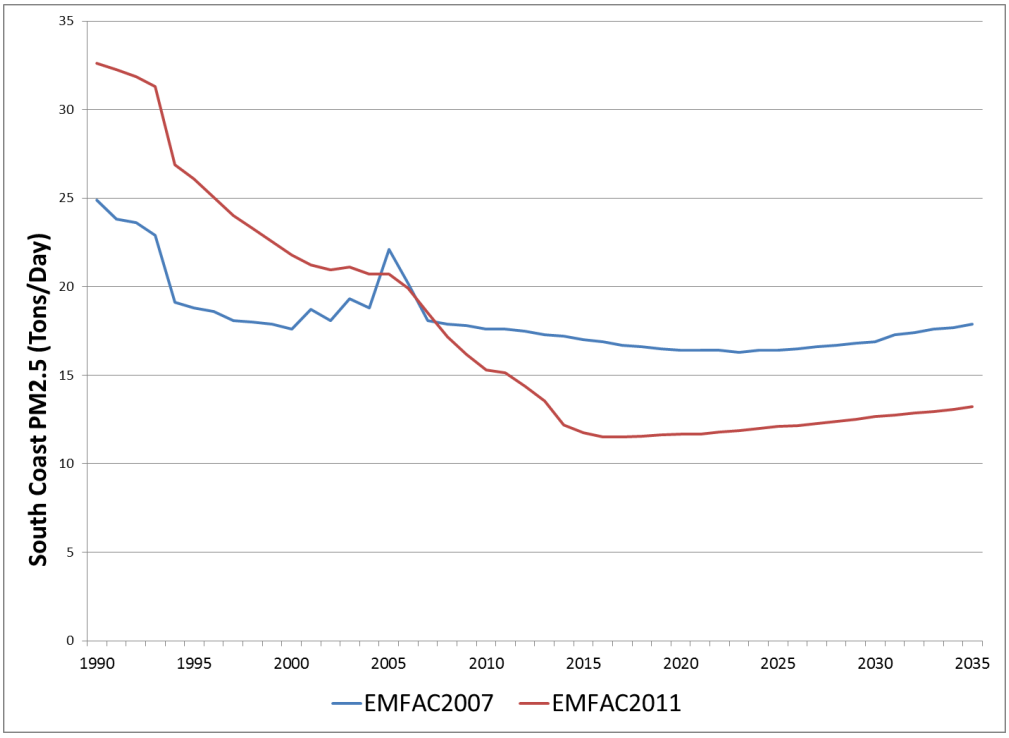
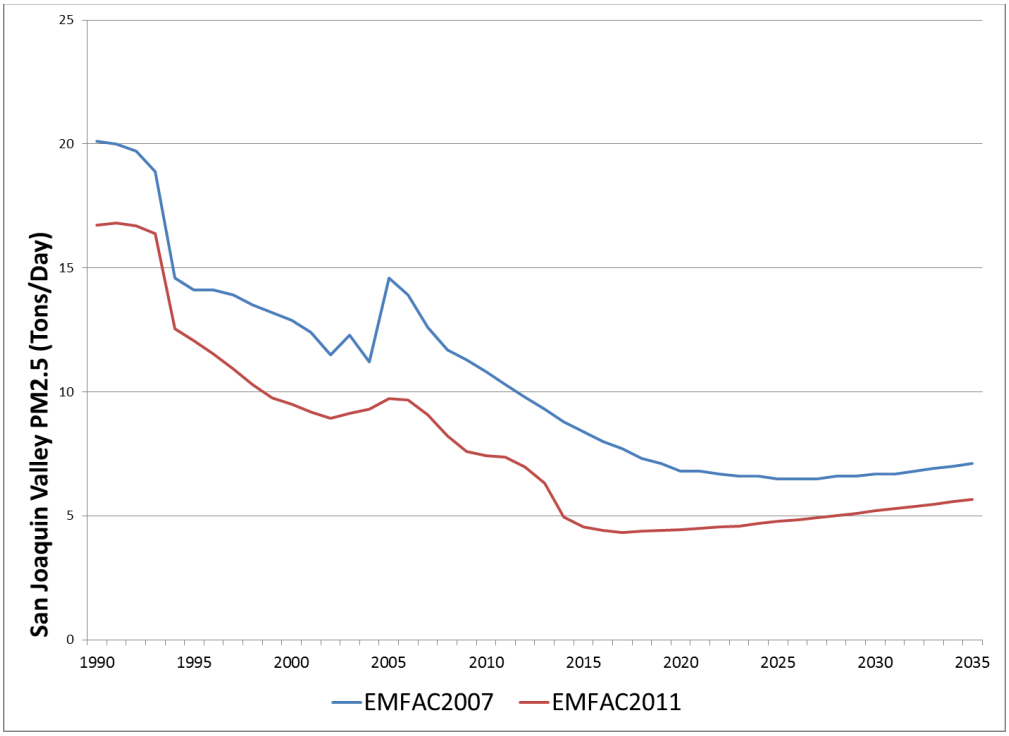


Figure 6-18. San Joaquin Valley PM2.5 Emissions: EMFAC2011 vs. EMFAC2007.



For detailed emissions impacts of each incremental change on selected air basins and calendar years of the State, see Section 12.

7 APPENDIX: UPDATING VEHICLE MILES TRAVELED AND SPEED DISTRIBUTIONS IN EMFAC2011

This section documents the final revisions to the motor vehicle activity data used EMFAC 2011. Vehicle miles traveled (VMT) and speed distributions were submitted by regional transportation planning agencies (RTPAs) in calendar year 2010 and early 2011 for five regions: South Coast region, the San Francisco Bay Area region, San Diego County, San Joaquin Valley region and Sacramento region. In addition to discussing the most recent activity data submitted by the TPAs, the memo recaps key information and issues from staff's review of TPA activity data submitted in 2010 and early 2011. Emissions impacts of the updated data are available in Sections 12.9 and 12.13.

ARB maintains EMFAC and periodically updates the model with new data. RTPAs are generally responsible for estimating vehicle miles and speed of travel in their respective regions. ARB relies on RTPAs, as well as the Department of Motor Vehicles (DMV), and the Bureau of Automotive Repair (BAR), for vehicle activity data in EMFAC. ARB solicited the data most recently adopted or proposed for adoption, prior to developing EMFAC 2011 model updates. In the absence of recent RTPA data, the model contains default speed distributions and estimated VMT as a function of vehicle population (from DMV) and mileage accrual rates (from BAR). Typically, for heavy-duty vehicles default speed distributions are based on instrumented vehicle studies. In some areas of the state, the VMT and speed distributions contained in EMFAC 2011 were carried forward from EMFAC 2007.

The years of VMT data provided by local RTPAs are summarized in Table 7-1. ARB processed base year vehicle population data from the California Department of Motor Vehicles (DMV) for year 2009. The model matched for 2009 population and VMT by allowing the accrual rate to float. The base years provided by RTPAs are also listed in Table 7-1.

Table 7-1. VMT and Speed Updated by Area

Agency	County	GAI	Base Year	Calendar Years	Received
SCAG	Ventura	58	2003	2008, 2009, 2010, 2012, 2014, 2018, 2020, 2023, 2030, 2035	Oct 2010
	Los Angeles	59	2003	2008, 2009, 2010, 2012, 2014, 2018, 2020, 2023, 2030, 2035	
	Orange	60	2003	2008, 2009, 2010, 2012, 2014, 2018, 2020, 2023, 2030, 2035	
	Riverside	61	2003	2008, 2009, 2010, 2012, 2014, 2018, 2020, 2023, 2030, 2035	
	San Bernardino	62	2003	2008, 2009, 2010, 2012, 2014, 2018, 2020, 2023, 2030, 2035	
	Imperial	63	2003	2008, 2009, 2010, 2012, 2014, 2018, 2020, 2023, 2030, 2035	
	Riverside	64	2003	2008, 2009, 2010, 2012, 2014, 2018, 2020, 2023, 2030, 2035	
	Riverside	66	2003	2008, 2009, 2010, 2012, 2014, 2018, 2020, 2023, 2030, 2035	
	Riverside	67	2003	2008, 2009, 2010, 2012, 2014, 2018, 2020, 2023, 2030, 2035	
	Los Angeles	68	2003	2008, 2009, 2010, 2012, 2014, 2018, 2020, 2023, 2030, 2035	
	San Bernardino	69	2003	2008, 2009, 2010, 2012, 2014, 2018, 2020, 2023, 2030, 2035	
Fresno COG	Fresno	48	2003	2011, 2012, 2014, 2017, 2020, 2023, 2025, 2035	Oct 2010
Kern COG	Kern (SJV)	49	2006	2011, 2012, 2014, 2017, 2020, 2023, 2025, 2035	
Kern COG	Kern (MD)	65	2006	2011, 2012, 2014, 2017, 2020, 2023, 2025, 2035	
Kings COG	Kings	50	2005	2011, 2012, 2014, 2017, 2020, 2023, 2025, 2035	
Madera COG	Madera	51	2000	2011, 2012, 2014, 2017, 2020, 2023, 2025, 2035	
Merced COG	Merced	52	2000	2011, 2012, 2014, 2017, 2020, 2023, 2025, 2035	
San Joaquin COG	San Joaquin	53	2005	2011, 2012, 2014, 2017, 2020, 2023, 2025, 2035	
Stanislaus COG	Stanislaus	54	2006	2011, 2012, 2014, 2017, 2020, 2023, 2025, 2035	
Tulare COG	Tulare	55	2007	2011, 2012, 2014, 2017, 2020, 2023, 2025, 2035	
SANDAG	San Diego	38	2008	2008, 2010, 2020, 2030	Oct 2010
SACOG	El Dorado (MC)	9	2005	2005, 2018, 2035	Feb 2011
	Placer (MC)	12	2005	2005, 2018, 2035	
	Placer (SV)	30	2005	2005, 2018, 2035	
	Sacramento	31	2005	2005, 2018, 2035	
	Sutter	34	2005	2005, 2018, 2035	
	Yolo	36	2005	2005, 2018, 2035	
	Yuba	37	2005	2005, 2018, 2035	
MTC	Sonoma (NC)	22	2005	2005, 2035	Jan 2011
	Solano (SV)	33	2005	2005, 2035	
	Alameda	39	2005	2005, 2035	
	Contra Costa	40	2005	2005, 2035	
	Marin	41	2005	2005, 2035	
	Napa	42	2005	2005, 2035	
	San Francisco	43	2005	2005, 2035	
	San Mateo	44	2005	2005, 2035	
	Santa Clara	45	2005	2005, 2035	
	Solano	46	2005	2005, 2035	
	Sonoma	47	2005	2005, 2035	

The RTPAs submitted VMT by speed bin by period of the day for selected calendar years. There are 14 speed bins from 5 to 70 miles per hour in 5 miles increment. Each RTPA may have different definitions of period ranging from daily, where the same speed distribution applies throughout the day, to hourly where distributions vary. However, most RTPAs submitted VMT by speed bin for morning peak (AMPK), afternoon peak (PMPK) and one or two off-peak periods. Table 7-2 summarizes the period definitions by area and calendar years provided by RTPAs. EMFAC coding requires six time periods: AMPK, Noon, Mid-day, PMPK and 2 Night periods, and staff matched the time periods provided by RTPAs to one of the six time periods in EMFAC as described in the regional submittal tables. For each region and time period, ARB staff developed the speed distribution using the VMT in the speed bins and the total VMT from all speed bins. ARB did not interpolate or extrapolate speed distributions, but applied the speed distribution for the next future year to interim years. The Southern California Association of Governments (SCAG) submitted separate VMTs for light-duty vehicles (LDV) and heavy-duty trucks (HDT). For all other regions, ARB default HDT speeds were used. In the absence of recent RTPA data, submittals for EMFAC2007 development were carried forward.

Staff evaluated speed data submitted by each RTPA, looking to make sure data were consistent and that generally in most cases peak speeds in urban areas declined with time, that peak speeds in growing rural areas were declining with time, that nighttime speeds were flat, and that peak speeds in rural non-growing areas were relatively high and flat over time. Speed data appeared reasonable in all cases and so were input to the model. Table 7-2 summarizes the period definitions by area and shows some differences from ARB's period definitions.

Table 7-2. Time Period Definitions for EMFAC 2011

GAI	AIR BASIN	COUNTY	COID	CALENDAR YEARS SUBMITTED	PERIODS SUBMITTED
9	MC	El Dorado County (portion)	9	**2005, 2018, 2035**	AMPK, NOON, PMPK, NIGHT
12	MC	Placer County (portion)	31	**2005, 2018, 2035**	AMPK, NOON, PMPK, NIGHT
30	SV	Placer County (portion)	31	**2005, 2018, 2035**	AMPK, NOON, PMPK, NIGHT
31	SV	Sacramento County	34	**2005, 2018, 2035**	AMPK, NOON, PMPK, NIGHT
34	SV	Sutter County	51	**2005, 2018, 2035**	AMPK, NOON, PMPK, NIGHT
36	SV	Yolo County	57	**2005, 2018, 2035**	AMPK, NOON, PMPK, NIGHT
37	SV	Yuba County	58	**2005, 2018, 2035**	AMPK, NOON, PMPK, NIGHT
38	SD	San Diego County	37	**2008, 2010, 2020, 2030**	Hourly converted to 6 periods
39	SF	Alameda County	1	**2000, 2005, 2035**	2, 5, 9, 11, 14, 18, 23
40	SF	Contra Costa County	7	**2000, 2005, 2035**	2, 5, 9, 11, 14, 18, 23
41	SF	Marin County	21	**2000, 2005, 2035**	2, 5, 9, 11, 14, 18, 23
42	SF	Napa County	28	**2000, 2005, 2035**	2, 5, 9, 11, 14, 18, 23
43	SF	San Francisco County	38	**2000, 2005, 2035**	2, 5, 9, 11, 14, 18, 23
44	SF	San Mateo County	41	**2000, 2005, 2035**	2, 5, 9, 11, 14, 18, 23
45	SF	Santa Clara County	43	**2000, 2005, 2035**	2, 5, 9, 11, 14, 18, 23
46	SF	Solano County (portion)	48	**2000, 2005, 2035**	2, 5, 9, 11, 14, 18, 23
47	SF	Sonoma County (portion)	49	**2000, 2005, 2035**	2, 5, 9, 11, 14, 18, 23
48	SJV	Fresno County	10	**2003, 2011, 2012, 2014, 2017**	AMPK, PMPK, OFFPK
				2020, 2023, 2025, 2035	
49	SJV	Kern County (portion)	15	**2006, 2011, 2012, 2014, 2017**	AMPK, PMPK, OFFPK
				2020, 2023, 2025, 2035	
50	SJV	Kings County	16	**2005, 2011, 2012, 2014, 2017**	DAILY
				2020, 2023, 2025, 2035	
51	SJV	Madera County	20	**2000, 2011, 2012, 2014, 2017**	DAILY
				2020, 2023, 2025, 2035	
52	SJV	Merced County	24	**2000, 2011, 2012, 2014, 2017**	DAILY
				2020, 2023, 2025, 2035	
53	SJV	San Joaquin County	39	**2005, 2011, 2012, 2014, 2017**	AMPK, PMPK, OFFPK
				2020, 2023, 2025, 2035	
54	SJV	Stanislaus County	50	**2006, 2011, 2012, 2014, 2017**	AMPK, PMPK, OFFPK
				2020, 2023, 2025, 2035	
55	SJV	Tulare County	54	**2007, 2011, 2012, 2014, 2017**	AMPK, PMPK, OFFPK
				2020, 2023, 2025, 2035	
58	SCC	Ventura County	56	**2003, 2008, 2009, 2010, 2012,**	AMPK, NOON, PMPK, NIGHT
				2014, 2018, 2020, 2023, 2030, 2035	
59	SC	Los Angeles County (portion)	19	**2003, 2008, 2009, 2010, 2012,**	AMPK, NOON, PMPK, NIGHT
				2014, 2018, 2020, 2023, 2030, 2035	
60	SC	Orange County	30	**2003, 2008, 2009, 2010, 2012,**	AMPK, NOON, PMPK, NIGHT
				2014, 2018, 2020, 2023, 2030, 2035	
61	SC	Riverside County (portion)	33	**2003, 2008, 2009, 2010, 2012,**	AMPK, NOON, PMPK, NIGHT
				2014, 2018, 2020, 2023, 2030, 2035	
62	SC	San Bernardino County (portion)	36	**2003, 2008, 2009, 2010, 2012,**	AMPK, NOON, PMPK, NIGHT
				2014, 2018, 2020, 2023, 2030, 2035	
63	SS	Imperial County	13	**2003, 2008, 2009, 2010, 2012,**	AMPK, NOON, PMPK, NIGHT
				2014, 2018, 2020, 2023, 2030, 2035	
64	SS	Riverside County (portion)	33	**2003, 2008, 2009, 2010, 2012,**	AMPK, NOON, PMPK, NIGHT
				2014, 2018, 2020, 2023, 2030, 2035	
66		Los Angeles County (portion)	19	**2003, 2008, 2009, 2010, 2012,**	AMPK, NOON, PMPK, NIGHT
				2014, 2018, 2020, 2023, 2030, 2035	
67/68	MD	Riverside County (portion)	33	**2003, 2008, 2009, 2010, 2012,**	AMPK, NOON, PMPK, NIGHT
				2014, 2018, 2020, 2023, 2030, 2035	
69	MD	San Bernardino County (portion)	36	**2003, 2008, 2009, 2010, 2012,**	AMPK, NOON, PMPK, NIGHT
				2014, 2018, 2020, 2023, 2030, 2035	

SCAG Region

The Southern California Association of Governments (SCAG) has submitted the latest motor vehicle activity for light-duty vehicles (LDV) and heavy-duty trucks (HDT). The submittal includes both vehicle miles traveled (VMT) and speed distributions for the CYs 2003, 2008, 2009, 2010, 2012, 2014, 2018, 2020, 2023, 2030, 2035. ARB staff reviewed the data for anomalies and compared the VMT and speed trends to SCAG 2009 submittals, EMFAC 2007, MVSTAFF and human population. Table 7-3 describes the VMT and speed distribution data submitted by SCAG. Table 7-4 and Table 7-5 summarize the latest SCAG submittal for LDV+MDV and HDT respectively.

Table 7-3. SCAG Submittal

Traffic Model Citation:	The adopted 2008 RTP					
Date of Submittal:	October 12, 2010					
Years Provided:	2003, 2008, 2009, 2010, 2012, 2014, 2018, 2020, 2023, 2030, 2035.					
VMT Vehicle Classes:	SCAG provided LDV VMT totals for light- and medium-duty vehicles plus motorcycles combined and HDT VMT totals for heavy-duty trucks combined. (No data for buses or motor homes.) ARB will match SCAG total VMT for all vehicle classes except buses and motorhomes by sub-area and distribute VMT by vehicle class based on updated DMV/Smog Check data. The HD diesel truck, other buses (diesel) and school buses (diesel) VMT by vehicle class are from ARB's EMFAC2011-HD truck model and updated DMV and mileage accrual rate data. ARB will add VMT for remaining classes bus and motor homes using DMV data.					
Speed Vehicle Classes:	Speeds were provided for light- and medium-duty vehicles combined and separate speeds for heavy-duty trucks derived from SCAG's truck model.					
Speed Distributions by Periods:	SCAG provided speed distributions for AM Peak (period 2), PM Peak (period 5), Mid-day (periods 3 and 4), and Night (periods 1 and 6)					
Period Definitions	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**	**Period 6**
	Hours 0-5	6-8	9-11	12-14	15-18	19-23

Table 7-4. SCAG Daily VMT for Light & Medium-Duty Vehicles

	2003	2008	2009	2010	2012	2014	2018	2020	2023	2030	2035
SCCAB (VENTURA COUNTY)	17,413,687	18,133,177	18,589,246	18,916,106	19,194,130	19,455,513	20,098,341	20,339,177	20,670,693	21,572,162	21,929,329
SCAB (LOS ANGELES COUNTY)	197,363,189	197,642,045	199,885,430	200,687,898	202,609,690	203,912,836	208,530,138	210,610,605	212,542,579	218,591,292	221,559,676
SCAB (ORANGE COUNTY)	66,508,789	69,424,103	70,415,994	70,919,803	71,866,039	73,021,835	75,709,228	76,326,599	77,106,333	80,031,953	81,490,036
SCAB (RIVERSIDE COUNTY)	28,577,374	32,934,988	34,003,198	34,690,277	36,068,252	37,480,079	40,953,166	43,207,006	45,406,357	51,019,470	54,692,082
SCAB (SAN BERNARDINO CO)	31,191,348	33,365,272	34,530,061	34,943,836	36,096,490	36,776,758	39,260,208	40,857,102	42,363,075	46,072,018	48,789,598
MDAB (ANTELOPE VALLEY)	7,267,648	11,991,960	13,009,220	13,640,897	14,202,335	14,840,779	16,133,352	16,775,809	17,957,168	21,316,360	23,386,688
MDAB (SBD/VICTOR VALLEY)	12,025,375	14,440,422	15,007,736	15,470,876	16,151,550	16,526,470	17,699,114	18,586,270	19,801,108	22,989,905	25,324,447
MDAB (SBD/SEARLES VALLEY)	146,642	135,674	135,311	135,296	146,870	146,630	135,264	134,625	135,954	137,391	138,637
MDAB (SBD DESERT AREA)	3,991,069	4,503,771	4,610,436	4,693,348	4,841,857	5,018,906	5,450,014	5,696,524	6,096,714	7,175,768	8,081,644
MDAB (RIV/SCAQMD)	825,631	818,005	829,997	844,803	887,292	915,182	949,590	970,357	1,047,742	1,234,069	1,412,958
MDAB (RIV/MDAQMD)	658,434	747,333	774,647	780,944	898,733	1,071,474	1,458,543	1,614,711	1,722,600	2,011,027	2,207,366
SSAB (RIV/COACHELLA VALLEY)	9,287,682	11,169,419	11,538,819	11,840,696	12,530,631	13,304,204	15,134,322	16,254,281	17,768,683	21,415,665	24,083,905
SSAB (IMPERIAL)	4,131,747	5,596,791	5,811,566	6,017,818	6,437,638	7,191,621	8,709,248	9,522,149	10,207,464	11,981,615	12,999,895
SSAB (IMP MOUNTAIN AREA)	203,114	259,625	265,705	269,396	331,975	432,095	689,459	804,617	868,129	1,049,859	1,168,751
	==========	==========	==========	==========	==========	==========	==========	==========	==========	==========	==========
	379,591,729	401,162,584	409,407,365	413,851,992	422,263,482	430,094,381	450,909,986	461,699,834	473,694,598	506,598,554	527,265,011

Table 7-5. SCAG Daily VMT for Heavy-duty Trucks (T5, T6, T7, & T8)

	2003	2008	2009	2010	2012	2014	2018	2020	2023	2030	2035
SCCAB (VENTURA COUNTY)	1,213,762	1,290,481	1,315,000	1,339,826	1,379,706	1,417,515	1,503,290	1,542,867	1,598,207	1,723,514	1,797,606
SCAB (LOS ANGELES COUNTY)	11,656,122	12,315,589	12,578,242	12,851,058	13,172,808	13,448,619	14,173,911	14,618,063	15,075,112	16,072,957	16,717,001
SCAB (ORANGE COUNTY)	3,773,633	3,886,545	3,954,093	4,014,088	4,115,012	4,208,992	4,439,819	4,502,056	4,610,851	4,833,335	4,984,754
SCAB (RIVERSIDE COUNTY)	2,516,083	3,023,172	3,119,933	3,229,899	3,410,416	3,583,539	3,948,767	4,112,515	4,342,359	4,859,805	5,188,530
SCAB (SAN BERNARDINO CO)	3,159,385	3,790,804	3,977,303	4,122,268	4,351,627	4,555,756	4,939,192	5,165,764	5,445,746	6,049,384	6,536,718
MDAB (ANTELOPE VALLEY)	388,404	411,613	427,810	433,235	451,530	475,465	532,126	560,102	611,275	721,880	790,658
MDAB (SBD/VICTOR VALLEY)	2,481,485	3,195,594	3,346,011	3,491,079	3,726,227	3,953,330	4,426,983	4,660,331	4,974,511	5,691,089	6,210,855
MDAB (SBD/SEARLES VALLEY)	26,355	26,978	27,020	27,185	29,538	29,808	28,140	28,256	28,603	29,181	29,683
MDAB (SBD DESERT AREA)	1,231,852	1,588,309	1,660,019	1,730,995	1,836,579	1,945,551	2,175,887	2,284,020	2,435,401	2,770,730	2,999,864
MDAB (RIV/SCAQMD)	290,291	340,765	351,715	362,660	377,141	393,957	428,659	443,524	465,888	516,265	553,567
MDAB (RIV/MDAQMD)	229,359	265,311	272,629	280,147	292,489	304,615	328,230	339,799	356,486	392,647	417,454
SSAB (RIV/COACHELLA VALLEY)	1,469,194	1,701,337	1,754,251	1,806,866	1,908,317	2,003,180	2,173,760	2,259,484	2,381,607	2,647,268	2,824,574
SSAB (IMPERIAL)	568,065	644,239	664,411	683,215	727,919	774,339	844,158	874,288	914,830	999,912	1,058,210
SSAB (IMP MOUNTAIN AREA)	38,519	41,896	42,832	43,825	45,534	47,104	50,228	51,654	53,673	57,994	61,128
	==========	==========	==========	==========	==========	==========	==========	==========	==========	==========	==========
	29,042,509	32,522,632	33,491,270	34,416,346	35,824,843	37,141,772	39,993,152	41,442,724	43,294,547	47,365,963	50,170,601

Staff reviewed VMT and speed data submitted by SCAG for the South Coast region, comparing growth rates to human population growth trends, and comparing submitted data to the following data sources:

- SCAG 2010 submittal (October 2010).
- EMFAC 2007, Version 2.6 (Nov 06).
- SCAG 2009 submittal (April 2009).
- California Motor Vehicle Stock, Travel and Fuel Forecast, May 2008 (MVSTAFF)
- Human Population, State of California, Department of Finance, Population Projections for California and Its Counties 2000-2050, Sacramento, California, July 2007.

Figure 7-1 compares the SCAG region VMT from the different data sources. The October 2010 submittal follows a similar trend to SCAG 2009 and EMFAC2007. Figure 7-2 illustrates the growth rate of VMT and human population from the different sources. The split between the light-duty and heavy-duty vehicles and the growth rate of these vehicle classes are shown in Figure 7-3. Both SCAG 2010 VMT and human population grow at a similar rate of 1.29% and 1.25% per annum respectively. SCAG's 2010 LDV VMT growth rate at 1.22% and HDT growth rate at 2.27% per annum are similar to the EMFAC2007 LDV VMT growth rate of 1.01% and HDT growth rate of 2.43%. While VMT and human population growth rates are much lower in the SCAG data than MVSTAFF, staff places little weight on MVSTAFF estimates in this area. The SCAG model does not estimate VMT for buses or motor homes. ARB provides the estimates for these vehicle classes based on updated DMV data and mileage accrual rates. In EMFAC2011, other buses (diesel) and school buses (diesel) are based on the ARB's EMFAC2011-HD truck model. Long term heavy duty vehicle VMT forecasts developed by SCAG are similar to those developed for the Statewide Truck and Bus Rule; however short term estimates do not appear to reflect the downturn in the economic cycle.

Figure 7-1. VMT in the SCAG Region

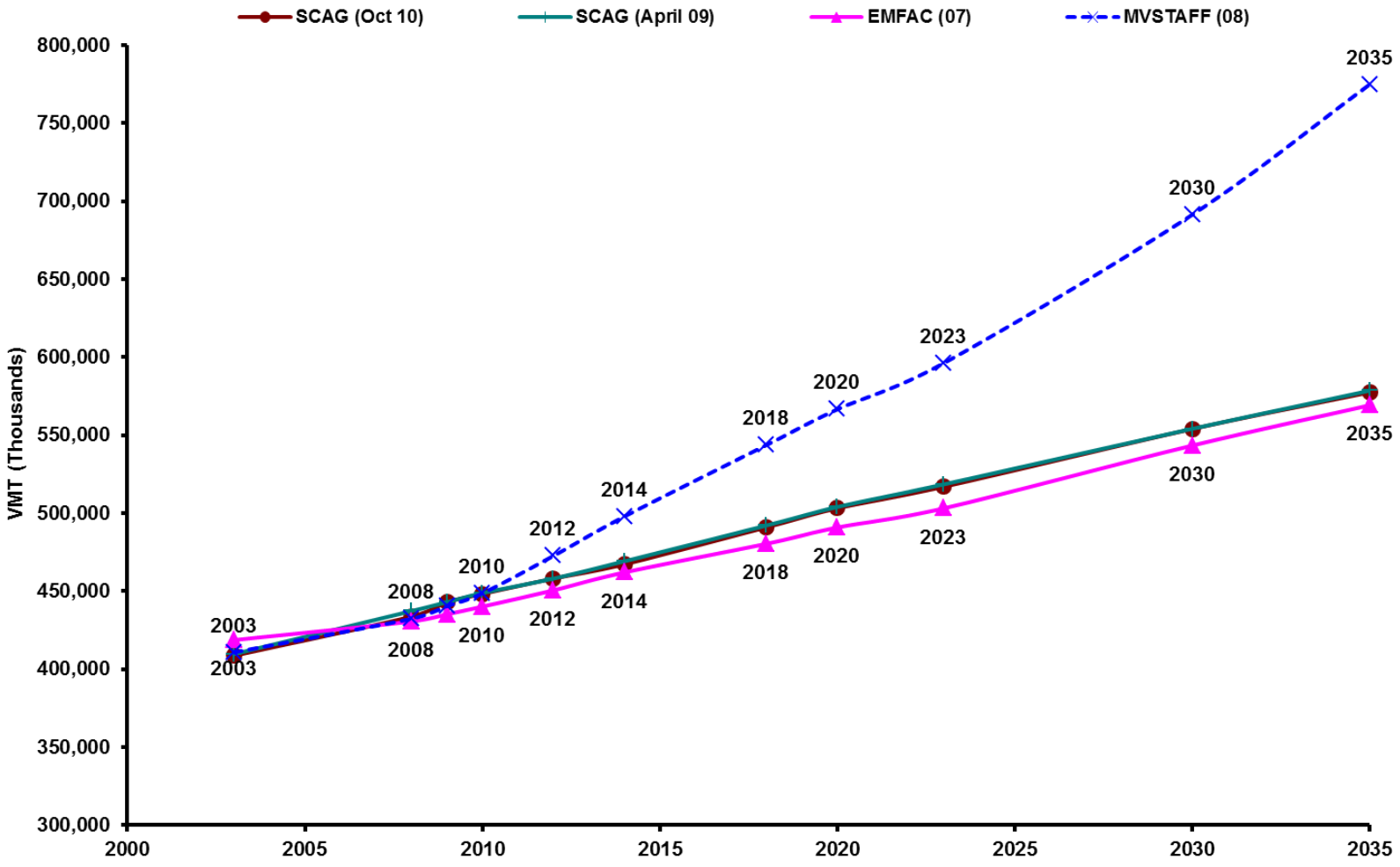


Figure 7-2. VMT and Human Population Growth in the SCAG Region

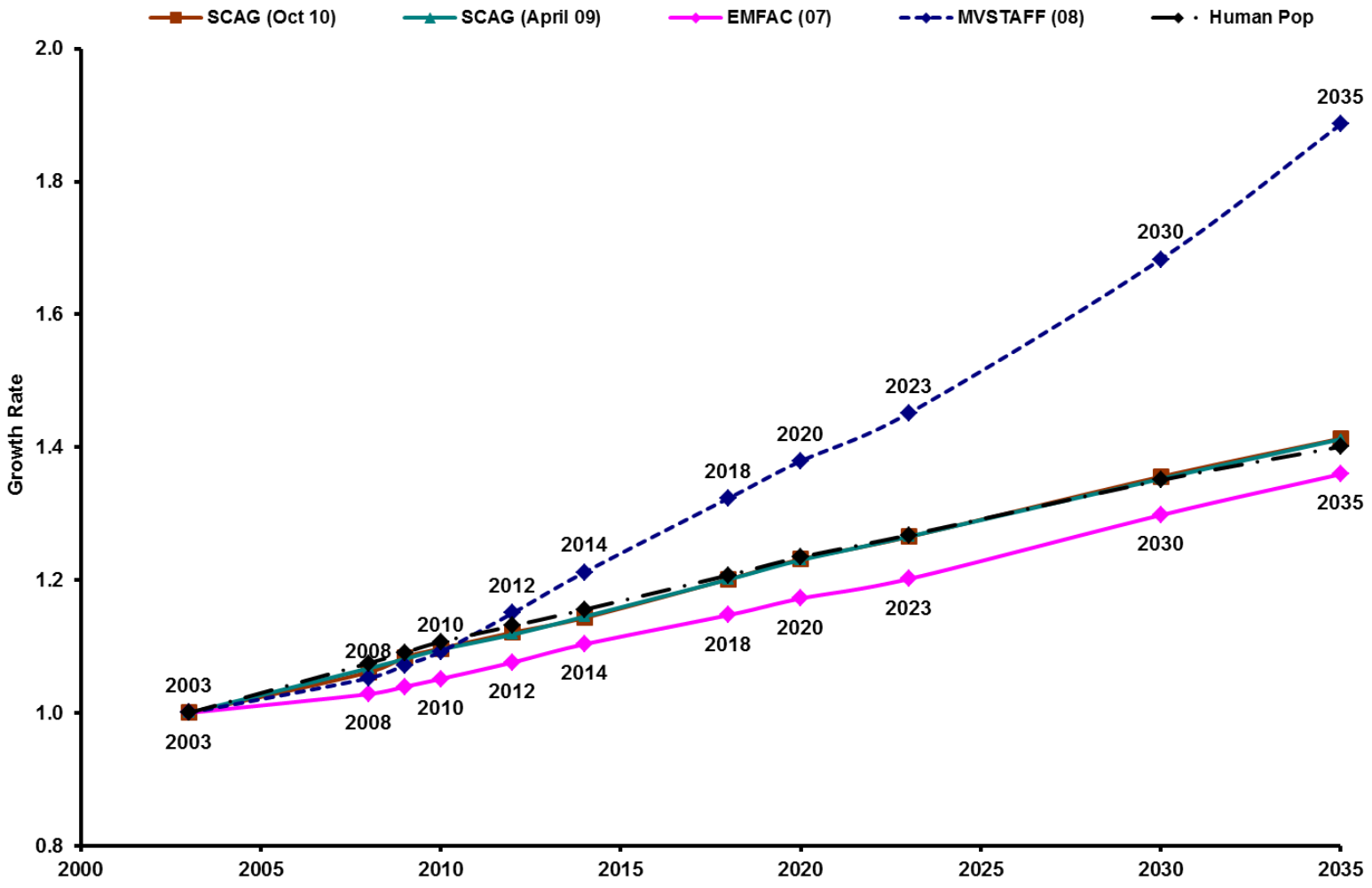
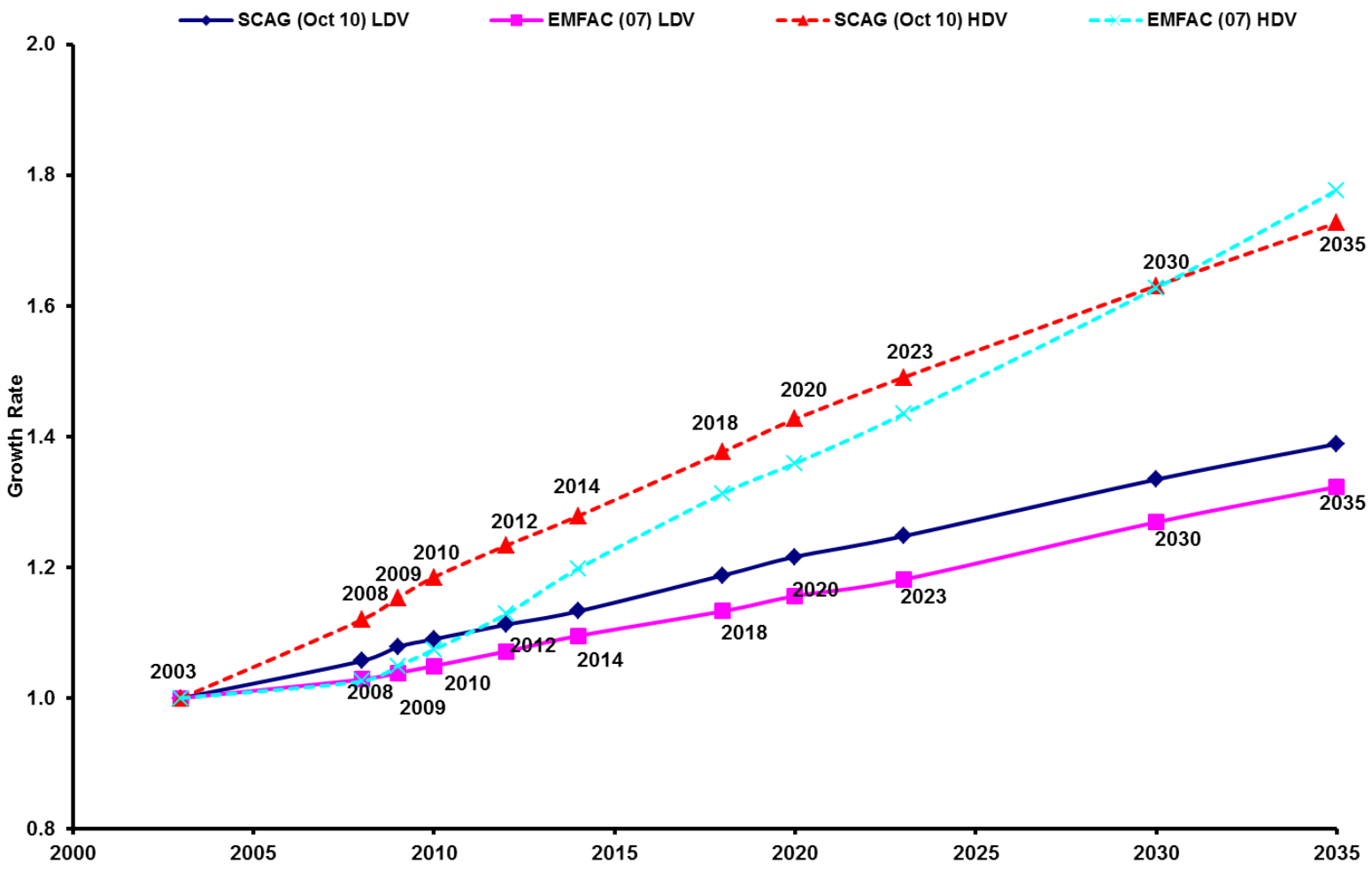


Figure 7-3. Light-Duty vs Heavy-Duty VMT Growth Rates in the SCAG Region



SAN DIEGO REGION

The San Diego Association of Governments (SANDAG) submitted vehicle activity data in October 2011. Table 7-6 provides details on the SANDAG submittal.

Table 7-6. SANDAG Data Submittal Summary

Traffic Model Citation:	**The adopted 2007 RTP.**					
Date of Submittal:	October 2010					
Years Provided:	2008, 2010, 2020, and 2030					
VMT Vehicle Classes:	VMT totals represent all vehicle classes. SANDAG provided VMT by vehicle class and by period; however, EMFAC 2011 reflects VMT distribution over the vehicle classes based on DMV data and ARB EMFAC2011-HD truck model.					
Speed Vehicle Classes:	Speed distributions were provided by vehicle class; however, only distribution for light duty vehicles was used because SANDAG has no heavy duty truck model.					
Speed Distributions by Periods:	Speed distributions were provided hourly and converted to AM Peak (period 2), PM Peak (period 5), Mid-day (periods 3 and 4), and Night (periods 1 and 6).					
Period Definitions	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**	**Period 6**
	Hours 0-5	6-8	9-11	12-14	15-17	18-23

Similar to the South Coast data review, ARB staff reviewed the activity data received from SANDAG and compared VMT trends for CYs 2008 through 2030 to other data sources including:

- SANDAG Activity Data Submitted to ARB in October 2010
- EMFAC 2007, Version 2.3 (Nov 2006)
- SANDAG Activity Data Submitted to ARB in 2008
- California Motor Vehicle Stock, Travel and Fuel Forecast, May 2008 (MVSTAFF)
- Human Population, State of California, Department of Finance, Population Projections for California and Its Counties 2000-2050, Sacramento, California, July 2007.

SANDAG provided VMT and speeds by vehicle class; however, because of ARB's recent efforts to update vehicle population and redistribute statewide VMT for heavy-duty trucks, ARB preferred to use SANDAG total VMT for the fleet as a whole but with ARB VMT distributions by vehicle class. The heavy heavy-duty truck VMT was updated to agree with ARB's EMFAC2011-HD truck model redistribution. DMV data was used to distribute the light-duty vehicles. Similarly, SANDAG agreed to use ARB default speed distributions for heavy-duty vehicles. EMFAC 2011 reflects SANDAG speed distributions for light-duty cars and trucks plus motorcycles. Figure 7-4 compares the SANDAG region VMT from different data sources. Figure 7-5 illustrates the growth rate of VMT and human population from the different sources. The October 2010 submittal follows a similar trend to SANDAG 2008 and EMFAC2007. However, it is about 7-10% lower than their previous submittal. Thought the total EMFAC2007 VMT is higher than the SANDAG 2010 submittal VMT, the annual growth rate is lower.

Figure 7-4. VMT in the San Diego Region

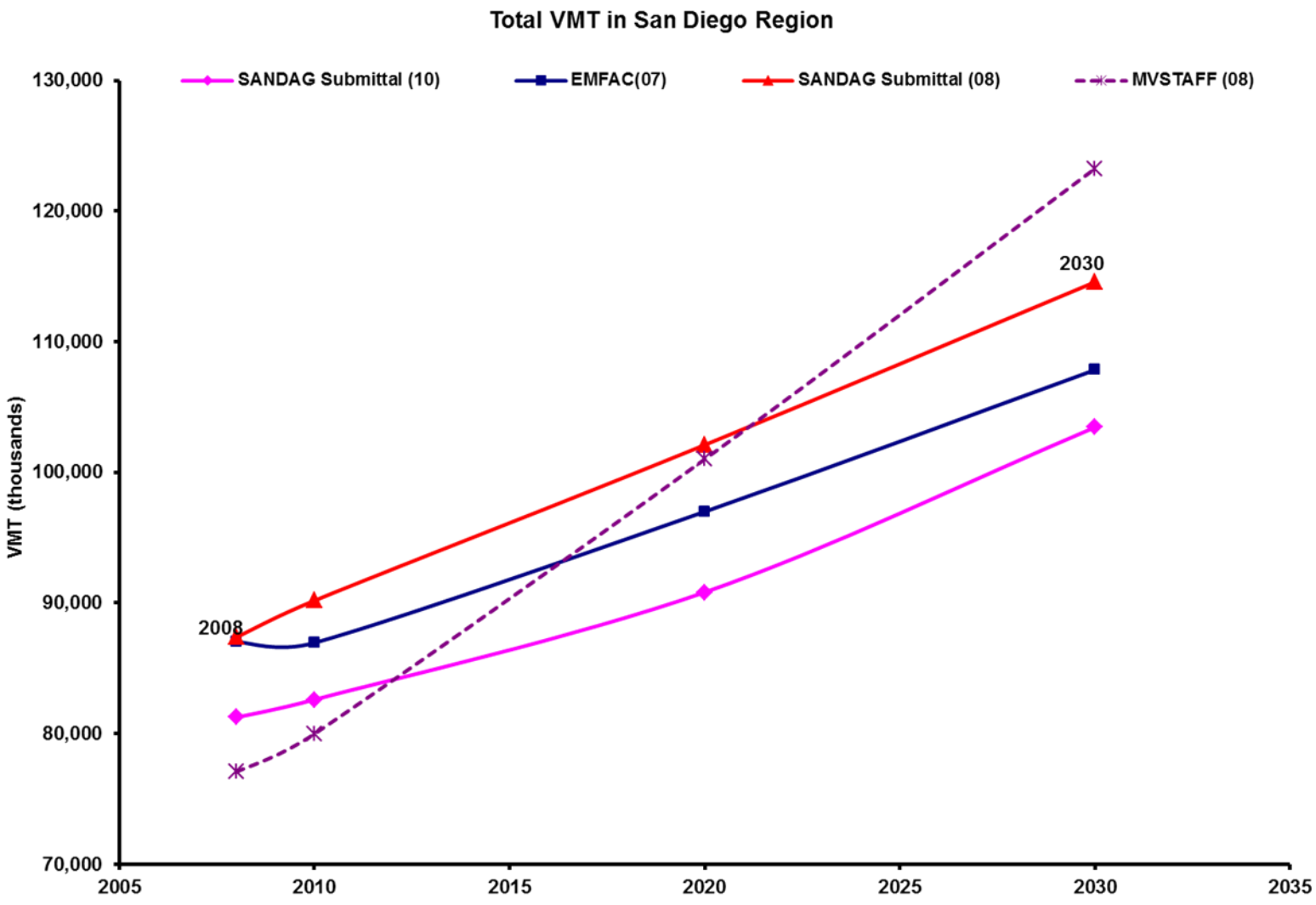
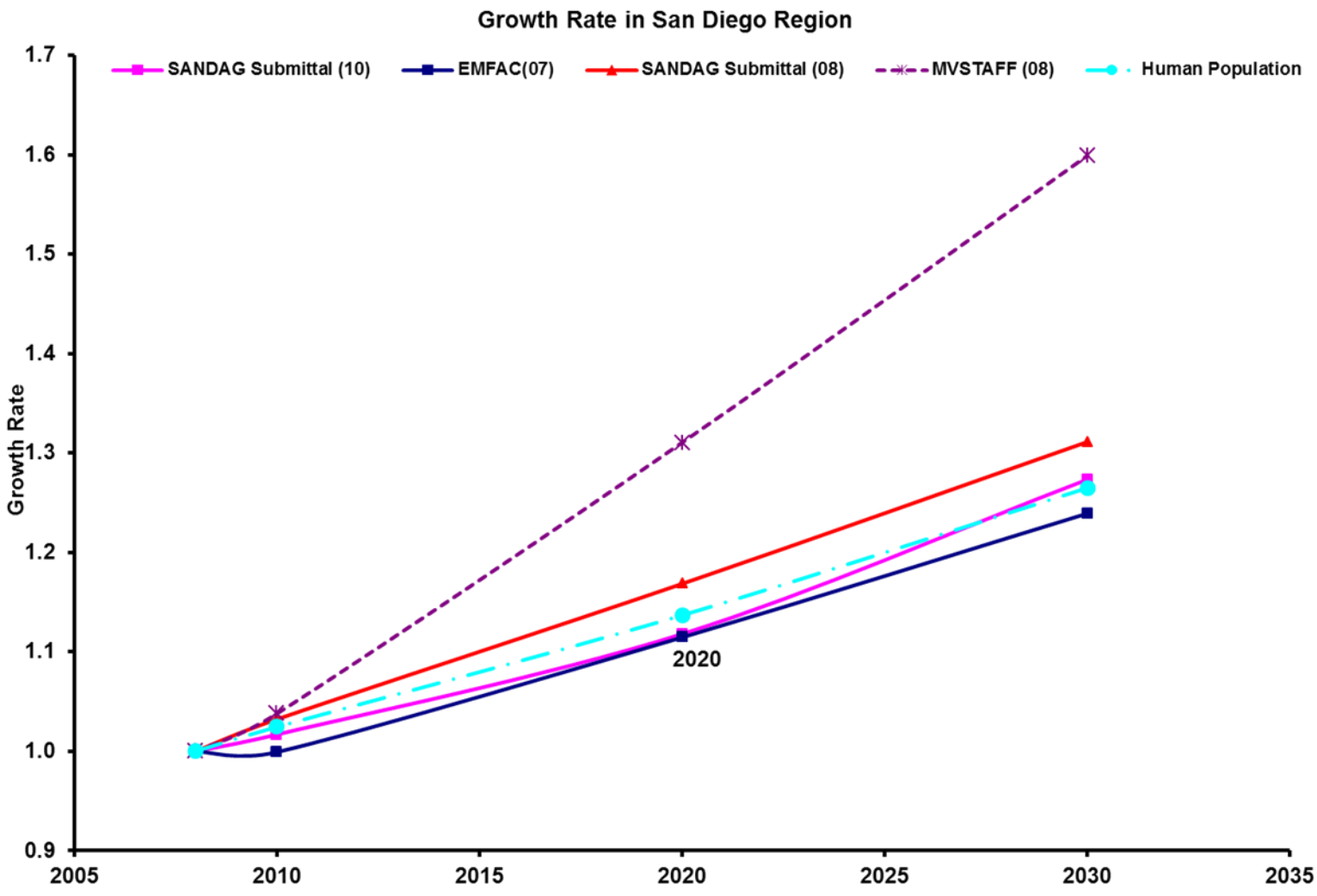


Figure 7-5. VMT and Human Population Growth in the San Diego Region



SAN FRANCISCO BAY AREA

The Metropolitan Transportation Commission (MTC) provided updated activity data in January 2011. Table 7-7 describes the VMT and speed distribution data submitted by MTC.

Table 7-7. Data Submittal from MTC

Traffic Model Citation:	Travel Model One (activity based model) using ABAG's Projections 2009 demographic/socio-economic/land forecast developed and adopted by ABAG in March 2009.					
Date of Submittal:	January 2011					
Years Provided:	2000, 2005, 2035					
VMT Vehicle Classes:	VMT totals represent all vehicle classes. EMFAC 2011 reflects VMT distribution over the vehicle classes based on DMV data and ARB EMFAC2011-HD truck model.					
Speed Vehicle Classes:	Apply to light-duty cars and trucks, medium-duty vehicles, and motorcycles. ARB default speeds to be used for all heavy-duty vehicles.					
Speed Distributions and Periods:	MTC submitted their speed distribution in 7 periods, which staff converted into 6 periods: AM Peak (period 2), PM Peak (period 5), Midday (periods 3 and 4), and Night (periods 1 and 6).					
Period Definitions	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**	**Period 6**
	Hours 3-5	6-9	10-11	12-14	15-18	19-2

Similar to the South Coast QA process, ARB staff reviewed MTC's VMT and speed distributions. ARB compared MTC's VMT and growth rates by county, CYs 2005 and 2035 to the following data sources:

- MTC Activity Data Submitted to ARB (Jan 2011)
- EMFAC 2007, Version 2.3 (Nov 2006)
- EMFAC 2011 (applied MTC growth rate for future years)
- California Motor Vehicle Stock, Travel and Fuel Forecast, May 2008 (MVSTAFF)
- Human Population, State of California, Department of Finance, Population Projections for California and Its Counties 2000-2050, Sacramento, California, July 2007.

Table 7-8 shows Daily VMT by County in the MTC region by calendar year.

Table 7-8. MTC Daily VMT by County

MTC	2000	2005	2035
Alameda	36,924,303	36,991,842	46,805,997
Contra Costa	19,947,507	21,437,898	26,777,372
Marin	6,064,389	6,186,610	6,962,727
Napa	2,611,517	3,045,574	3,513,033
San Francisco	8,724,235	8,699,284	10,568,527
San Mateo	15,543,143	14,841,629	18,518,543
Santa Clara	38,572,183	37,645,288	49,766,067
So. Solano	6,291,308	6,923,862	8,190,946
So. Sonoma	7,934,749	8,242,240	9,664,187
No. Solano	4,276,033	4,502,751	5,326,765
No. Sonoma	1,854,636	2,118,420	2,483,889
Total	148,744,003	150,635,398	188,578,053

For EMFAC2011, MTC VMT growth rates were applied to the default CY 2000 base year VMT in EMFAC 2011 to estimate the MTC CY 2005 and 2035 VMT. VMT comparison and growth rates for the San Francisco Air Basin are shown in Figure 7-6 and Figure 7-7. The EMFAC 2011 VMT is about 11 – 25% higher than the MTC 2011 VMT. Both MTC 2011 VMT and human population grow at a similar rate of 0.8% and 0.9% per annum respectively.

One important issue discussed during the QA process on MTC's data was VMT estimates for base year 2000. Prior investigations as well as the current analysis by ARB showed that MTC VMT estimates were significantly lower than those based on the DMV vehicle populations plus mileage accrual rates determined from California's Smog Check Program. In an effort to be fully protective of air quality, ARB, MTC, and the Bay Area Air Quality Management District (BAAQMD) determined that it would be better to have VMT forecasts that err on the side of being too high rather than too low. Therefore, these agencies agreed to adjust Bay Area VMT before using it in air quality plans or in the EMFAC model pending future efforts to determine the reasons for VMT discrepancies among independent sources of data.

Figure 7-6. VMT in the San Francisco Bay Area

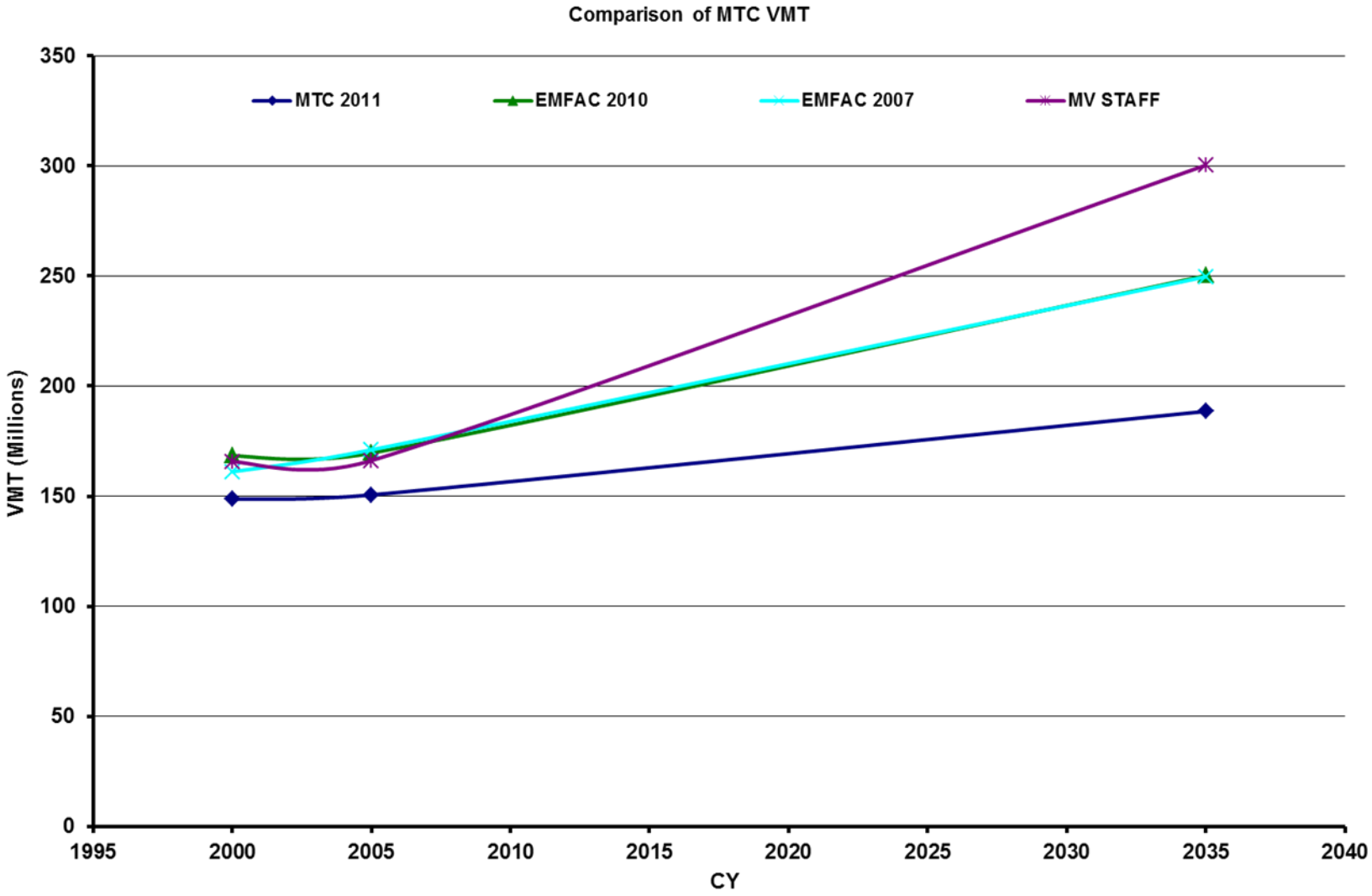
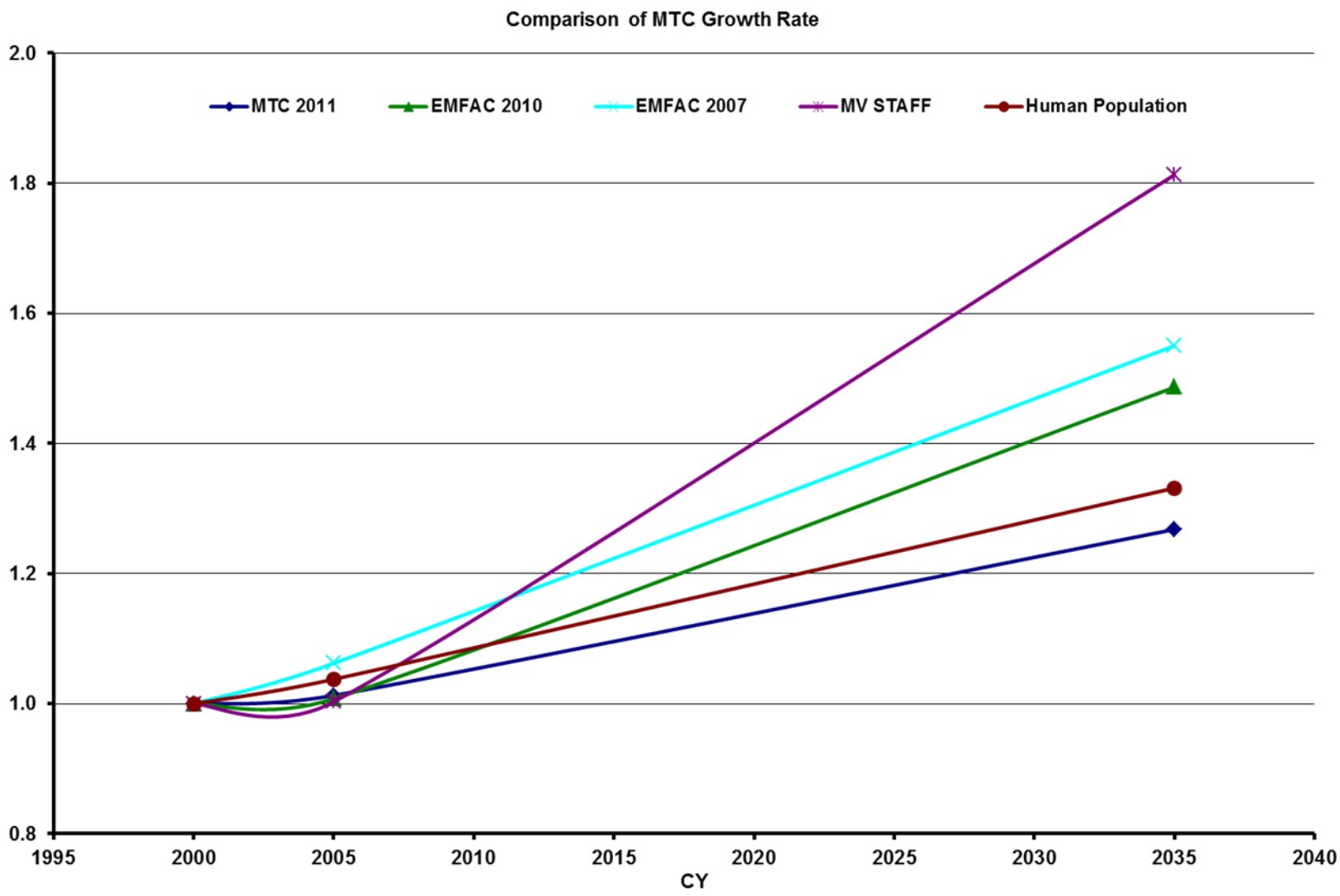


Figure 7-7. VMT and Human Population Growth in the San Francisco Bay Area



SACRAMENTO METROPOLITAN AREA

Sacramento Area Council of Governments (SACOG) provided ARB with VMT and speed distributions in February 2011. Table 7-9 illustrates the VMT and speed distribution data submitted by SACOG.

Table 7-9. SACOG Submittal

Traffic Model Citation:	The adopted Metropolitan Transportation Plan 2035.					
Date of Submittal:	February 2011					
Years Provided:	2005, 2018, and 2035					
VMT Vehicle Classes:	VMT totals represent all vehicle classes. EMFAC 2011 reflects VMT distribution over the vehicle classes based on DMV data and ARB truck model.					
Speed Vehicle Classes:	Apply to light-duty cars and trucks, medium-duty vehicles, and motorcycles. ARB default speeds to be used for all heavy-duty vehicles.					
Speed Distributions and Periods:	SACOG provided four speed distributions -- AM peak (period 2), PM peak (period 5), Noon (periods 3 and 4) and Night (periods 1 and 6)					
Period Definitions	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**	**Period 6**
	Hours 0-5	6-8	9-11	12-14	15-17	18-23

ARB staff reviewed SACOG's VMT and speed distributions. Table 9 shows the daily VMT provided by SACOG. ARB compared SACOG's VMT and growth rates by county to the following data sources:

- SACOG Activity Data Submitted to ARB (Feb 2011)
- EMFAC 2007, Version 2.3 (Nov 2006)
- SACOG Activity Data Submitted to ARB (2007)
- California Motor Vehicle Stock, Travel and Fuel Forecast, May 2008 (MVSTAFF)
- Human Population, State of California, Department of Finance, Population Projections for California and Its Counties 2000-2050, Sacramento, California, July 2007.

Table 7-10. SACOG Daily VMT by County

SACOG	Area	2005 (EMFAC)	2005 (SACOG07)	2005 (SACOG11)	2018 (EMFAC)	2018 (SACOG07)	2018 (SACOG11)	2035 (EMFAC)	2035 (SACOG07)	2035 (SACOG11)
El Dorado	9	3,706,000	4,157,854	4,155,441	4,305,000	5,045,473	4,948,882	5,241,000	5,819,807	5,361,995
Placer (MC)	12	988,000	1,600,847	1,474,339	1,220,000	1,853,406	1,658,850	1,464,000	2,306,092	1,664,866
Placer (SV)	30	8,947,000	7,504,939	7,505,269	9,773,000	10,427,060	10,358,839	11,699,000	13,667,576	13,194,072
Sacramento	31	32,513,000	33,376,527	33,392,044	36,614,000	41,019,449	40,824,102	42,026,000	49,397,697	48,856,257
Sutter	34	2,443,000	1,962,622	1,954,199	3,925,000	2,575,221	2,575,060	6,907,000	3,232,017	3,162,046
Yolo	36	5,733,000	5,421,497	5,372,892	6,806,000	6,593,345	6,583,507	7,907,000	7,906,712	7,785,032
Yuba	37	1,606,000	0	1,785,066	2,358,000	0	2,487,589	6,907,000	0	3,064,986
South Sutter		633,852	506,013	507,029	1,151,251	751,214	755,297	2,425,032	1,112,803	1,110,187
Total NAA		54,963,852	54,530,299	54,361,213	63,794,251	68,265,168	67,704,537	77,669,032	83,442,703	81,134,456
Total Region		55,936,000	54,024,286	55,639,250	65,001,000	67,513,953	69,436,829	82,151,000	82,329,900	83,089,255

SACOG provided VMT and speeds by vehicle class and by county. ARB used DMV population and EMFAC2011-HD truck model redistribution to update vehicle population. SACOG agreed to use ARB default speed distributions for heavy-duty vehicles. EMFAC 2011 reflects SACOG's speed distributions for light-duty cars and trucks plus motorcycles. The Sacramento Metropolitan Area VMT comparison and growth rates are shown in Figure 7-8 and Figure 7-9. SACOG 2011 has same VMT as in their previous submittal except less than 1% difference in their base year.

Figure 7-8. Sacramento Region VMT

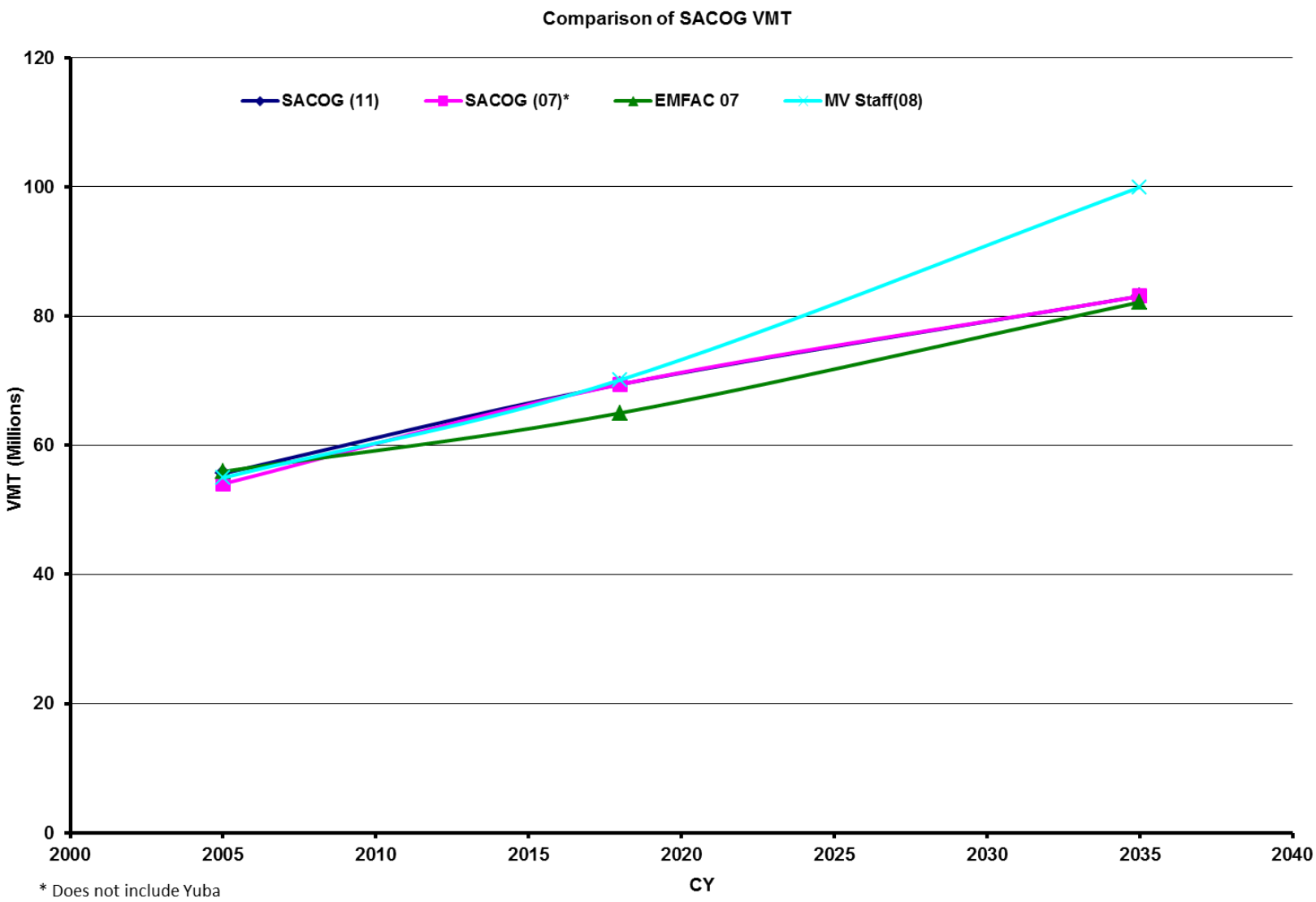
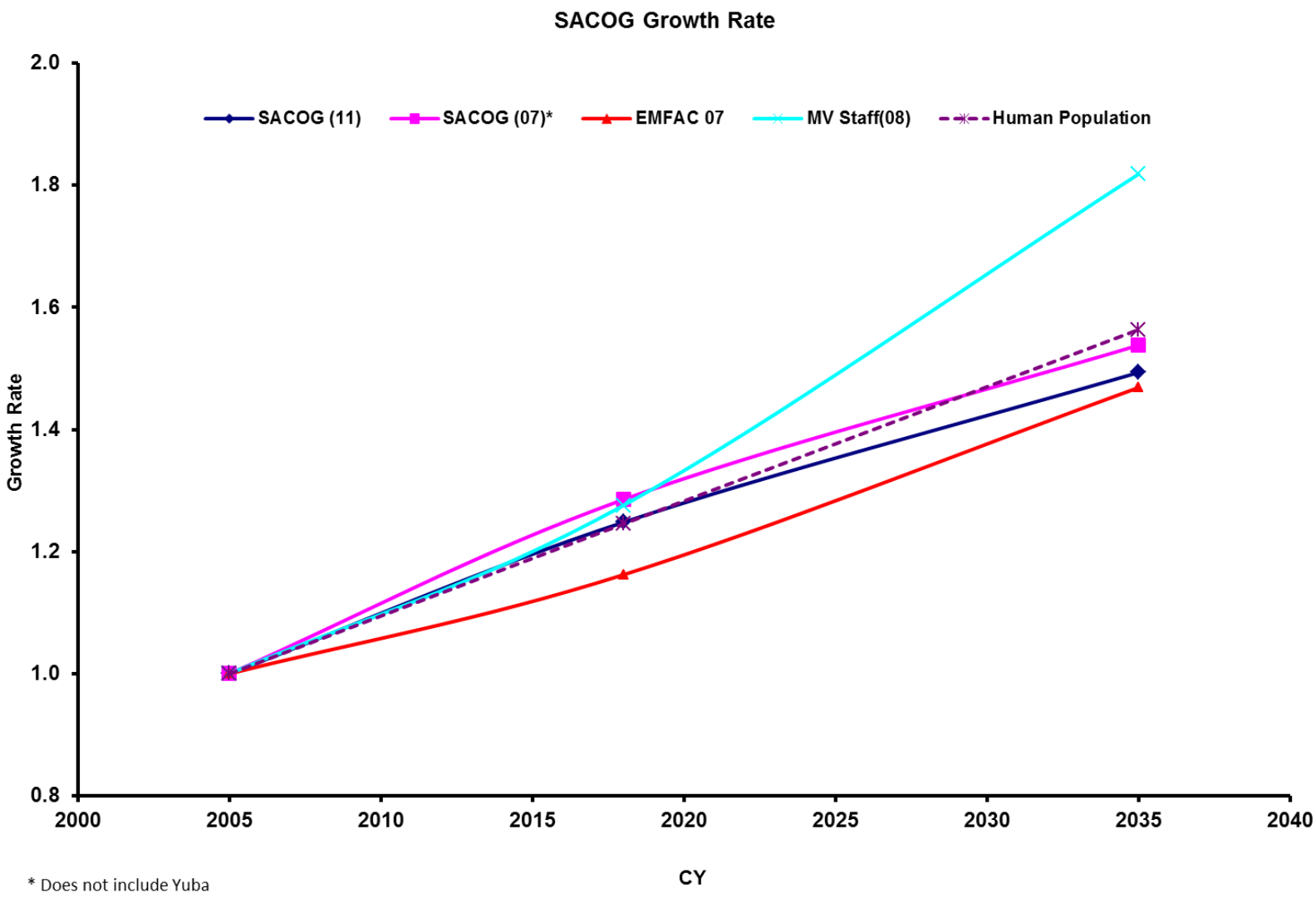


Figure 7-9. VMT and Human Population Growth in the Sacramento Region



* Does not include Yuba

SAN JOAQUIN VALLEY

There are eight COGs (Council of Governments) in the San Joaquin Valley (SJV) including Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare. All the COGs in SJV region have submitted vehicle activity data in October 2011. Table 7-11 provides details on the SJV submittal.

Table 7-11. San Joaquin Valley Submittal

Traffic Model Citation:	Activity data is based 2011 TIP and RTP currently pending state and federal approval					
Date of Submittal:	October 2010					
Base Years Provided:	Fresno - 2003, Kern - 2006, Kings - 2005, Madera - 2000, Merced - 2000, San Joaquin - 2005, Stanislaus - 2006, and Tulare - 2007.					
Future Years Provided:	2011, 2012, 2014, 2017, 2020, 2023, 2025, 2035					
VMT Vehicle Classes:	VMT totals represent all vehicle classes. EMFAC 2011 reflects VMT distribution over the vehicle classes based on DMV data and ARB truck model.					
Speed Vehicle Classes:	Apply to light-duty cars and trucks, medium-duty vehicles, and motorcycles. ARB default speeds to be used for all heavy-duty vehicles.					
Speed Distributions and Periods:	Fresno, Kern, San Joaquin, Stanislaus and Tulare COGs provided speed distribution for three periods: AM peak (period 2); PM peak (period 5); and off-peak (periods 1, 3, 4, and 6). Kings, Madera and Merced COGs provided daily speed distribution.					
Period Definitions	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**	**Period 6**
	Hours 0-5	6-8	9-11	12-14	15-17	18-23
Period Definitions	Daily, same distribution for all periods.					

ARB staff reviewed the activity data received from SJV COGs and compared VMT trends for CYs 2000 through 2035 to other data sources:

- SJV Activity Data Submitted to ARB in October 2010
- EMFAC 2007, Version 2.3 (Nov 2006)
- SJV Activity Data Submitted to ARB in 2009
- California Motor Vehicle Stock, Travel and Fuel Forecast, May 2008 (MVSTAFF)
- Human Population, State of California, Department of Finance, Population Projections for California and Its Counties 2000-2050, Sacramento, California, July 2007.

SJV COGs provided total VMT and one speed distribution for all vehicle classes. The heavy heavy-duty truck VMT was updated to agree with ARB's EMFAC2011-HD truck model redistribution. Similarly, SJV COGs agreed to use ARB default speed distributions for heavy-duty vehicles. EMFAC2011 reflects SJV COGs speed distributions for light-duty cars and trucks plus motorcycles.

The SJV COGs total VMT comparison and growth rates (excluding the portion of Kern County located in the Mojave Desert Air Basin) are shown in Figure 7-10 and Figure 7-11. Figure 7-12 and Figure 7-13 show the VMT and growth rate comparisons for Kern County in the Mojave Desert Air Basin.

Figure 7-10. VMT in the San Joaquin Valley (Excluding Portions of Kern County Located in the Mojave Desert Air Basin)

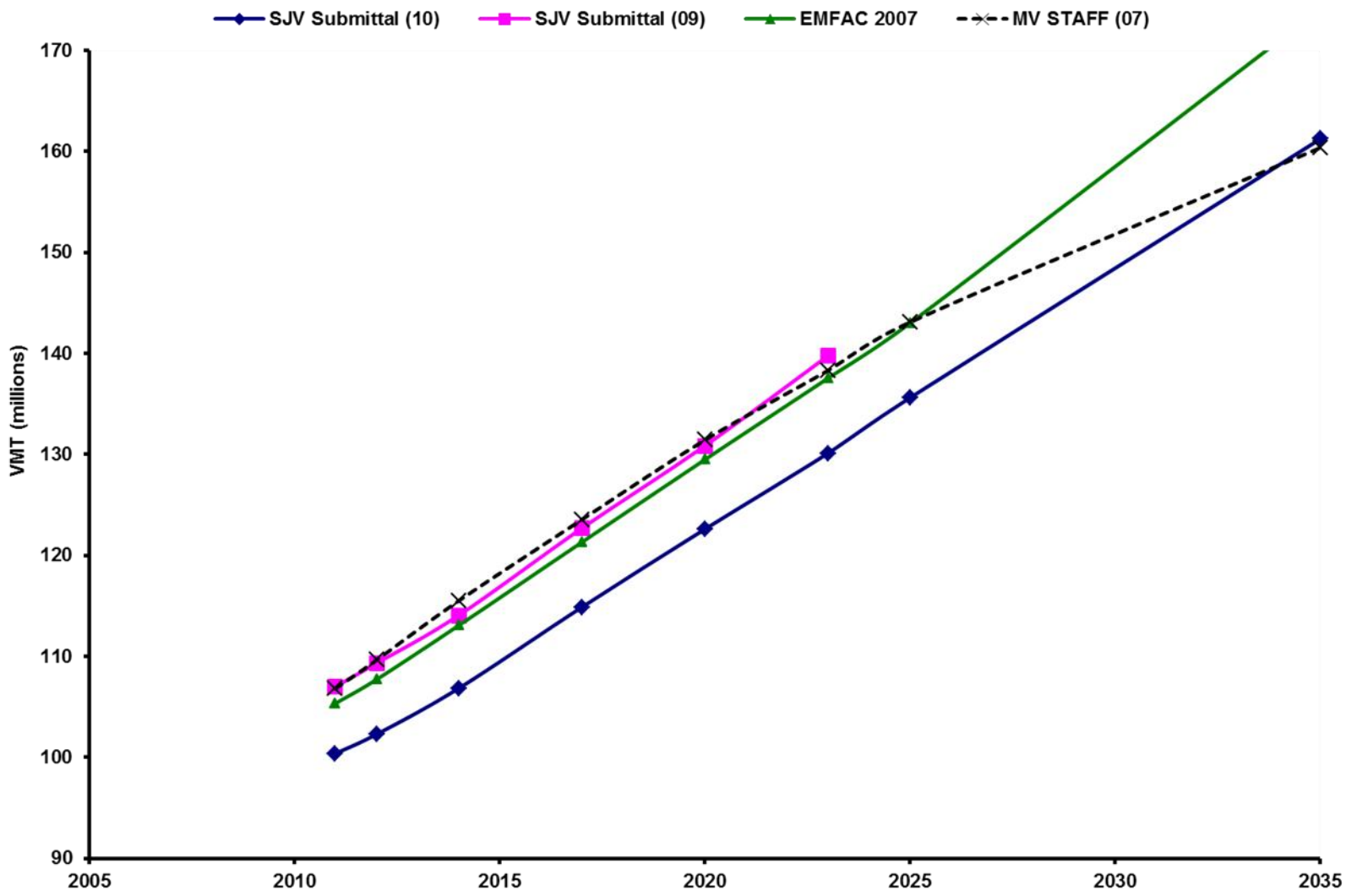


Figure 7-11. VMT and Human Population Growth in the San Joaquin Valley

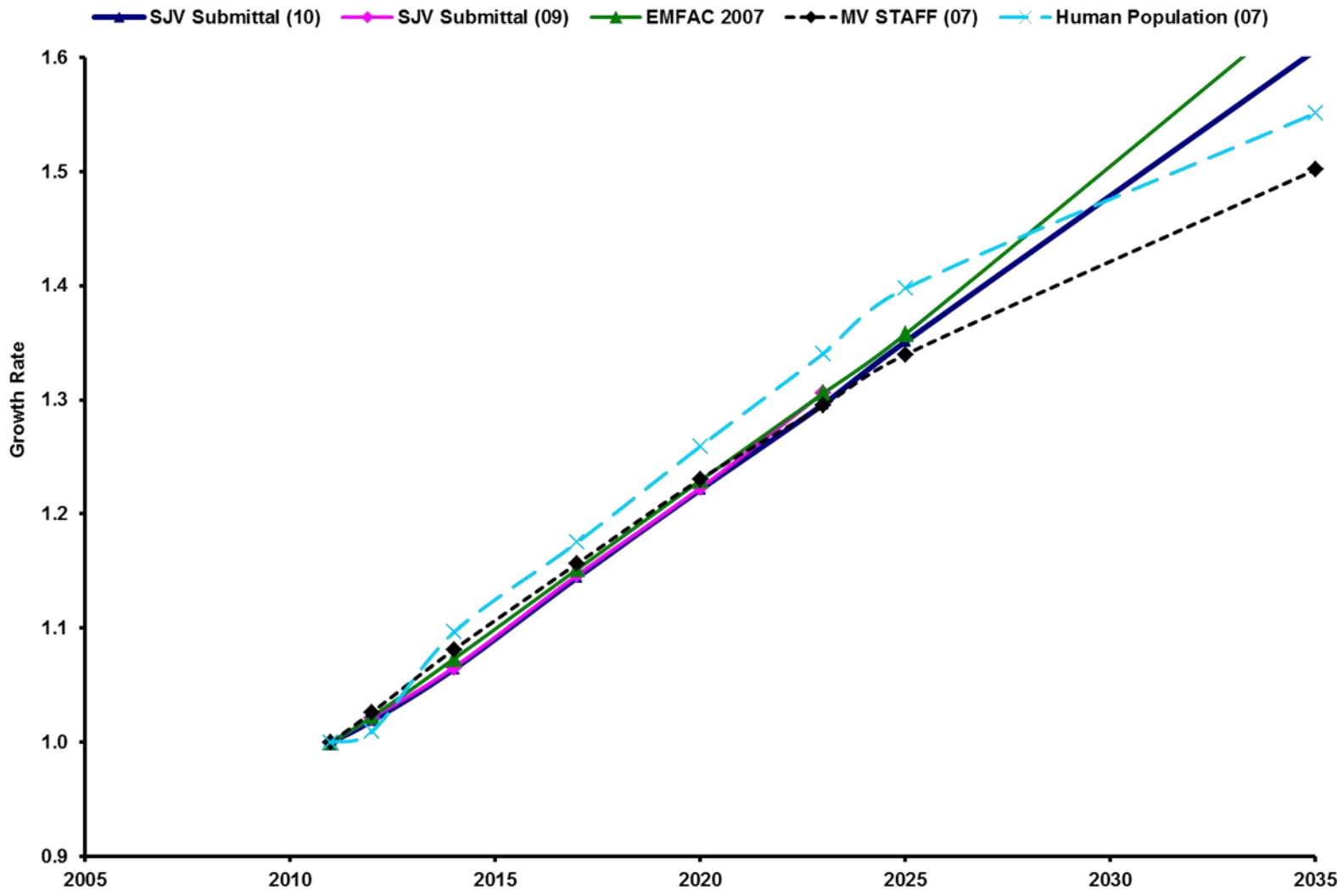


Figure 7-12. VMT in Kern County, Mojave Desert Air Basin

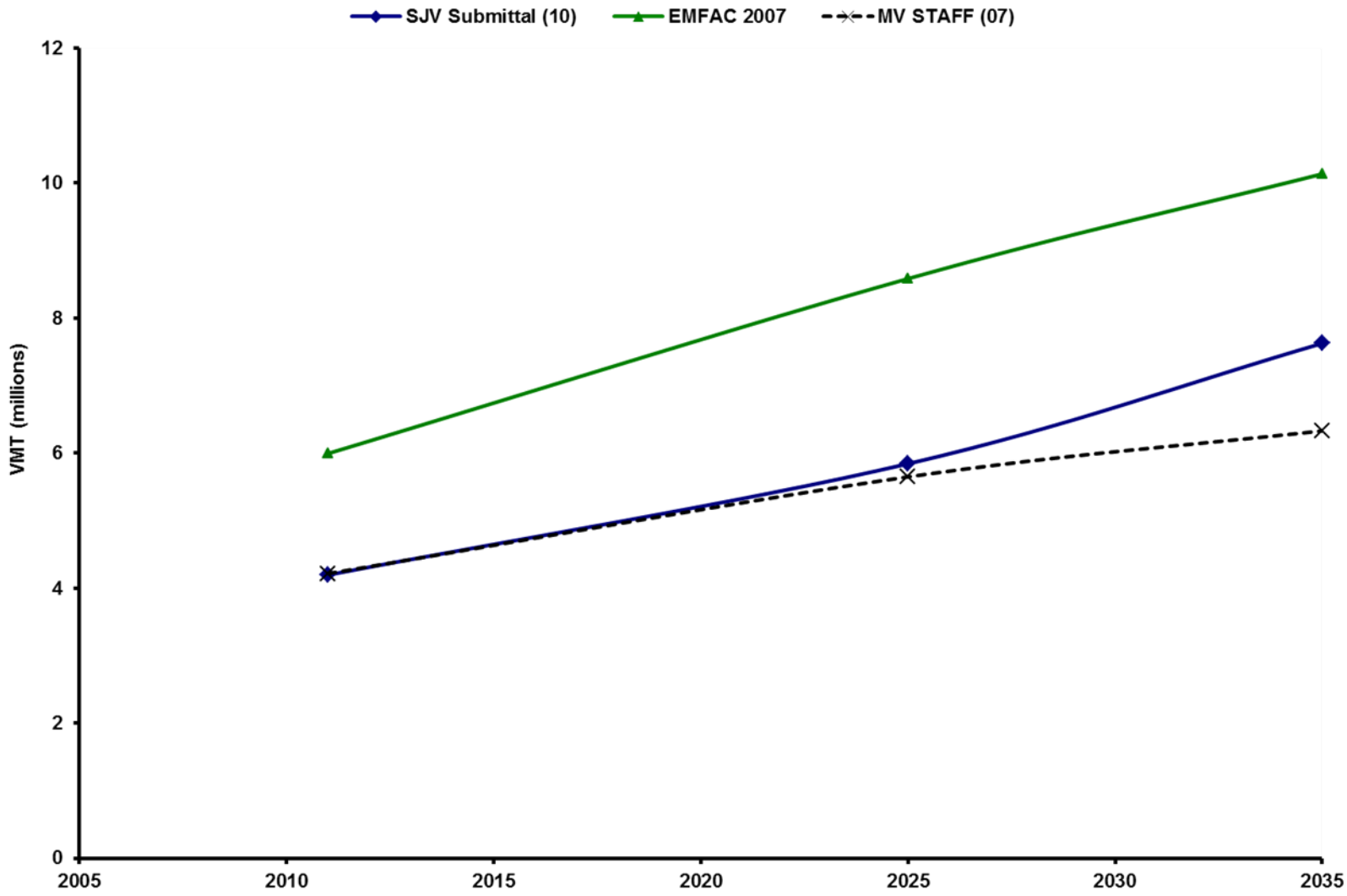
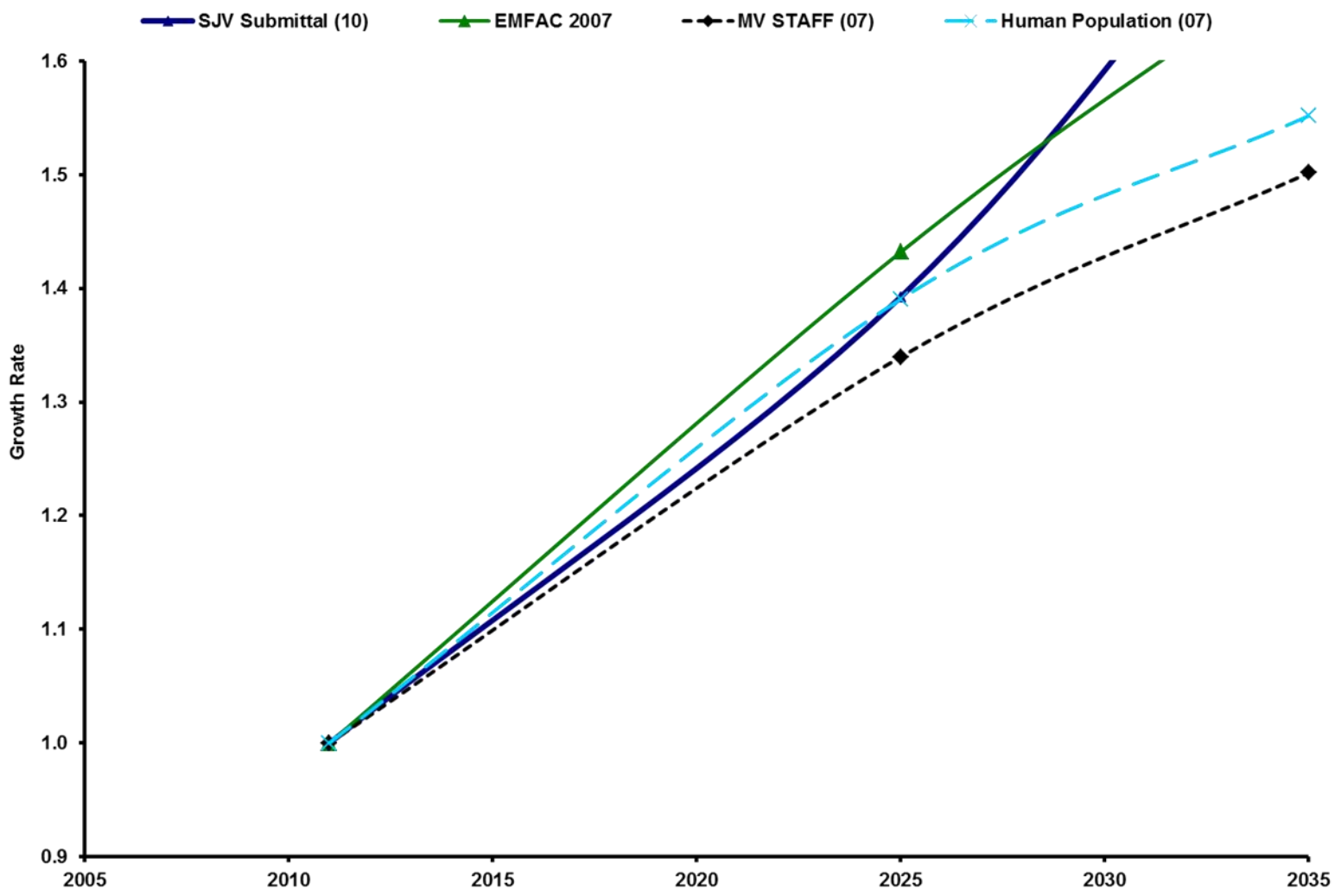


Figure 7-13. VMT and Human Population in Kern County, Mojave Desert Air Basin



8 APPENDIX: CARBON DIOXIDE EMISSION RATE UPDATES

The official greenhouse gas emissions inventory representing the transportation economic sector is developed using top-down methods based upon statewide fuel sales data and published at **http://www.arb.ca.gov/cc/inventory/inventory.htm**.

EMFAC2011 outputs carbon dioxide emissions and fuel consumption through the EMFAC2011-LDV and EMFAC2011-HD modules using a bottom-up emissions inventory calculation based on population, activity, and emission rates. The two approaches provide marginally different results. The top-down method is considered a more accurate assessment of fuel use and carbon dioxide emissions because fuel use is measured through tax receipts by the California State Board of Equalization. The bottom-up method used by EMFAC provides information the top-down method cannot provide, such as a breakdown of estimated fuel use and emissions by vehicle class, for different engine technologies, different model years of vehicles and other factors.

Since EMFAC2000 the model has output carbon dioxide emissions and estimated fuel consumption based on carbon balance. The estimates of carbon dioxide (CO_2) emissions in the EMFAC model come from direct chassis dynamometer exhaust tests. This section analyzes the effect of introduction of oxygenated fuels, and updates the previous (2000) analysis with recent dynamometer test data collected on the Unified Cycle. The methods of estimating fuel consumption from CO_2 emissions and carbon balance are explored as a function of oxygenate content. The forecasted CO_2 emissions estimates provided in EMFAC2011 assume implementation of the Pavley (AB1432) greenhouse gas emission limits; however these benefits are calculated in EMFAC2011-SG, and not in EMFAC2011-LDV; as a result the changes discussed here only reflect changes based on driving cycle and oxygenate content.

A summary of the emissions effects of these changes for various areas in the State is shown in Section 12. Table 8-1 shows the effect on criteria pollutants and CO2 for the year 2007. The proposed changes lower the CO2 emissions by about 2% in 2007, mostly due to slightly different results from the vehicle surveillance programs.

Table 8-1. Summary of Emissions Changes due to Revised Greenhouse Gas Emission Factors, Calendar Year 2007

Air Basin	CO2 Emission Changes (tons per day)
Statewide	-6,446
South Coast	-2,092
San Joaquin Valley	-596
Sacramento Valley	-476
San Diego	-502
San Francisco Bay Area	-1,673

We determine carbon dioxide emissions from vehicles by measuring the exhaust concentration of carbon dioxide while running a specified driving cycle with the car situated on a dynamometer. In this case we evaluated two driving cycles: the Federal Test Procedure (FTP) and Unified Cycle (UC). The FTP is used for emission certification of new vehicles, and is modeled after suburban driving around Los Angeles in 1977. The FTP is not considered to be representative of actual driving conditions as it reflects 30-year old traffic conditions, has no or little freeway driving, and measured acceleration rates were reduced in the development of the cycle to accommodate older technology dynamometers. In the EMFAC model, base emissions are estimated using the UC driving this cycle because it is intended to be representative of average driving. It was developed from California-specific chase-car studies completed in the early 90's. It reflects driving on freeways; therefore, has higher speeds and acceleration rates than the FTP cycle.

The CO_2 emissions data in the EMFAC2007 model date from EMFAC2000, and are based on testing of cars during the 1990s. Table 8-2 shows the sources of the FTP data analyzed for EMFAC2000 and for this update.

Table 8-3 shows the sources of UC data. The projects with "S" in the name are surveillances. The projects with "R" in the name are research projects. The middle digits (positions 3 and 4 from the left) are the year that the project was begun. The three surveillances listed in the last three lines of the table are new (since the EMFAC2000 work), and are the basis for this model revision.

Table 8-2. CO_2 FTP Emissions Projects

Project	Number of Passenger Cars	Number of Light Duty Trucks (Class-1)^	Number of Light Duty Trucks (Class-2)**	Number of Medium Duty Trucks^^
FTP Phase 1 Gasoline				
2S93C1	65		13*	
2R9312	74			
FTP Phase 2 Gasoline				
2S95C1	321		62*	16
2S97C1	217		64*	22
2R9312	39		6*	1
2R9513	89		6*	
2R9811	7		1*	
2S00C1	226	21	40	13
2S03C1	212	29	50	34
2S06C1	41		11	16

^ < 6000 pounds Gross Vehicle Weight Rating, < 3450 pounds Curb Weight
** < 6000 pounds Gross Vehicle Weight Rating, > 3450 pounds Curb Weight
^^ 6000 - 8500 pounds Gross Vehicle Weight Rating

Table 8-3. CO2 UC Emissions Projects

Project	Number of Passenger Cars	Number of Light Duty Trucks (Class-1)^	Number of Light Duty Trucks (Class-2)*	Number of Medium Duty Trucks^^
2R9312	39	6*		1
2R9513	89	6*		
2R9811	7	1*		
2S00C1	226	21	40	13
2S03C1	212	29	50	34
2S06C1	41		11	16

^ < 6000 pounds Gross Vehicle Weight Rating, < 3450 pounds Curb Weight
** < 6000 pounds Gross Vehicle Weight Rating, > 3450 pounds Curb Weight
^^ 6000 - 8500 pounds Gross Vehicle Weight Rating
* In these projects light duty trucks were not separated by class I and 2. They are combined.

The term "Phase 2" in Table 2 refers to Phase 2 Reformulated Gasoline. In 1995 vehicles being tested at the ARB Haagen-Smit Laboratory in El Monte started to be performed with commercial Phase 2 reformulated gasoline (RFG), which contained 10% MtBE (methyl t-butyl ether) at the time. We segregated the 1990's data into Phase 1 and Phase 2 RFG. We combined the recent surveillance data (from 2000 to 2007). We compiled the results for the three bags (test phases) of the FTP, as well as new UC results. The results of the data compilation for passenger cars are shown in Table 8-4 through Table 8-7 for the FTP and Table 8-8 through Table 8-11 for the UC. The new composite results are remarkably close to the EMFAC 2000 results. Segregating the light trucks into the separate LT1 and LT2 categories shows that the LT1s and PCs have similar CO_2 emission rates.

In EMFAC2007, fuel usage estimates are determined by carbon balance, which means that the emissions results for carbon containing species (carbon dioxide, carbon monoxide, and total hydrocarbons or volatile organic compounds) are used to determine the amount of fuel combusted. For EMFAC2011 the carbon balance methodology has been improved by accounting for oxygenated reformulated gasolines.

The carbon balance equation (for gasoline) as described in the EMFAC2000 Technical Support Document is as follows:

$$\text{gal/d} = 375 \text{ gal/ton C} * (0.273*CO_2 \text{ tpd} + 0.429*\text{CO tpd} + 0.866*\text{HC tpd})$$

The quantity in parentheses is the mass of carbon in the emission gases. The coefficients of the CO_2, CO and HC terms (0.273, 0.429, 0,866) are the weight fractions of carbon in those quantities. The first factor in the equation (375 gal/ton C) is the only one that would be affected by the presence of oxygen in gasoline. It is calculated from:

$$\text{gal/ton C} = 2000 \text{ lb/ton} / \text{wt frac C} / \rho_{gaso} \text{ lb/gal}$$

where ρ_{gaso} is the density of liquid gasoline, lb/gal

Properties of gasoline as well as MtBE and Ethanol gasoline blends are provided in Table 8-12.

Table 8-4. Passenger Car FTP CO_2 Results

	FTP Bag 1			FTP Bag 2			FTP Bag 3		
	CO_2			CO_2			CO_2		
MY and Technology	Number of Observations	mean	Standard Deviation	Number of Observations	mean	Standard Deviation	Number of Observations	mean	Standard Deviation
		g/mi	g/mi		g/mi	g/mi		g/mi	g/mi
75-80 Carb	69	565	176	74	556	163	73	494	148
81-85 Carb	73	399	89	73	407	104	73	351	48
86-92 Carb	49	344	74	49	343	74	49	302	58
81-85 FI	29	413	63	29	410	53	29	353	46
86-92 FI	283	393	66	283	401	70	282	349	52
93-99 FI	315	368	68	315	369	74	314	315	57
00+ FI	96	380	61	96	371	60	96	318	50
81-85 TBI	30	473	115	30	481	116	30	408	99
86-92 TBI	58	394	82	58	397	97	59	341	73

Carbureted (Carb); FI (Fuel-Injected); TBI (Throttle-Body Single-Point Fuel Injection)

Table 8-5. Light Duty Truck Class I FTP CO2 Results

	FTP Bag 1			FTP Bag 2			FTP Bag 3		
	CO_2			CO_2			CO_2		
MY and Technology	**Number of Observations**	**mean**	**Standard Deviation**	**Number of Observations**	**mean**	**Standard Deviation**	**Number of Observations**	**mean**	**Standard Deviation**
		g/mi	**g/mi**		**g/mi**	**g/mi**		**g/mi**	**g/mi**
75-80 Carb				1	514		1	456	
81-85 Carb	2	438	56	2	446	36	2	377	58
86-92 Carb	4	456	47	4	434	68	4	395	37
81-85 FI									
86-92 FI	7	432	56	7	425	49	7	372	44
93-99 FI	28	400	51	29	385	49	28	345	38
00+ FI	6	452	58	6	420	71	6	384	50
81-85 TBI									
86-92 TBI	2	414	4	2	397	10	2	352	33

Carbureted (Carb); FI (Fuel-Injected); TBI (Throttle-Body Single-Point Fuel Injection)

Table 8-6. Light Duty Truck Class 2 FTP CO2 Results

	FTP Bag 1			FTP Bag 2			FTP Bag 3		
	CO_2			CO_2			CO_2		
MY and Technology	Number of Observations	mean	Standard Deviation	Number of Observations	mean	Standard Deviation	Number of Observations	mean	Standard Deviation
		g/mi	g/mi		g/mi	g/mi		g/mi	g/mi
75-80 Carb									
81-85 Carb	2	596	84	2	576	81	2	533	65
86-92 Carb									
81-85 FI									
86-92 FI	14	553	69	14	532	67	14	474	54
93-99 FI	57	494	41	56	482	42	56	426	34
00+ FI	25	515	72	25	483	74	26	433	63
81-85 TBI									
86-92 TBI	5	518	38	5	507	34	5	461	44

Carbureted (Carb); FI (Fuel-Injected); TBI (Throttle-Body Single-Point Fuel Injection)

Table 8-7. Medium-Duty Vehicle FTP CO2 Results

	FTP Bag 1			FTP Bag 2			FTP Bag 3		
	CO_2			CO_2			CO_2		
MY and Technology	**Number of Observations**	**mean**	**Standard Deviation**	**Number of Observations**	**mean**	**Standard Deviation**	**Number of Observations**	**mean**	**Standard Deviation**
		g/mi	**g/mi**		**g/mi**	**g/mi**		**g/mi**	**g/mi**
75-80 Carb	15	747	108	15	738	115	15	679	112
81-85 Carb	7	707	69	7	666	48	7	604	47
86-92 Carb									
81-85 FI									
86-92 FI	2	630	73				2	597	123
93-99 FI	29	585	87	31	579	86	29	510	76
00+ FI	21	641	112	21	634	126	21	563	102
81-85 TBI									
86-92 TBI	10	745	200	10	703	184	10	849	715

Carbureted (Carb); FI (Fuel-Injected); TBI (Throttle-Body Single-Point Fuel Injection)

Table 8-8. Passenger Vehicle Unified Cycle CO2 Results

	UC Bag 1			UC Bag 2		
		CO_2		CO_2		
MY Fuel Delivery	**Number of Observations**	**mean**	**Standard Deviation**	**Number of Observations**	**mean**	**Standard Deviation**
		g/mi	**g/mi**		**g/mi**	**g/mi**
75-80 Carb	9	878	315	10	535	141
81-85 Carb	24	651	188	24	390	90
86-92 Carb	19	485	109	19	315	54
81-85 FI	9	656	95	10	397	52
86-92 FI	153	610	114	86	368	58
93-99 FI	247	591	124	248	343	61
00+ FI	96	640	120	96	353	59
81-85 TBI	4	672	88			
86-92 TBI	31	612	182	31	366	89

Carbureted (Carb); FI (Fuel-Injected); TBI (Throttle-Body Single-Point Fuel Injection)

Table 8-9. Light Duty Truck Class I Unified Cycle CO2 Results

	UC Bag 1			UC Bag 2		
		CO_2		CO_2		
MY Fuel Delivery	**Number of Observations**	**mean**	**Standard Deviation**	**Number of Observations**	**mean**	**Standard Deviation**
		g/mi	**g/mi**		**g/mi**	**g/mi**
75-80 Carb	1	703		1	516	
81-85 Carb	2	697	135	2	411	54
86-92 Carb	4	675	114	4	425	38
81-85 FI						
86-92 FI	7	641	94	7	407	48
93-99 FI	28	619	93	28	379	39
00+ FI	6	720	120	6	411	42
81-85 TBI						
86-92 TBI	2	598	35	2	391	11

Carbureted (Carb); FI (Fuel-Injected); TBI (Throttle-Body Single-Point Fuel Injection)

Table 8-10. Light Duty Truck Class 2 Unified Cycle CO2 Results

	UC Bag 1			UC Bag 2		
		CO_2		CO_2		
MY Fuel Delivery	Number of Observations	mean	Standard Deviation	Number of Observations	mean	Standard Deviation
		g/mi	g/mi		g/mi	g/mi
75-80 Carb						
81-85 Carb	2	925	175	2	595	94
86-92 Carb						
81-85 FI						
86-92 FI	14	828	100	16	524	57
93-99 FI	53	777	75	55	474	39
00+ FI	25	824	122	25	480	72
81-85 TBI						
86-92 TBI	5	802	60	5	509	77

Carbureted (Carb); FI (Fuel-Injected); TBI (Throttle-Body Single-Point Fuel Injection)

Table 8-11. Medium Duty Truck Unified Cycle CO2 Results

	UC Bag 1			UC Bag 2		
		CO_2		CO_2		
MY Fuel Delivery	Number of Observations	mean	Standard Deviation	Number of Observations	mean	Standard Deviation
		g/mi	g/mi		g/mi	g/mi
75-80 Carb	2	1168	149	1	783	
81-85 Carb	3	1112	205	3	698	61
86-92 Carb						
81-85 FI						
86-92 FI	2	1042	300	2	643	119
93-99 FI	26	970	171	25	550	81
00+ FI	21	1044	177	21	616	103
81-85 TBI						
86-92 TBI	1	611		1	406	

Carbureted (Carb); FI (Fuel-Injected); TBI (Throttle-Body Single-Point Fuel Injection)

Table 8-12. Properties of Oxygenated and Non-Oxygenated Gasolines

	Weight Percent Carbon	Weight Percent Hydrogen	Weight Percent Oxygen	Density (lbs/gallon)	Gallons per Ton Carbon
Non-oxy gasoline	85-88	12-15	0-0.2	6.0-6.5	350-392
Indolene, 9 psi	85.4	13.4	0.2	6.2	378
M10 (10M-90I)	83.6	13.4	2.0	6.2	386
E6 (5.2E 94.8I)	83.6	13.4	2.0	6.22	385
E10 (10E 90I)	82.1	13.4	3.7	6.24	390
E85 (85E 15I)	57.0	13.1	29.8	6.54	537

(M10 is 10% MtBE and 90% Gasoline; E10 is 10% Ethanol, 90% Gasoline)

Prior to 1994, gasoline sold in California was non-oxygenated, with the exception of gasoline sold in the South Coast Air Quality Management District. Beginning in 1996, California required reformulated gasoline, which was formulated using 10% MtBE. In 2004, California banned the use of MtBE as a fuel oxygenate, requiring instead that ethanol be used at 6% by weight (E6). Beginning in 2010, petroleum marketers began selling a 10% ethanol gasoline blend (E10). Gasoline exceeding 10% ethanol can be sold in California but may only be used in flex-fuel vehicles, which is currently a very small proportion of the vehicle fleet in California.

The impact of this change on the emissions inventory is relatively minor, and caused by both the updated base emission rates using updated information and the UC, and the impact of the inclusion of oxygenated fuels. Table 8-13 compares running CO2 emission rates by model year between EMFAC2007 and EMFAC2011. Passenger car emission rates are about 5% lower than in EMFAC2007 than in EMFAC2011, and Light Duty Trucks (Class I) are 6% lower in EMFAC2011 than EMFAC2007. Light Duty Trucks (Class 2) and Medium Duty Trucks are about 6% higher in EMFAC2011 than assumed in EMFAC2007. The effect on CO2 emissions statewide is shown in Table 8-14. Overall the emission rate update had a minor effect on emissions which differs by calendar year and is about a 2% reduction in estimated emissions into the future.

The calculation of CO2 emissions is dependent on fuel carbon content. Table 8-15 compares estimated fuel use using the EMFAC2011 (accounting for fuel oxygenate content) and EMFAC2007 (no accounting for fuel oxygenates) approaches. Results show estimated fuel use is 3%-4% higher in EMFAC2011 than in EMFAC2007.

Table 8-13. CO2 Running Emission Rates: EMFAC2011 vs EMFAC2007.

	Running CO2							
	LDA		LT1		LT2		MT3	
Model Year	EMFAC 2010	EMFAC 2007	EMFAC 2010	EMFAC 2007	EMFAC 2010	EMFAC 2007	EMFAC 2010	EMFAC 2007
	g/mi	g/mi	g/mi	g/mi	g/mi	g/mi	g/mi	g/mi
1976	570	585	554	550	558	571	773	838
1977	569	584	554	550	559	572	774	839
1978	569	583	554	550	559	572	769	838
1979	566	584	554	549	559	572	769	839
1980	540	583	545	550	550	563	749	840
1981	489	430	548	436	553	637	761	748
1982	503	430	542	436	547	638	757	747
1983	498	430	490	441	495	644	769	745
1984	488	432	487	441	492	645	774	756
1985	422	433	479	443	484	648	754	758
1986	415	409	471	439	476	571	723	698
1987	415	409	467	439	473	572	685	699
1988	417	409	465	440	470	573	708	701
1989	440	409	467	442	472	575	712	704
1990	458	411	463	443	468	576	692	705
1991	458	411	456	443	462	577	697	706
1992	458	411	455	444	460	578	685	707
1993	438	385	473	414	479	524	665	606
1994	414	385	493	415	498	526	659	606
1995	405	386	500	416	506	527	660	607
1996	405	385	498	417	504	528	663	606
1997	405	385	499	418	505	529	702	606
1998	405	382	499	418	505	529	697	608
1999	404	379	498	418	504	529	690	610
2000	404	387	498	453	504	536	685	684
2001	403	387	498	453	504	536	683	685
2002	403	387	497	453	504	536	682	685
2003	403	387	497	453	503	535	682	685
2004	403	390	497	452	503	535	682	684
2005	402	394	496	452	503	534	681	683
2006	400	394	494	449	502	534	681	683
2007	399	394	493	448	502	534	681	682
2008	399	393	493	448	502	533	680	682

Table 8-14. CO2 Emissions by Calendar Year Resulting from CO2 Emission Rate Updates for Selected Calendar Years

	EMFAC 2007	EMFAC 2010	Difference	Percent Increase
Calendar Year	**CO2 (Tons per Day)**			
1990	409,201	411,454	2,253	0.6%
2000	463,492	453,755	-9,737	-2.1%
2005	575,802	562,711	-13,091	-2.3%
2007	552,745	540,824	-11,921	-2.2%
2010	574,626	563,701	-10,925	-1.9%
2014	620,393	610,742	-9,651	-1.6%
2017	654,218	645,355	-8,863	-1.4%
2020	683,822	675,460	-8,361	-1.2%
2023	714,979	706,729	-8,250	-1.2%

Table 8-15. Comparison of CO2 Emissions Calculated With and Without Accounting for Fuel Oxygenate Content

1000 Gallons Gasoline per Day			
Calendar Year	**Fuel Use Calculated Accounting for Oxygenated Fuel (EMFAC2011 Approach)**	**Fuel Use Calculated Without Accounting for Oxygenated Fuel (EMFAC2007 Approach)**	**Ratio EMFAC2011 Approach to EMFAC2007 Approach**
1990	39,198	39,198	1.00
2000	41,781	40,695	1.03
2005	48,507	47,247	1.03
2007	47,230	46,003	1.03
2010	49,793	47,878	1.04
2014	53,533	51,474	1.04
2017	56,196	54,035	1.04
2020	58,564	56,312	1.04
2023	61,122	58,771	1.04

9 APPENDIX: BRAKE WEAR PARTICULATE MATTER EMISSIONS UPDATE

EMFAC2011 estimates the directly emitted emissions of total particulate matter (PM) for exhaust, tire wear, and brake wear. EMFAC2007 used an emission factor of 12.8 milligrams per mile (12.8 mg/mi PM) to estimate the amount of airborne dust attributable to brake wear. This emission factor, based on twenty-year-old tests of asbestos friction-materials from automobile disc brakes, was applied to all vehicles. Two studies were performed on modern asbestos-replacement friction materials over the past 10 years. Staff correlated results from these studies with wheel load, braking speed and material. The results were applied to the braking events of the Unified Cycle (UC), and the Transient and Cruise cycles for medium heavy-duty and heavy heavy-duty trucks, taking into account that heavy heavy-duty trucks have eight rear and two front brakes compared to four brakes on cars. This information was used to update brake wear emissions estimates in EMFAC2011.

Updated per-mile braking emission rates are, in general, about 2.5 times greater in EMFAC2011 than in EMFAC2007. This is increase is caused by modern brake pad materials that are more friable but less toxic than older asbestos based technologies. Staff analysis also found that the speed at which braking occurs, the weight of the vehicle, and, most importantly, the fraction of stop-and-go driving affects the per-mile airborne brake wear rate. A summary of the increases for various areas in the State is shown in Table 9-1 below. Implementation of the proposed modification results in an increase in the PM inventory of about 30 tons per day statewide in 2007. This is a more than tripling of the brakewear emissions and a 50% increase in total PM emissions. The increase in PM2.5 is less than for PM due to the relatively small fraction of brake wear PM in the PM2.5 size fraction.

Table 9-1. PM10 Emissions Increase Due to Brake Wear Method Improvement

Air Basin	PM10 Emissions Increase (Tons per Day)	
	2007	2023
Statewide	29.95	37.34
South Coast	11.65	13.55
San Joaquin Valley	3.32	4.69
Sacramento Valley	2.25	3.09
San Diego	2.77	3.17
San Francisco Bay Area	5.5	6.68

EMFAC2007 brake wear emission factors were, carried over from earlier versions of the U.S. EPA Mobile model. The U.S. EPA in turn derived the 13 mg/vehicle-mile estimate from a 1983 paper by Cha et al.[2] (U.S. EPA and Northrop). That work collected particles generated from operating a disc brake dynamometer with asbestos friction

[2] Cha, S, P. Carter, and R. Bradow. 1983. Simulation of Automobile Brake Wear Dynamics and Estimation of Emissions. SAE Paper 831036. Society of Automotive Engineers, Warrendale, PA.

materials on a schedule of braking events typical of Raleigh City driving. The original result of 12.8 mg/mile was calculated from the following equation:

(2 x 2.43 mg/application front disc + 2 x 1.68 mg/application rear) x 31% airborne x 5.1 applications/mi.

Cha et al estimated 0.75 mg PM / application airborne (out of a total brake pad weight loss of 2.43 mg/application) for one disc brake. So, when calculating brake wear emissions there are a number of variables of interest including (a) the number of brakes per vehicle; (b) dust emissions per brake application; (c) the fraction of dust that becomes airborne in various size fractions; and (d) the number of brake applications per mile. The amount of dust generated per brake application is a function of the type of friction material, the type of brake, the deceleration rate, the vehicle weight, and the brake pad size. In many studies, the experimental method used provides only the airborne dust per application (the product of the gross dust emissions per application and the fraction of dust airborne), so the variables of dust emission per application and fraction of dust airborne are in some cases not reported separately.

Two new studies over the past 10 years have characterized particulate matter emission from braking events using modern materials: Garg et al[34] from General Motors and Sanders et al[56] from Ford. Garg gave the breakdown of the sales of friction materials in 1998, shown below in Table 9-2. The trucks in this table are pickups and full-size sport utility vehicles. All vehicles were equipped with disc brakes unless otherwise noted. 1998 was the last year for asbestos-containing materials in OEM brake pads.

Table 9-2. Sales of Brake Pad Materials in 1998 (Garg et al., 2000a)

		Semi-Metallic	Low-Metallic	Non-Asbestos Organic	Asbestos Organic
Front Brakes	**Automobile**	70%	15%	15%	
	Truck	75%	25%		
Rear Brakes	**Automobile**	50%	12%	16%	22% (drum)
	Truck	75% (drum)	15%	10%	

[3] Garg, B., S. Cadle, P. Groblicki, P. Mulawa, C. Laroo, and G. Parr. 2000a. Brake-wear Particulate Matter Emissions. Report R&D 9033. General Motors Research and Development Center

[4] Garg, B., S. Cadle, P. Mulawa, P. Groblicki, C. Laroo, and G. Parr. 2000b. Brake Wear Particulate Emissions. *Env Sci & Tech* 34:4463-4469.

[5] Sanders, P., T. Dalka, N. Xu, M. Maricq, and R. Basch. 2002. Brake Dynamometer Measurement of Airborne Brake Wear Debris. SAE Paper 2002-01-1280. Society of Automotive Engineers, Warrendale, PA.

[6] Sanders, P., N. Xu, T. Dalka, and M. Maricq. 2003. Airborne Brake Wear Debris: Size Distributions, Composition, and a Comparison of Dynamometer and Vehicle Tests. *Env. Sci. & Tech.* 37:4060-4069.

In the Garg and Sanders studies, researchers tested brake pads with different friction materials on a shrouded brake dynamometer, sampled dusts generated by each braking event, and measured the breakdown of emissions by particle size. Results are shown in Table 9-3.

Table 9-3. Airborne Dust Emissions per Brake Application

Material	Source	Average Brake Speed (mph)	Dust (mg/stop)	Wheel Load (pounds)	Wind Speed (mph)	Brake Drag (pounds)
Low-Metallic	Sanders	15	6	1070	8	120
		15	4	1070	8	120
		31	21.5	1070	8	856
		15	9	1070	7	120
		30	24.5	1070	7	196
		30	21	1070	40	196
Semi-Metallic	Sanders	15	1.5	1447	8	160
		31	20	1447	8	1160
		15	1.5	1447	7	160
	Garg	16	3.9	1984	2-13	586
		16	1.7	1616	2-13	469
Non Asbestos Organic	Sanders	15	0.9	1070	8	120
		31	11.5	1070	8	856
		15	1.4	1076	7	120
	Garg	16	4.6	1376	2-13	407
		16	1.9	1671	2-13	500
		16	3	1577	2-13	469
		16	2.1	592	2-13	167
		16	6.5	1434	2-13	430

Results shown in Table 9-3 are corrected to a wheel-installed basis and 50% airborne sampling efficiency. Other characteristics of the tests varied. For example, while both studies measured emissions from full stops, Garg et al. used repeated stops from 32 miles per hour at a 6.5 miles/hour-sec deceleration rate. In contrast, Sanders et al., used several braking programs including a series of 24 stops from various speeds (22-55 mph) at variable deceleration rates (1.3-3.4 mph/second); a series of 10 stops from 62 miles per hour at 17.7 mph/second; and a series of stops from 60 miles per hour at 4 mph/second. Sanders et al found a 50% airborne fraction using a wind tunnel at 40 miles per hour. While this is higher than the 31% previously assumed, the Sanders study is more representative of real-world driving and as a result the 50% factor is used in this analysis.

The frequency and intensity of braking events is depending on real-world driving conditions. EMFAC2007 and previous versions of EMFAC assumed a PM emissions factor that was based on a statistical analysis of Raleigh city driving (Cha, 1983) which assumed 5.1 brake applications per mile, 69% on average of a full stop with an initial braking even velocity of 22 mph. The fraction of a full stop was defined as the initial velocity squared minus final velocity squared all divided by initial velocity squared - this is the ratio of the actual kinetic energy change to the absolute kinetic energy.

In this analysis we updated our assumptions about the frequency and intensity of braking events. We used the Unified Cycle (LA 92) for passenger cars and SUVs, which is the same driving cycle upon which emission factors are based for all pollutants in EMFAC. For medium heavy-duty trucks, we used the ARB MHD cycle developed for the CRC E55/59 testing. The cruise, low-speed transient, and high-speed transient cycles were weighted according to their activity. For heavy heavy-duty trucks, the ARB HHD cycles were used, and weighted according to their activity. Heavy-duty truck activity is dominated by high speed cruising (interstate travel). Thus the braking cycle for them has few applications per mile and the events are shallow (low-energy). For urban buses we used the OCTA (Orange County Transit Authority) cycle. This was developed from actual tracking of buses in Orange County, and has more 40 mi/h cruising than the New York City Cycle or the SAE Central Business District cycle. The severity, frequency and average speed of braking for each vehicle type is shown in Table 9-4, and is compared to the assumptions in EMFAC2007 based on Cha et al.

Table 9-4. Assumed Braking Attributes by Vehicle Type

Vehicle Type	Braking Cycle	Braking Frequency (Applications/mile)	Initial Velocity (mph)	Fraction Full Stop
Passenger Cars and SUVs	UC	4.0	27.1	61%
Medium-Heavy Duty Trucks	ARB-MHD	3.0	29.1	49%
Heavy Heavy-Duty Trucks	ARB-HD	1.2	31.5	8%
Urban Transit Buses	OCTA	8.2	21.2	73%
School Buses	MHD-LS Transient	14	12.7	79%
All (EMFAC2007) from Cha et al. (1983)	Raleigh City	5.1	22.1	69%

To develop a model of brake wear emissions, staff combined data by material and evaluated the results. Figure 9-1 and Figure 9-2 show modeled results for non-asbestos organic materials and semi-metallic materials respectively. The slope of the emissions vs wheel load was taken in both cases from the 15 and 16 mph results. The same slope was assumed for the 31 mph results. These slopes were used to scale the automotive data to truck applications. Representative loads are shown in Table 9-5.

Figure 9-1. Modeled Brake Dust Emissions: Non-Asbestos Organic Materials

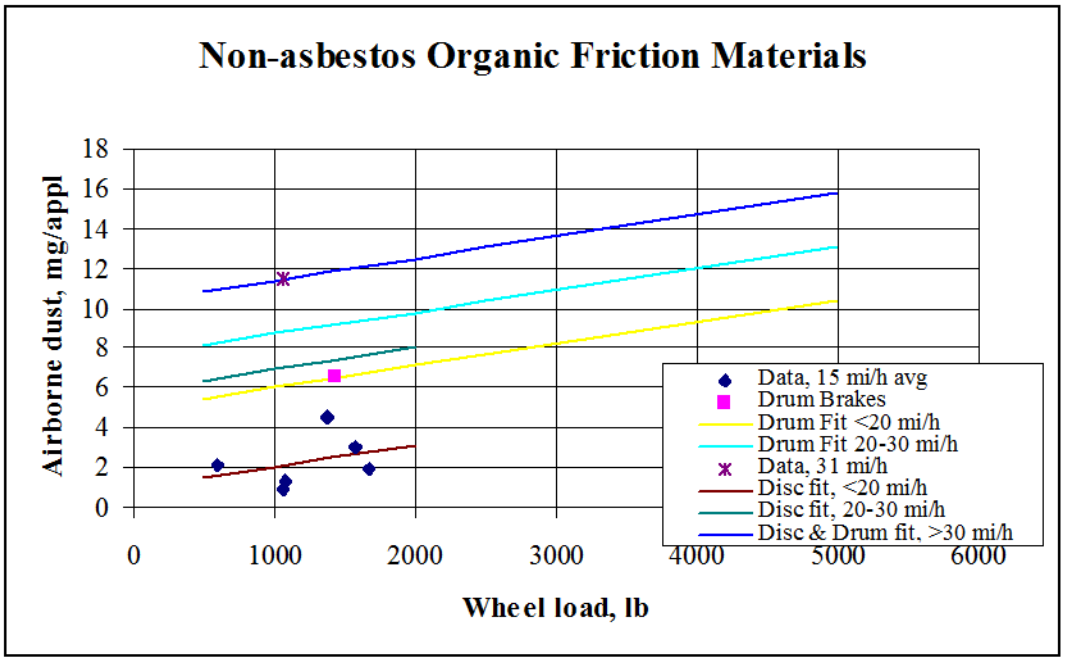


Figure 9-2. Modeled Brake Dust Emissions: Semi-Metallic Materials

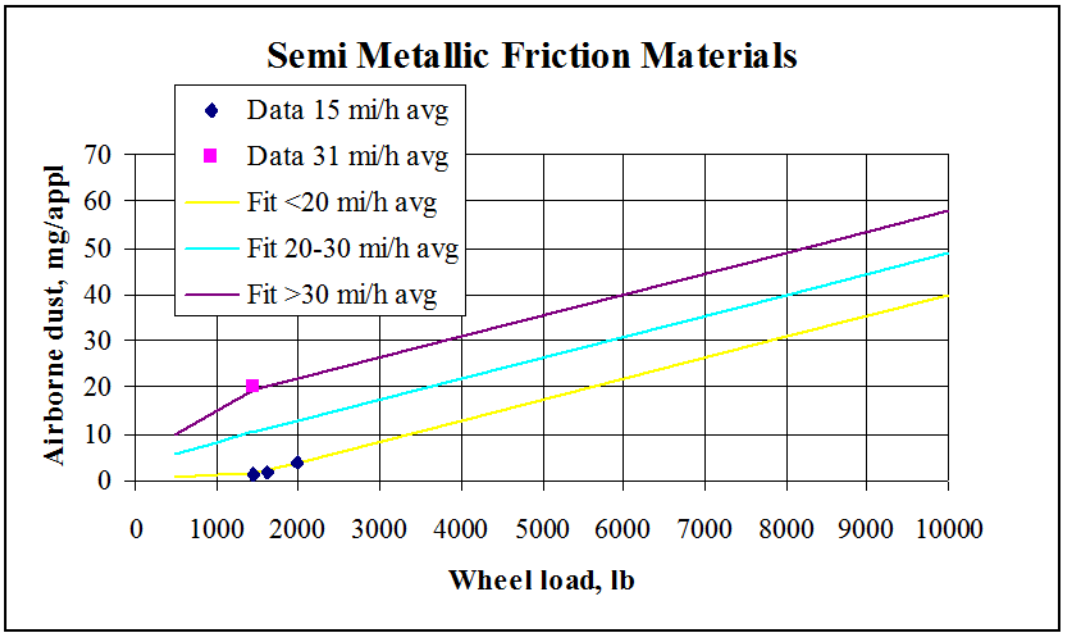


Table 9-5. Assumed Wheel Braking Loads

	Assumed Gross Vehicle Weight (pounds)	Front (pounds/wheel)	Rear (pounds/wheel)	Rear Trailer (pounds/wheel)
Car	3100	1100	450	
SUV	6000	2100	900	
Medium Heavy Truck	20000	7000	3000	
Heavy Heavy-Duty Truck	52000	9000	4600	3900
Urban Bus	42000	14700	6300	

The figures show a correlation between average brake event speed (average of beginning and ending speed in the braking event) and emissions. In general, emissions are higher as a function of wheel load (brake inertia weight). The newer asbestos-free braking materials were found to have much higher emissions than asbestos friction materials. The (Cha,1983) result was about 0.75 mg airborne dust per application for an automotive front brake.

Brakes with the wheel loads in Table 9-5 were modeled as being operated on braking cycles derived from typical driving based on the test cycles described in Table 9-4. Emission factors were estimated by friction material and scaled by wheel load by average braking speed (average of initial and final speeds). Braking event emissions for partial stops were scaled by the kinetic energy change (difference of final speed squared and initial speed squared).

Results of this calculation for several vehicle types are shown in Table 9-6 and Table 9-7. The predicted value for passenger cars is about 34 mg/mi, about two and a half times the value of Cha et al (1983). This is largely due to the fact that the new asbestos-free friction materials give off more dust during braking than did the old asbestos-containing materials.

Table 9-6. Calculated Brake Wear Emission Rates.

	EMFAC2011			
Vehicle Category	**Passenger Car**	**Light Duty Truck 1**	**Light Duty Truck 2**	**Medium Duty Vehicle**
Assumed GVWR (pounds)	3100	3700	5000	7000
Brake Description	4 discs	4 discs	4 discs	4 discs
Friction Material Front	semi-metallic	semi-metallic	semi-metallic	semi-metallic
Friction Material Rear	semi-metallic / non asbestos organic	semi-metallic	semi-metallic	semi-metallic
Emissions per Application (Front)	4.9	5.2	6.2	10
Emissions per Application (Rear)	3.6	3.1	3.5	4.4
Fraction Airborne	50%	50%	50%	50%
Applications per Mile	4	4	4	4
Initial Velocity (mph)	27.1	27.1	27.1	27.1
Fraction Full Stop	61%	59%	60%	60%
Total Airborne Dust (mg/mile)	34	33	38.6	57.4

	EMFAC2011			
Vehicle Category	**Light Heavy Truck 1**	**Light Heavy Truck 2**	**Medium Heavy Truck**	**Heavy Heavy Truck**
Assumed GVWR (pounds)	9500	12500	20000	52000
Brake Description	2 front discs and 2 rear drums	2 front discs and 2 rear drums	2 front discs and 2 rear drums	2 front discs, 4 tractor drums, 4 trailer drums
Friction Material Front	semi-metallic	semi-metallic	semi-metallic	semi-metallic
Friction Material Rear	non-asbestos organic	non-asbestos organic	non-asbestos organic	non-asbestos organic
Friction Material Trailer				non-asbestos organic
Emissions per Application (Front)	17.2	19.6	32.4	21.6
Emissions per Application (Rear)	7.4	8.4	11	6.2
Emissions per Application (Trailer)				5.8
Fraction Airborne	50%	50%	50%	50%
Applications per Mile	3.2	3.3	3	1.2
Initial Velocity (mph)	29.1	29.1	29.1	31.5
Fraction Full Stop	49%	49%	49%	8%
Total Airborne Dust (mg/mile)	78.3	91.2	132.9	62.9

		EMFAC2011		EMFAC2007
Vehicle Category	**Urban Bus**	**Motorcycle**	**School Bus**	**All Vehicles**
Assumed GVWR (pounds)	42000	650	20000	4300
Brake Description	2 front discs and 2 rear drums	2 discs	2 front discs and 2 rear drums	2 discs and 2 drums
Friction Material Front	semi-metallic	semi-metallic	semi-metallic	Asbestos-Organic
Friction Material Rear	non-asbestos organic	semi-metallic / non asbestos organic	non-asbestos organic	
Emissions per Application (Front)	88.8	2.9	40	2.4
Emissions per Application (Rear)	17.2	3.2	12	1.7
Fraction Airborne	50%	50%	50%	31%
Applications per Mile	8.2	4	14	5.1
Initial Velocity (mph)	21.2	27.8	12.7	22.1
Fraction Full Stop	73%	60%	79%	69%
Total Airborne Dust (mg/mile)	859.4	12.4	760	12.8

Table 9-7 Calculated Brake Wear Emission Rates by Technology Group.

Technology Group	Description	Present	Proposed
		g/mi	g/mi
1-37	PCs, LDTs, MDVs Gas	0.0128	0.0375
40-43	PCs (Mexican)	0.0128	0.0375
46-57	M4 Truck Gas	0.0128	0.078
60-71	M4 Truck Diesel	0.0128	0.078
76-87	M5 Truck Gas	0.0128	0.091
90-101	M5 Truck Diesel	0.0128	0.091
106-114	HDL&M Truck Gas	0.0128	0.133
120-131	HDL&M Truck MH OB Dsl	0.0128	0.133
136-144	HDH Truck Gas	0.0288	0.063
150-161	HDH Truck Diesel	0.0288	0.063
170-177	PCs Diesel	0.0128	0.034
178-185	LDTs Diesel	0.0128	0.036
186-194	MDVs Diesel	0.0128	0.057
200-211	HDH Truck Diesel Federal	0.0288	0.063
216-225	Urban Buses Diesel	0.0128	0.859
228-237	School Buses Gas	0.0128	0.76
240-251	School Buses Diesel	0.0128	0.76
260-277	Motorcycles	0.0064	0.012

10 APPENDIX: GASOLINE PM EMISSION FACTOR UPDATES

UPDATE

The current exhaust emissions standard for PM from automobiles is 10 mg/mile. As shown in Table 9-6 above, passenger vehicles emit between 30 and 60 mg PM / mile from brake wear alone. Passenger vehicles manufactured since 1996 have met and exceeded the current exhaust emissions standard, and today 85 – 90% of particulate matter emitted from passenger vehicles is dust from tire and break wear emissions.

Gasoline PM emission factor updates in EMFAC2011 for 2004 and newer port fuel injected (PFI) and gasoline direct injected (GDI) engines were developed using tests results from 40 vehicles on the Federal Test Procedure (FTP) driving cycle, and 10 vehicles on the Unified Cycle (UC). FTP results appeared to show a statistically significant difference between newer technology PFI engines and newer technology GDI engines. This difference is described in this section and integrated into EMFAC2011.

In August 2011 staff received new testing data from U.S. EPA on 15 PFI and 2 GDI vehicles. These vehicles were tested by USEPA on the FTP and the US06 which is an aggressive driving cycle designed to identify off FTP cycle emissions. These data cast the assumptions developed for EMFAC2011 into question. Results from analysis of the USEPA data suggested that under FTP driving conditions emission rates for most PFI vehicles are very clean, and potentially cleaner than GDI vehicles. However, some newer PFI vehicles may burn oil through engine deterioration, and that could lead to higher emissions that could meet or exceed PM emission rates from current GDI technologies. At the same time testing on the US06 driving cycle was suggestive, although not conclusive, that PFI engines may have less precise engine control under aggressive conditions than GDI vehicles, leading to potential off-cycle PM emissions in excess of those expected under the FTP.

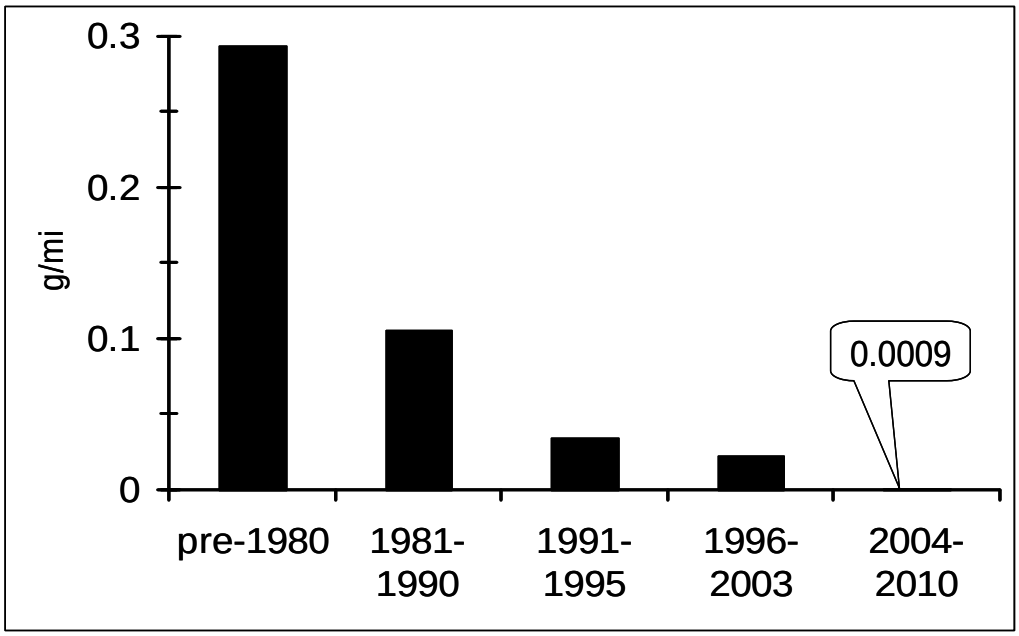
An overall analysis of the available data at this time suggests that while it is clear both GDI and PFI technologies emit at levels far below the current emissions standard of 10 mg/mile, it is not clear that 2004 and newer GDI technologies are cleaner than 2004 and newer GDI technologies.

The net impact on the inventory of this uncertainty is minimal, because the vast majority of fine particulate matter emitted by passenger vehicles is generated by tire and break wear. Statewide, gasoline vehicle particulate matter emissions from exhaust, tire wear, and brake wear represent around 3% of all PM2.5 emitted in California. Of that, only about 10-15% of that 3%, or 0.5% of the total is emitted from passenger vehicle exhaust.

These assumptions are continuing to be refined and will be discussed in greater detail through the Advanced Clean Car Rulemaking currently scheduled for December, 2011.

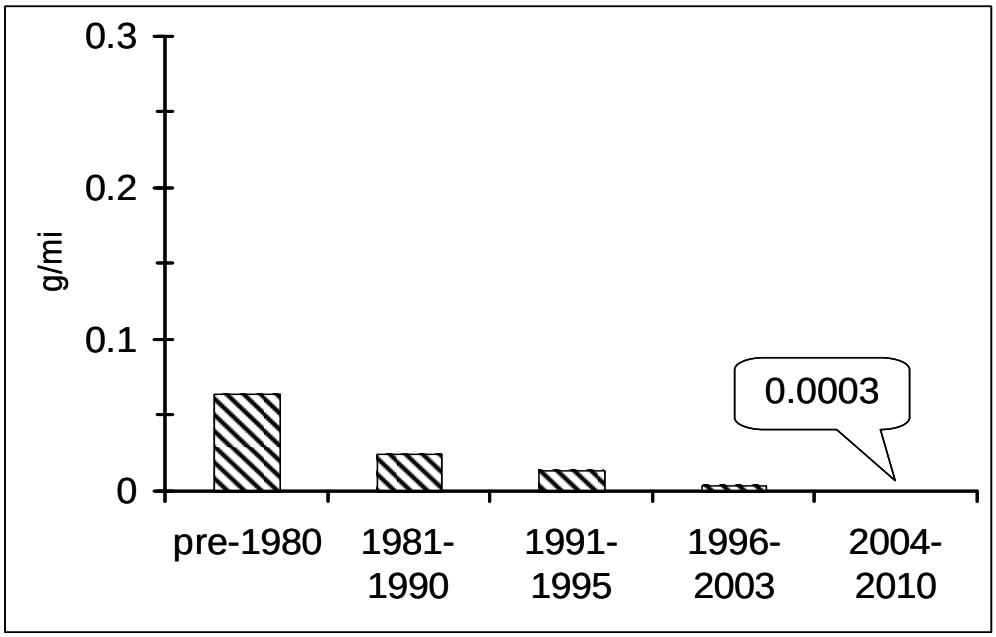
Basic emission rates for light duty gasoline vehicles have been updated using data from the Kansas City PM Characterization Study[7] (E-69). Those vehicles were certified to Federal Standards. Emissions data were collected under conditions prescribed in the Federal Test Procedures, and vehicles were operated over the LA92 Unified Driving Cycle. Figure 10-1 shows Kansas City Study $PM_{2.5}$ emission factors for cold start (Bag 1), and Figure 10-2 shows $PM_{2.5}$ hot running exhaust (Bag 2) by model year group through 2003. Measurements for newer vehicles (2004-2010) are from tests of in-use PFI vehicles over the same cycles and conditions but conducted at ARB's Haagen Smit Laboratory.

Figure 10-1. PM2.5 Emission Factor: Cold Start Exhaust (Bag 1)



[7] Kansas City PM Characterization Study, EPA420-R-08-009, April 2008

Figure 10-2. PM2.5 Emission Factor: Hot Stabilized Exhaust (Bag2)



We expect the percentage of gasoline direct injection (GDI) engines to increase from current levels in order to meet the GHG emission targets. We assumed that current wall-guided GDI engines will penetrate the fleet first, followed by cleaner center-walled technology in the future. The anticipated fleet penetration of GDI technology and its impact on $PM_{2.5}$ emission for both Bag 1 and Bag 2 are shown in Figure 10-3 and Figure 10-4, based on ARB testing of wall-guided technology GDI vehicles.

Figure 10-3. GDI Fleet Penetration and Cold Start Exhaust (grams per mile)

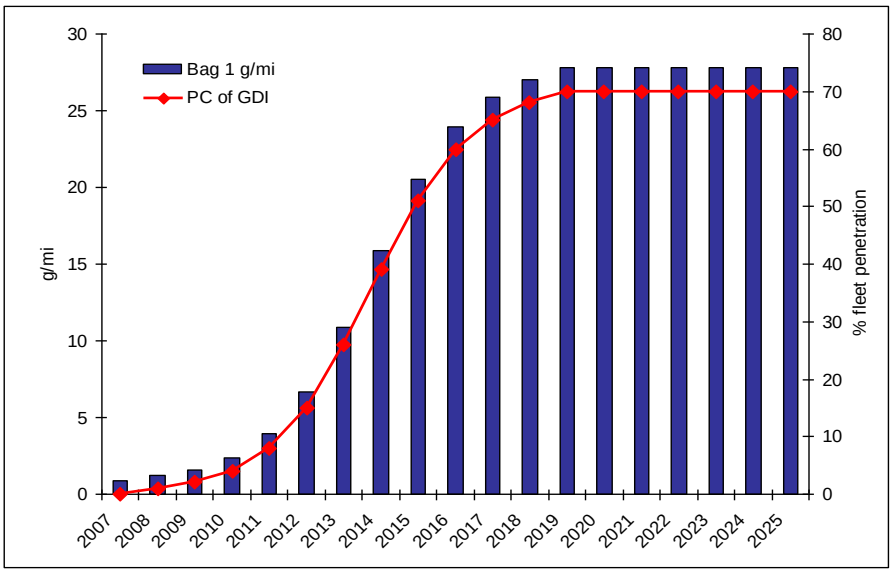
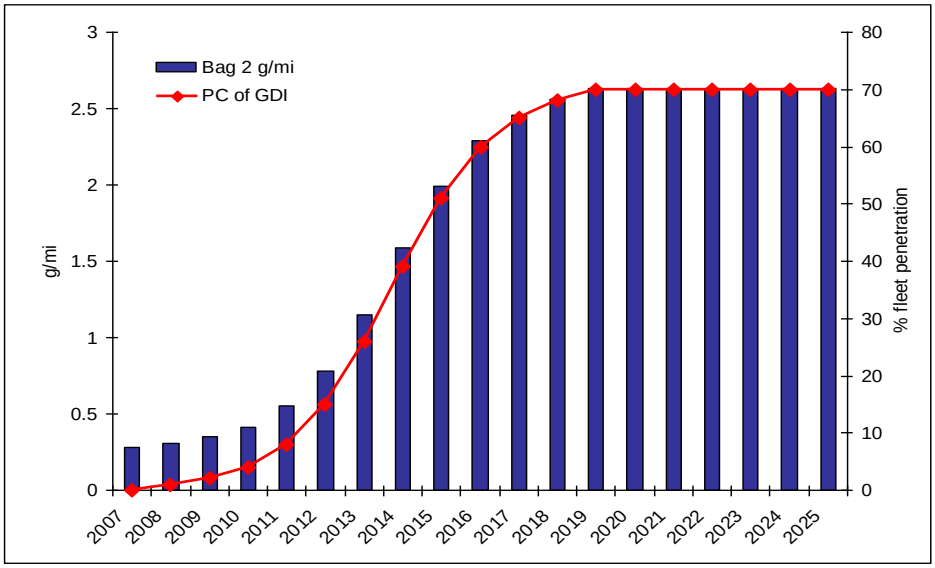


Figure 10-4. GDI Fleet Penetration and Hot Stabilized Exhaust (grams per mile)



The current LEV II standard for PM is 10 mg/mi and will be in effect until 2016. As these standards are further reduced we expect technological improvements in GDI engines will result in substantial PM reductions over the present GDI. Our test results of one center-guided GDI engine showed about ⅓ of the PM emissions from wall-guided GDI engines. We assume that in the future these low PM emitting center-guided GDI engines will be the dominant technology. Figure 10-5 shows how technology is expected to change and the expected emissions.

Figure 10-5. Forecasted Light Duty Vehicle Technology Mix: 2007-2025.

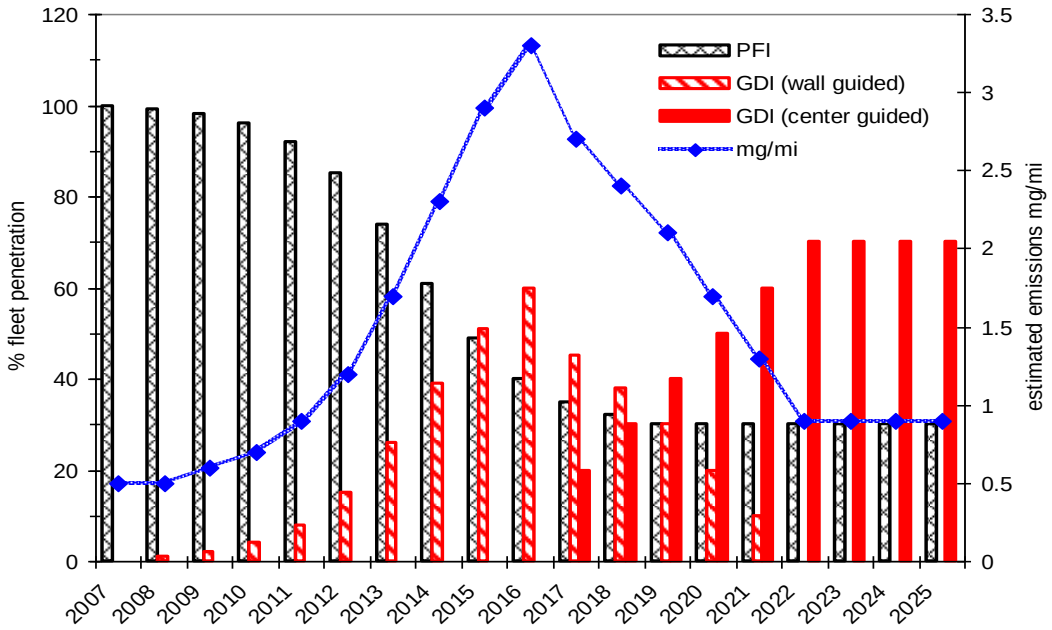


Table 10-1 below shows the reductions in emissions of PM from light duty gasoline vehicles with improved technology. We estimate there will be an approximately two ton per day reduction in PM emissions from light duty gasoline vehicles in 2040 caused by the penetration of GDI technology.

Table 10-1. Statewide Light Duty Gasoline PM Emissions (Tons per Day)

Year	Baseline (tons/day)	With Improved Technology (tons/day)
2014	3.6	3.6
2017	3.3	3.3
2018	3.3	3.2
2020	3.3	3.0
2022	3.4	2.8
2025	3.6	2.6
2035	4.2	2.0
2040	4.5	1.9

11 APPENDIX: HEAVY DUTY TRUCK EMISSION RATE UPDATES

The updates to heavy duty truck emission rates described in this section reflect updates to emission rates that were first integrated into the Statewide Truck and Bus Rule emissions inventory as external adjustments to emission rates developed using EMFAC2007. Those external adjustments in the rulemaking inventory have now been integrated into the EMFAC2011-HD calculation methodology and made consistent with EMFAC modeling methods on a regional basis.

There are four major updates that are covered in this document. The first is an update to medium-heavy duty diesel truck (MHDDT) running emission rates based on new test data. The second is improved assumptions about how manufacturers are complying with 2004, 2007, and 2010 emissions standards, and how that affects MHDDT and heavy heavy-duty diesel truck (HHDDT) emission rates. The third is carbon dioxide emission rate improvements using assumptions developed for the ARB's Statewide Truck and Bus Rule. Finally, idling emission rates are updated for both MHDDT and HHDDT.

In EMFAC2007 staff updated emission factors for heavy-heavy duty trucks based on emissions test data from the Coordinating Research Council (CRC) E55/59 project. The E55/59 project included testing on both heavy-heavy (HHDDT) and medium-heavy duty diesel trucks (MHDDT). After the release of EMFAC2007 the medium-heavy duty truck test data became available. Those data are used to update emission factors for medium-heavy duty trucks in EMFAC2011.

To revise the MHDDT emission factors, staff combined the E55/59 data into the data set that was used to develop MHDDT emission factors in EMFAC2002. The EMFAC2002 data set included emission test data from the New York State Department of Environmental Conservation and Energy, West Virginia University, and the Colorado Institute for Fuels, and High Altitude Engine Research. From the combined data set, staff then calculated zero-mile rates (ZMR) and deterioration rates (DR) of pollutants HC, CO, NOx, and PM.

The method of calculating MHDDT ZMR and DR is the same as that used for deriving emission factors of heavy heavy-duty trucks (HHDDT) in EMFAC2007. The method has been described in detail in an EMFAC2007 technical memo (ARB, 2006). Basically, the merged data set was divided into a number of model year groups by considering the general emission trends as well as changes in heavy-duty diesel engine emission standard and emission control technology. For each model year group, an average emission rate was calculated from the test data or projected based future emission standards, and a tampering and mal-maintenance (T&M) impact rate was also calculated. From the average emission rates and T&M impact rates, the ZMRs and DRs for HC, CO, NOx, and PM were then calculated for all model year groups using the Radian model. The revised MHDDT emission factors are given in Table 11-1. Note that in the table the NOx emission factors for 2006-2011 model years reflect the adjustments based on the latest engine certification data, and this will be discussed in the next section.

Table 11-1. Revised MHDDT ZMR (g/mi) and DR (g/mi/10,000mi) for MHDDT

Model Year Group	HC		CO		NOx		PM	
	ZMR	DR	ZMR	DR	ZMR	DR	ZMR	DR
Pre 1987	0.83	0.047	2.79	0.159	15.6	0.033	0.97	0.038
1987-90	0.65	0.056	2.19	0.189	15.4	0.044	1.05	0.034
1991-93	0.29	0.025	1.12	0.095	11.5	0.053	0.57	0.026
1994-97	0.21	0.028	0.83	0.109	11.3	0.068	0.31	0.017
1998-02	0.22	0.028	0.84	0.108	11.1	0.078	0.35	0.015
2003-06	0.14	0.013	0.37	0.033	7.35	0.077	0.22	0.008
2007	0.12	0.008	0.31	0.020	4.78	0.065	0.022	0.001
2008	0.12	0.008	0.31	0.020	4.39	0.064	0.022	0.001
2009	0.12	0.008	0.31	0.020	3.78	0.062	0.022	0.001
2010	0.10	0.002	0.26	0.005	1.01	0.054	0.022	0.001
2011	0.10	0.002	0.26	0.005	0.86	0.054	0.022	0.001
2012	0.10	0.002	0.26	0.005	0.67	0.041	0.022	0.001
2013+	0.10	0.002	0.26	0.005	0.67	0.041	0.022	0.001

Staff updated the 2006-2011 model year HHDDT and MHDDT emission factors in EMFAC2011 to reflect how engine manufacturers complied with the 2007 engine standards and how they comply with the 2010 engine standards between 2007 and 2011. A review of the certification data shows that some engine manufacturers introduced 1.2 g/bhp-hr NOx heavy-duty engines one year earlier than required and one manufacturer chooses to meet USEPA 2010 NOx standard without using selective catalytic reduction. For the earlier introduction of engines meeting 1.2 g/bhp-hr NOx and 0.01 g/bhp-hr PM standards, the current ZMR and DR for 2003-06 and 2007-09 model year groups were weighted by the sales fractions of 2007 standard compliant engines in 2006 model year.

For the introduction of 0.5 g/bhp-hr NOx engines in 2009 model year, staff estimated the ZMR by adjusting the current ZMR for 2006-2009 model year group (1.2 g/bhp-hr NOx engines) but assumed that the DR for 2006-09 model year would still apply to the 0.5 g/bhp-hr NOx engines. The assumption of unchanged DR is largely based on the fact that the engine manufacturers will achieve a 0.5 g/bhp-hr NOx level with an integrated technology solution based on their 2006-09 technologies.

Staff estimated the 2005-2008 model year sales fractions of heavy and medium heavy-duty diesel engines based on the sales fraction data reported by the manufacturers and projected the 2009-2012 model year sales fractions from the available information. The penetration rates for 2005 to 2012 model years are summarized in Table 11-2.

Table 11-2. Penetration Rates of 2005-2012 Model Year Engines

Model Year	Certified NOx (g/bhp-hr)				Certified PM (g/bhp-hr)	
	2.2	1.2	0.5	0.25/0.2*	0.1	0.01
HHDDT						
2005	100%					
2006	99%	1%			98%	2%
2007	14%	86%			1%	99%
2008	7%	93%				100%
2009		90%	10%			100%
2010			10%	90%		100%
2011			10%	95%		100%
2012				100%		100%
MHDDT						
2005	100%					
2006	100%				98%	2%
2007	23%	77%				100%
2008	12%	88%				100%
2009		90%	10%			100%
2010			10%	90%		100%
2011			10%	90%		100%
2012				100%		100%

* 0.25 g/bhp-hour applies to 2010 model year only.

Using the sales fractions in Table 11-2, staff calculated the NOx ZMR and DR of both HHDDT and MHDDT for 2006-2011 model years by weighting the ZMR and DR of the corresponding model year groups. Staff did not revise the PM emission factors for HHDDT and MHDDT. As seen in Table 11-2, the sales of PM filter-equipped engines in 2006 account for only about 2% for both HHDDT and MHDDT categories, and therefore the impact of DPF engines on the PM emission rates for the 2006 model year should be negligible. Table 11-3 shows the current and adjusted NOx ZMR and DR for 2006-2011 model year HHDDT and MHDDT.

Table 11-3. Before- and After-Adjustment NOx ZMR (g/mi) and DR (g/mi/10,000 mi) for 2006-2011 MY Heavy-Duty Diesel Trucks

Model Year	HHDDT				MHDDT			
	Before		After		Before		After*	
	ZMR	DR	ZMR	DR	ZMR	DR	ZMR	DR
2006	12.5	0.052	12.5	0.052	7.35	0.077	7.35	0.077
2007	6.84	0.047	7.66	0.057	4.01	0.062	4.78	0.065
2008			7.25	0.047			4.39	0.064
2009			6.44	0.046			3.78	0.062
2010	1.14	0.041	1.72	0.041	0.669	0.053	1.01	0.054
2011			1.46	0.041			0.859	0.054

*The adjusted ZMR and DR have been reflected in Table 1 (Revised MHDDT Emission Factors).

In addition to updating MHDDT emission factors for E55/59 test data, staff also updated carbon dioxide (CO2) emission rates using a similar methodology to that described in ARB (2008). In EMFAC2007, CO2 emission rates of diesel trucks were assumed to remain constant regardless of model year, technology, activity, and other factors. However, with the emphasis on greenhouse gas emissions control over the past few years, staff decided to update CO2 emission rates for individual model years in EMFAC2011. During the Board's In-Use On-Road Diesel Vehicle rulemaking, staff evaluated available data to determine how improvements in engine technology and increasingly stringent criteria pollutant emission control requirements have affected the fuel economy of trucks. Staff reviewed multiple data sources to characterize the variations in the fuel economy values of trucks in California. After fuel economy was estimated, fuel usage was then converted to CO2 emissions. The data and the method used for the CO2 emission rate update have been described in detail in Appendix G of the In-Use On-Road Diesel Vehicle rulemaking staff report (ARB, 2008). Table 11-4 gives the CO2 emission rates for both HHDDT and MHDDT.

Table 11-4. HHDDT and MHDDT CO2 Emission Rates (g/mi)

MY Group	HHDDT	MHDDT
Pre-1987	2,335	1,511
1987-1990	2,262	1,464
1991-1993	2,176	1,408
1994-1997	2,086	1,350
1998-2002	2,137	1,383
2003-2006	2,112	1,367
2007-2009	2,171	1,405
2010+	2,099	1,358
2010+/OBD	2,094	1,355

Staff also updated MHDDT idle emission rates. As with the revision of MHDDT running exhaust emission rates, the available CRC E55/59 idle emission test data allowed staff to revise the MHDDT idle emission rates in EMFAC2011. The method of analysis is the same as that used for calculating HHDDT idle emission rates in EMFAC2007 (see ARB, 2006). The high idle correction factors for HHDDT in EMFAC2007 are also applicable to MHDDT. Table 11-5 shows the revised MHDDT idle emission rates.

Table 11-5. Revised MHDDT Idle Emission Rates (g/hour)

	HC	CO	NOx	PM	CO2
Low Idle					
Pre-1987	20.0	38.7	59.4	5.65	3,802
1987-1990	8.08	23.7	64.6	2.47	4,029
1991-1993	5.56	19.3	71.9	1.75	4,246
1994-1997	3.86	15.7	82.1	1.25	4,532
1998-2002	2.41	12.1	99.3	0.810	4,995
2003-2006	1.73	10.1	113	0.599	5,357
2007-2009	1.73	10.1	30.0	0.0599	5,357
EPA2007	1.73	10.1	30.0	0.0599	5,357
High Idle for Summer					
Pre-1987	33.9	120	125	14.1	8,744
1987-1990	13.7	73.6	136	6.17	9,266
1991-1993	9.46	59.8	151	4.38	9,766
1994-1997	6.56	48.7	172	3.13	10,424
1998-2002	4.09	37.5	208	2.02	11,489
2003-2006	2.95	31.3	237	1.50	12,322
2007-2009	2.95	31.3	63.0	0.150	12,322
EPA2007	2.95	31.3	63.0	0.150	12,322
High Idle for Winter					
1987-1990	17.8	173	116	10.6	7,252
1991-1993	12.2	141	129	7.53	7,643
1994-1997	8.49	115	148	5.38	8,158
1998-2002	5.30	88.2	179	3.48	8,991
2003-2006	3.81	73.7	203	2.58	9,643
2007-2009	3.81	73.7	54.0	0.258	9,643
EPA2007	3.81	73.7	54.0	0.258	9,643

Finally, staff updated HHDDT idle emission rates for NOx and CO2. The EMFAC2007 NOx idle emission rates for HHDDT for 2007 and subsequent model years were projected based on the then prevailing assumption that engine manufacturers would adopt a 5-minute shut-off mechanism to comply with ARB's anti-idle rules. However, ARB certification data demonstrate that all engine manufacturers have instead chosen to meet the ARB requirements with the 30 g/hour NOx idle emission rate option. As a result, staff revised the NOx idle emission rates of 2008+ model year trucks in EMFAC2011 to reflect the engine certification data.

The HHDDT CO2 idle emission rates were also updated in EMFAC2011. In EMFAC2007, an average CO2 idle emission rate was used for all model years. To be consistent with the revision to the CO2 exhaust emission rates of HHDDT, in EMFAC2011 idle emission rates of CO2 were calculated for individual model year groups. Table 11-6 gives the updated NOx and CO2 idle emission rates of HHDDT.

Table 11-6. Updated HHDDT NOx and CO2 Idle Emission Rates (g/hour)

Model Year Group	NOx			CO2		
	Low Idle	High Idle for Summer	High Idle for Winter	Low Idle	High Idle for Summer	High Idle for Winter
Pre-1987	45.7	95.9	82.2	4,271	9,822	7,687
1987-1990	70.2	147	126	4,507	10,365	8,112
1991-1993	78.4	165	141	4,610	10,603	8,298
1994-1997	85.3	179	153	4,713	10,840	8,483
1998-2002	92.1	193	166	4,846	11,145	8,722
2003-2006	95.5	201	172	4,934	11,349	8,882
2007-2009	30.0	63.0	54.0	4,934	11,349	8,882
EPA2007	30.0	63.0	54.0	4,934	11,349	8,882

References

ARB, 2006. California Air Resources Board. *EMFAC Modeling Change Technical Memo: Revision of Heavy Heavy Duty Diesel Truck Emission Factors and Speed Correction Factors*. October 2006. Available at: http://www.arb.ca.gov/msei/onroad/techmemo/revised_hhddt_emission_factors_and_speed_corr_factors.pdf

ARB, 2008. California Air Resources Board. *Staff Report: Proposed Regulation for In-Use On-Road Diesel Vehicles, Appendix G*: *Emissions Inventory Method and Results.* October 2008. Available at: http://www.arb.ca.gov/regact/2008/truckbus08/appg.pdf

12 APPENDIX: DETAILED INCREMENTAL CHANGES

This section documents incremental changes made from EMFAC2007 to the final version of EMFAC2011-SG. Each major change is referenced in each section, and incremental changes are provided for each change for Statewide emissions as well as for the Sacramento Valley, San Francisco Bay Area, San Diego, San Joaquin Valley, and South Coast air basins. Model version names and version numbers are listed in each change.

12.1 REVISE CO_2 EMISSIONS DUE TO AIR CONDITIONING

The following pages give a breakdown and discussion of the emissions changes of the items discussed in Section 3.3.3.2. This update had the effect of reducing CO2 emissions by approximately 5%. This will vary by region depending upon temperature and humidity and age of the fleet.

Table 12-1. Impact on Statewide Inventory of Change 12.1

Statewide Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2009 ver 2.500)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,590,314	691,047,620	2,239	23,348	2,550	430,950	107.7
2000	22,238,266	799,847,680	1,181	11,621	1,990	491,504	76.4
2005	25,779,210	955,232,640	831	7,688	1,977	614,490	90.4
2007	25,431,494	923,187,330	686	6,327	1,628	587,279	78.5
2010	26,905,676	958,078,400	566	5,086	1,365	606,130	74.1
2014	28,886,190	1,016,924,100	453	3,865	1,026	648,503	69.8
2017	30,223,024	1,059,723,600	394	3,194	824	681,124	67.3
2020	31,543,326	1,104,522,800	350	2,702	676	711,057	65.8
2023	32,780,300	1,145,924,000	320	2,359	581	743,154	66.0

Statewide Summer Episodic On-Road Motor Vehicle Inventories With CO2 Bug Fix
(Calculated Using EMFAC2009 ver 2.501)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,590,314	691,047,620	2,239	23,348	2,550	416,606	107.7
2000	22,238,266	799,847,680	1,181	11,621	1,990	468,243	76.4
2005	25,779,210	955,232,640	831	7,688	1,977	583,869	90.4
2007	25,431,494	923,187,330	686	6,327	1,628	557,267	78.5
2010	26,905,676	958,078,400	566	5,086	1,365	574,695	74.1
2014	28,886,190	1,016,924,100	453	3,865	1,026	614,607	69.8
2017	30,223,024	1,059,723,600	394	3,194	824	645,454	67.3
2020	31,543,326	1,104,522,800	350	2,702	676	673,688	65.8
2023	32,780,300	1,145,924,000	320	2,359	581	704,024	66.0

Difference (Ver. 2.501 - Ver. 2.500) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT(mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0	0	0	-14,344	0.0
2000	0	0	0	0	0	-23,261	0.0
2005	0	0	0	0	0	-30,621	0.0
2007	0	0	0	0	0	-30,012	0.0
2010	0	0	0	0	0	-31,435	0.0
2014	0	0	0	0	0	-33,896	0.0
2017	0	0	0	0	0	-35,670	0.0
2020	0	0	0	0	0	-37,369	0.0
2023	0	0	0	0	0	-39,130	0.0

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.500)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	-3.33%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	-4.73%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	-4.98%	0.00%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	-5.11%	0.00%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	-5.19%	0.00%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	-5.23%	0.00%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	-5.24%	0.00%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	-5.26%	0.00%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	-5.27%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-2. Impact on Sacramento Valley Air Basin Inventory of Change 12.1

Sacramento Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2009 ver 2.500)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,386,223	50,471,700	184.3	1924.2	204.1	32,015	9.13
2000	1,640,558	57,266,592	97.3	940.5	161.2	35,900	6.19
2005	1,987,329	71,431,680	71.2	624.5	166.7	46,619	7.19
2007	1,965,062	68,937,520	60.7	524.4	143.4	45,228	6.39
2010	2,128,722	73,600,320	51.2	427.3	121.0	47,687	5.95
2014	2,322,142	80,409,344	40.8	320.8	90.3	52,260	5.51
2017	2,460,579	85,238,032	35.3	262.0	72.0	55,648	5.27
2020	2,597,977	89,913,456	31.4	220.2	58.7	58,795	5.15
2023	2,742,230	94,758,616	28.8	192.8	50.1	62,091	5.18

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With CO2 Bug Fix
(Calculated Using EMFAC2009 ver 2.501)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,386,223	50,471,700	184.3	1924.2	204.1	30,680	9.13
2000	1,640,558	57,266,592	97.3	940.5	161.2	33,798	6.19
2005	1,987,329	71,431,680	71.2	624.5	166.7	43,732	7.19
2007	1,965,062	68,937,520	60.7	524.4	143.4	42,404	6.39
2010	2,128,722	73,600,320	51.2	427.3	121.0	44,657	5.95
2014	2,322,142	80,409,344	40.8	320.8	90.3	48,892	5.51
2017	2,460,579	85,238,032	35.3	262.0	72.0	52,055	5.27
2020	2,597,977	89,913,456	31.4	220.2	58.7	54,994	5.15
2023	2,742,230	94,758,616	28.8	192.8	50.1	58,071	5.18

Difference (Ver. 2.501 - Ver. 2.500) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT(mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	-1,335	0.00
2000	0	0	0.0	0.0	0.0	-2,102	0.00
2005	0	0	0.0	0.0	0.0	-2,886	0.00
2007	0	0	0.0	0.0	0.0	-2,824	0.00
2010	0	0	0.0	0.0	0.0	-3,030	0.00
2014	0	0	0.0	0.0	0.0	-3,368	0.00
2017	0	0	0.0	0.0	0.0	-3,592	0.00
2020	0	0	0.0	0.0	0.0	-3,800	0.00
2023	0	0	0.0	0.0	0.0	-4,020	0.00

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.500)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	-4.17%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	-5.86%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	-6.19%	0.00%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	-6.24%	0.00%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	-6.35%	0.00%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	-6.44%	0.00%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	-6.46%	0.00%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	-6.46%	0.00%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	-6.47%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-3. Impact on San Diego Air Basin Inventory of Change 12.1

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2009 ver 2.500)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,617,500	65,249,684	196.5	2152.8	206.0	40,979	6.40
2000	1,930,482	74,567,344	95.5	1006.5	147.6	43,250	5.20
2005	2,229,141	87,943,560	63.5	655.9	122.9	52,596	5.90
2007	2,268,770	87,223,808	55.0	568.6	108.9	52,077	5.67
2010	2,329,638	86,947,928	45.0	452.8	89.3	51,691	5.46
2014	2,454,378	90,207,104	36.6	345.7	68.9	53,616	5.41
2017	2,552,300	93,440,232	32.4	289.6	57.3	55,457	5.42
2020	2,654,134	96,987,496	29.6	249.4	48.8	57,432	5.48
2023	2,749,919	100,077,140	27.5	222.6	42.7	59,551	5.61

San Diego Summer Episodic On-Road Motor Vehicle Inventories With CO2 Bug Fix
(Calculated Using EMFAC2009 ver 2.501)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,617,500	65,249,684	196	2153	206	39,690	6.40
2000	1,930,482	74,567,344	96	1006	148	41,425	5.20
2005	2,229,141	87,943,560	64	656	123	50,220	5.90
2007	2,268,770	87,223,808	55	569	109	49,718	5.67
2010	2,329,638	86,947,928	45	453	89	49,336	5.46
2014	2,454,378	90,207,104	37	346	69	51,143	5.41
2017	2,552,300	93,440,232	32	290	57	52,883	5.42
2020	2,654,134	96,987,496	30	249	49	54,753	5.48
2023	2,749,919	100,077,140	28	223	43	56,764	5.61

Difference (Ver. 2.501 - Ver. 2.500) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT(mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	-1,289	0.00
2000	0	0	0.0	0.0	0.0	-1,825	0.00
2005	0	0	0.0	0.0	0.0	-2,376	0.00
2007	0	0	0.0	0.0	0.0	-2,359	0.00
2010	0	0	0.0	0.0	0.0	-2,355	0.00
2014	0	0	0.0	0.0	0.0	-2,473	0.00
2017	0	0	0.0	0.0	0.0	-2,574	0.00
2020	0	0	0.0	0.0	0.0	-2,679	0.00
2023	0	0	0.0	0.0	0.0	-2,786	0.00

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.500)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	-3.14%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	-4.22%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	-4.52%	0.00%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	-4.53%	0.00%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	-4.56%	0.00%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	-4.61%	0.00%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	-4.64%	0.00%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	-4.66%	0.00%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	-4.68%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-4. Impact on San Francisco Bay Air Basin Inventory of Change 12.1

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2009 ver 2.500)

Cal. Year	Population	VMT mi/d	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,934,765	132,557,320	424.5	4409.2	436.5	76,279	12.40
2000	4,710,429	154,959,220	225.9	2183.4	303.5	92,229	9.82
2005	4,931,736	163,790,940	145.9	1322.3	244.2	99,546	10.45
2007	5,036,947	164,750,270	126.1	1126.9	216.0	99,894	10.16
2010	5,292,331	170,504,190	103.3	896.9	177.8	103,271	9.97
2014	5,653,666	180,540,940	81.2	665.5	131.1	108,683	9.79
2017	5,903,500	187,522,050	70.3	545.5	105.6	113,700	9.85
2020	6,144,994	194,476,420	62.3	455.5	86.9	117,593	9.91
2023	6,396,558	201,902,660	56.5	393.5	74.1	121,733	10.08

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With CO2 Bug Fix
(Calculated Using EMFAC2009 ver 2.501)

Cal. Year	Population	VMT mi/d	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,934,765	132,557,320	424.5	4409.2	436.5	73,379	12.40
2000	4,710,429	154,959,220	225.9	2183.4	303.5	87,397	9.82
2005	4,931,736	163,790,940	145.9	1322.3	244.2	93,989	10.45
2007	5,036,947	164,750,270	126.1	1126.9	216.0	94,268	10.16
2010	5,292,331	170,504,190	103.3	896.9	177.8	97,377	9.97
2014	5,653,666	180,540,940	81.2	665.5	131.1	102,380	9.79
2017	5,903,500	187,522,050	70.3	545.5	105.6	107,074	9.85
2020	6,144,994	194,476,420	62.3	455.5	86.9	110,707	9.91
2023	6,396,558	201,902,660	56.5	393.5	74.1	114,570	10.08

Difference (Ver. 2.501 - Ver. 2.500) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	-2,900	0.00
2000	0	0	0.0	0.0	0.0	-4,831	0.00
2005	0	0	0.0	0.0	0.0	-5,557	0.00
2007	0	0	0.0	0.0	0.0	-5,626	0.00
2010	0	0	0.0	0.0	0.0	-5,894	0.00
2014	0	0	0.0	0.0	0.0	-6,303	0.00
2017	0	0	0.0	0.0	0.0	-6,625	0.00
2020	0	0	0.0	0.0	0.0	-6,886	0.00
2023	0	0	0.0	0.0	0.0	-7,163	0.00

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.500)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	-3.80%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	-5.24%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	-5.58%	0.00%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	-5.63%	0.00%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	-5.71%	0.00%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	-5.80%	0.00%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	-5.83%	0.00%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	-5.86%	0.00%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	-5.88%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-5. Impact on San Joaquin Valley Air Basin Inventory of Change 12.1

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2009 ver 2.500)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,395,276	58,324,144	217.2	2295.9	336.1	43,727	22.84
2000	1,943,266	77,177,384	136.0	1329.0	334.8	56,057	15.36
2005	2,389,187	98,949,360	105.3	911.9	398.6	75,951	17.65
2007	2,407,269	97,362,664	91.1	779.7	351.6	74,238	15.39
2010	2,600,194	103,175,620	76.9	637.4	295.4	77,581	13.55
2014	2,830,486	113,056,740	60.8	480.9	219.2	85,499	11.62
2017	3,012,235	121,296,220	51.8	394.2	172.8	92,103	10.47
2020	3,203,412	129,483,290	45.5	334.8	139.7	98,656	9.75
2023	3,406,506	137,546,020	41.8	300.0	119.7	106,532	9.63

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With CO2 Bug Fix
(Calculated Using EMFAC2009 ver 2.501)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,395,276	58,324,144	217.2	2295.9	336.1	42,187	22.84
2000	1,943,266	77,177,384	136.0	1329.0	334.8	53,215	15.36
2005	2,389,187	98,949,360	105.3	911.9	398.6	71,973	17.65
2007	2,407,269	97,362,664	91.1	779.7	351.6	70,282	15.39
2010	2,600,194	103,175,620	76.9	637.4	295.4	73,320	13.55
2014	2,830,486	113,056,740	60.8	480.9	219.2	80,735	11.62
2017	3,012,235	121,296,220	51.8	394.2	172.8	86,967	10.47
2020	3,203,412	129,483,290	45.5	334.8	139.7	93,172	9.75
2023	3,406,506	137,546,020	41.8	300.0	119.7	100,580	9.63

Difference (Ver. 2.501 - Ver. 2.500) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT(mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	-1,540	0.00
2000	0	0	0.0	0.0	0.0	-2,841	0.00
2005	0	0	0.0	0.0	0.0	-3,978	0.00
2007	0	0	0.0	0.0	0.0	-3,956	0.00
2010	0	0	0.0	0.0	0.0	-4,261	0.00
2014	0	0	0.0	0.0	0.0	-4,765	0.00
2017	0	0	0.0	0.0	0.0	-5,136	0.00
2020	0	0	0.0	0.0	0.0	-5,484	0.00
2023	0	0	0.0	0.0	0.0	-5,953	0.00

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.500)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	-3.52%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	-5.07%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	-5.24%	0.00%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	-5.33%	0.00%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	-5.49%	0.00%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	-5.57%	0.00%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	-5.58%	0.00%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	-5.56%	0.00%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	-5.59%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-6. Impact on South Coast Air Basin Inventory of Change 12.1

South Coast Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2009 ver 2.500)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,547,354	282,561,700	864.7	8974.6	915.0	170,319	31.42
2000	8,884,512	323,009,820	435.5	4364.1	668.4	190,653	23.83
2005	10,519,533	393,767,140	302.4	2952.0	617.2	243,338	29.71
2007	9,971,546	367,745,790	229.9	2264.3	463.3	223,457	24.95
2010	10,473,329	377,734,460	185.2	1793.4	391.1	228,520	24.61
2014	11,179,470	393,460,000	149.3	1377.6	298.8	241,333	24.36
2017	11,582,715	403,019,170	130.6	1143.5	242.4	249,438	24.05
2020	11,961,100	414,266,140	116.7	966.4	199.3	256,666	23.82
2023	12,242,332	422,567,460	105.9	835.0	170.9	264,171	23.92

South Coast Summer Episodic On-Road Motor Vehicle Inventories With CO2 Bug Fix
(Calculated Using EMFAC2009 ver 2.501)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,547,354	282,561,700	864.7	8974.6	915.0	165,412	31.42
2000	8,884,512	323,009,820	435.5	4364.1	668.4	182,610	23.83
2005	10,519,533	393,767,140	302.4	2952.0	617.2	232,449	29.71
2007	9,971,546	367,745,790	229.9	2264.3	463.3	213,120	24.95
2010	10,473,329	377,734,460	185.2	1793.4	391.1	217,868	24.61
2014	11,179,470	393,460,000	149.3	1377.6	298.8	230,137	24.36
2017	11,582,715	403,019,170	130.6	1143.5	242.4	237,892	24.05
2020	11,961,100	414,266,140	116.7	966.4	199.3	244,741	23.82
2023	12,242,332	422,567,460	105.9	835.0	170.9	251,932	23.92

Difference (Ver. 2.501 - Ver. 2.500) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	-4,907	0.00
2000	0	0	0.0	0.0	0.0	-8,043	0.00
2005	0	0	0.0	0.0	0.0	-10,889	0.00
2007	0	0	0.0	0.0	0.0	-10,338	0.00
2010	0	0	0.0	0.0	0.0	-10,652	0.00
2014	0	0	0.0	0.0	0.0	-11,196	0.00
2017	0	0	0.0	0.0	0.0	-11,546	0.00
2020	0	0	0.0	0.0	0.0	-11,925	0.00
2023	0	0	0.0	0.0	0.0	-12,239	0.00

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.500)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	-2.88%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	-4.22%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	-4.47%	0.00%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	-4.63%	0.00%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	-4.66%	0.00%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	-4.64%	0.00%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	-4.63%	0.00%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	-4.65%	0.00%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	-4.63%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type Using Populations

12.2 REVISE EVAPORATIVE DIURNAL BASIC EMISSION RATE COEFFICIENTS

Please refer to Section 3.3.3.3. This change only affects evaporative diurnal emissions, and has less than a 1% effect on emissions. It will vary by area based upon temperature, but for most areas this effect is insignificant.

Table 12-7. Impact on Statewide Inventory of Change 12.2

Statewide Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2009 ver 2.501a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,590,372	691,048,900	2,239	23,348	2,550	416,607	107.71
2000	22,238,334	799,849,410	1,181	11,621	1,990	468,244	76.42
2005	25,779,274	955,234,500	831	7,688	1,977	583,870	90.36
2007	25,431,560	923,189,120	686	6,327	1,628	557,268	78.52
2010	26,905,742	958,080,320	566	5,086	1,365	574,696	74.11
2014	28,886,264	1,016,926,600	453	3,865	1,026	614,608	69.81
2017	30,223,104	1,059,726,400	394	3,194	824	645,455	67.30
2020	31,543,406	1,104,525,600	350	2,702	676	673,689	65.83
2023	32,780,384	1,145,927,000	320	2,359	581	704,026	66.04

Statewide Summer Episodic On-Road Motor Vehicle Inventories With CO2 Bug Fix
(Calculated Using EMFAC2009 ver 2.503a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,590,372	691,048,900	2,239	23,348	2,550	416,607	107.71
2000	22,238,334	799,849,410	1,181	11,621	1,990	468,244	76.42
2005	25,779,274	955,234,500	831	7,688	1,977	583,870	90.36
2007	25,431,560	923,189,120	686	6,327	1,628	557,268	78.52
2010	26,905,742	958,080,320	567	5,086	1,365	574,696	74.11
2014	28,886,264	1,016,926,600	455	3,865	1,026	614,608	69.81
2017	30,223,104	1,059,726,400	396	3,194	824	645,455	67.30
2020	31,543,406	1,104,525,600	353	2,702	676	673,689	65.83
2023	32,780,384	1,145,927,000	323	2,359	581	704,026	66.04

Difference (Ver. 2.503a - Ver. 2.501a) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.1	0.0	0.0	0	0.00
2007	0	0	0.3	0.0	0.0	0	0.00
2010	0	0	0.6	0.0	0.0	0	0.00
2014	0	0	1.3	0.0	0.0	0	0.00
2017	0	0	1.9	0.0	0.0	0	0.00
2020	0	0	2.5	0.0	0.0	0	0.00
2023	0	0	3.1	0.0	0.0	0	0.00

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.501a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	0.11%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	0.29%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	0.48%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	0.70%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	0.97%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-8. Impact on Sacramento Valley Air Basin Inventory of Change 12.2

Sacramento Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2009 ver 2.501a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,386,228	50,471,784	184.3	1924.2	204.1	30,680	9.13
2000	1,640,564	57,266,724	97.3	940.5	161.2	33,798	6.19
2005	1,987,335	71,431,800	71.2	624.5	166.7	43,732	7.19
2007	1,965,067	68,937,656	60.7	524.4	143.4	42,404	6.39
2010	2,128,728	73,600,472	51.2	427.3	121.0	44,657	5.95
2014	2,322,148	80,409,520	40.8	320.8	90.3	48,892	5.51
2017	2,460,585	85,238,240	35.3	262.0	72.0	52,055	5.27
2020	2,597,983	89,913,688	31.4	220.2	58.7	54,995	5.15
2023	2,742,237	94,758,856	28.8	192.8	50.1	58,071	5.18

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With CO2 Bug Fix
(Calculated Using EMFAC2009 ver 2.503a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,386,228	50,471,784	184.3	1924.2	204.1	30,680	9.13
2000	1,640,564	57,266,724	97.3	940.5	161.2	33,798	6.19
2005	1,987,335	71,431,800	71.2	624.5	166.7	43,732	7.19
2007	1,965,067	68,937,656	60.7	524.4	143.4	42,404	6.39
2010	2,128,728	73,600,472	51.2	427.3	121.0	44,657	5.95
2014	2,322,148	80,409,520	41.0	320.8	90.3	48,892	5.51
2017	2,460,585	85,238,240	35.5	262.0	72.0	52,055	5.27
2020	2,597,983	89,913,688	31.7	220.2	58.7	54,995	5.15
2023	2,742,237	94,758,856	29.1	192.8	50.1	58,071	5.18

Difference (Ver. 2.503a - Ver. 2.501a) in Sacramento Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	0	0	0.0	0.0	0.0	0	0.00
2010	0	0	0.1	0.0	0.0	0	0.00
2014	0	0	0.1	0.0	0.0	0	0.00
2017	0	0	0.2	0.0	0.0	0	0.00
2020	0	0	0.2	0.0	0.0	0	0.00
2023	0	0	0.3	0.0	0.0	0	0.00

Percentage Change in Sacramento Emission Inventories (relative to Ver. 2.501a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	0.11%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	0.29%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	0.50%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	0.78%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	1.10%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-9. Impact on San Diego Air Basin Inventory of Change 12.2

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2009 ver 2.501a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,617,505	65,249,804	196.5	2152.8	206.0	39,690	6.40
2000	1,930,488	74,567,480	95.5	1006.5	147.6	41,425	5.20
2005	2,229,147	87,943,704	63.5	655.9	122.9	50,220	5.90
2007	2,268,776	87,223,976	55.0	568.6	108.9	49,718	5.67
2010	2,329,644	86,948,128	45.0	452.8	89.3	49,336	5.46
2014	2,454,384	90,207,336	36.5	345.7	68.9	51,143	5.41
2017	2,552,306	93,440,464	32.4	289.6	57.3	52,884	5.42
2020	2,654,140	96,987,712	29.5	249.3	48.8	54,753	5.48
2023	2,749,925	100,077,350	27.5	222.6	42.7	56,764	5.61

San Diego Summer Episodic On-Road Motor Vehicle Inventories With CO2 Bug Fix
(Calculated Using EMFAC2009 ver 2.503a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,617,505	65,249,804	196	2153	206	39,690	6.40
2000	1,930,488	74,567,480	96	1006	148	41,425	5.20
2005	2,229,147	87,943,704	64	656	123	50,220	5.90
2007	2,268,776	87,223,976	55	569	109	49,718	5.67
2010	2,329,644	86,948,128	45	453	89	49,336	5.46
2014	2,454,384	90,207,336	37	346	69	51,143	5.41
2017	2,552,306	93,440,464	33	290	57	52,884	5.42
2020	2,654,140	96,987,712	30	249	49	54,753	5.48
2023	2,749,925	100,077,350	28	223	43	56,764	5.61

Difference (Ver. 2.503a - Ver. 2.501a) in San Diego Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	0	0	0.0	0.0	0.0	0	0.00
2010	0	0	0.0	0.0	0.0	0	0.00
2014	0	0	0.1	0.0	0.0	0	0.00
2017	0	0	0.1	0.0	0.0	0	0.00
2020	0	0	0.1	0.0	0.0	0	0.00
2023	0	0	0.2	0.0	0.0	0	0.00

Percentage Change in San Diego Emission Inventories (relative to Ver. 2.501a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	0.08%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	0.19%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	0.31%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	0.47%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	0.63%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-10. Impact on San Francisco Bay Air Basin Inventory of Change 12.2

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2009 ver 2.501a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,934,775	132,557,540	424.5	4409.2	436.5	73,379	12.40
2000	4,710,441	154,959,550	226.0	2183.4	303.5	87,398	9.82
2005	4,931,748	163,791,250	145.9	1322.3	244.2	93,989	10.45
2007	5,036,958	164,750,560	126.1	1126.9	216.0	94,268	10.16
2010	5,292,343	170,504,560	103.3	896.9	177.8	97,377	9.97
2014	5,653,678	180,541,380	81.2	665.5	131.1	102,380	9.79
2017	5,903,513	187,522,510	70.3	545.5	105.6	107,075	9.85
2020	6,145,010	194,476,900	62.3	455.5	86.9	110,708	9.91
2023	6,396,572	201,903,140	56.5	393.5	74.1	114,571	10.08

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With CO2 Bug Fix
(Calculated Using EMFAC2009 ver 2.503a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,934,775	132,557,540	424.5	4409.2	436.5	73,379	12.40
2000	4,710,441	154,959,550	226.0	2183.4	303.5	87,398	9.82
2005	4,931,748	163,791,250	145.9	1322.3	244.2	93,989	10.45
2007	5,036,958	164,750,560	126.1	1126.9	216.0	94,268	10.16
2010	5,292,343	170,504,560	103.4	896.9	177.8	97,377	9.97
2014	5,653,678	180,541,380	81.4	665.5	131.1	102,380	9.79
2017	5,903,513	187,522,510	70.7	545.5	105.6	107,075	9.85
2020	6,145,010	194,476,900	62.8	455.5	86.9	110,708	9.91
2023	6,396,572	201,903,140	57.1	393.5	74.1	114,571	10.08

Difference (Ver. 2.503a - Ver. 2.501a) in San Francisco Bay Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	0	0	0.1	0.0	0.0	0	0.00
2010	0	0	0.1	0.0	0.0	0	0.00
2014	0	0	0.2	0.0	0.0	0	0.00
2017	0	0	0.4	0.0	0.0	0	0.00
2020	0	0	0.5	0.0	0.0	0	0.00
2023	0	0	0.6	0.0	0.0	0	0.00

Percentage Change in San Francisco Bay Emission Inventories (relative to Ver. 2.501a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	0.12%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	0.30%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	0.52%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	0.80%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	1.14%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-11. Impact on San Joaquin Valley Air Basin Inventory of Change 12.2

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2009 ver 2.501a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,395,280	58,324,240	217.2	2295.9	336.1	42,187	22.85
2000	1,943,272	77,177,536	136.0	1329.0	334.8	53,215	15.36
2005	2,389,193	98,949,512	105.3	911.9	398.6	71,973	17.65
2007	2,407,275	97,362,808	91.1	779.7	351.6	70,282	15.39
2010	2,600,200	103,175,860	76.9	637.4	295.4	73,320	13.55
2014	2,830,493	113,057,020	60.8	480.9	219.2	80,735	11.62
2017	3,012,243	121,296,510	51.8	394.2	172.8	86,967	10.47
2020	3,203,419	129,483,600	45.5	334.8	139.7	93,173	9.75
2023	3,406,514	137,546,340	41.8	300.0	119.7	100,580	9.63

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With CO2 Bug Fix
(Calculated Using EMFAC2009 ver 2.503a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,395,280	58,324,240	217.2	2295.9	336.1	42,187	22.85
2000	1,943,272	77,177,536	136.0	1329.0	334.8	53,215	15.36
2005	2,389,193	98,949,512	105.4	911.9	398.6	71,973	17.65
2007	2,407,275	97,362,808	91.1	779.7	351.6	70,282	15.39
2010	2,600,200	103,175,860	77.0	637.4	295.4	73,320	13.55
2014	2,830,493	113,057,020	60.9	480.9	219.2	80,735	11.62
2017	3,012,243	121,296,510	52.0	394.2	172.8	86,967	10.47
2020	3,203,419	129,483,600	45.9	334.8	139.7	93,173	9.75
2023	3,406,514	137,546,340	42.2	300.0	119.7	100,580	9.63

Difference (Ver. 2.503a - Ver. 2.501a) in San Joaquin Valley Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	0	0	0.0	0.0	0.0	0	0.00
2010	0	0	0.1	0.0	0.0	0	0.00
2014	0	0	0.1	0.0	0.0	0	0.00
2017	0	0	0.2	0.0	0.0	0	0.00
2020	0	0	0.3	0.0	0.0	0	0.00
2023	0	0	0.4	0.0	0.0	0	0.00

Percentage Change in San Joaquin Valley Emission Inventories (relative to Ver. 2.501a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	0.09%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	0.25%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	0.43%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	0.69%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	0.97%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-12. Impact on South Coast Air Basin Inventory of Change 12.2

South Coast Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2009 ver 2.501a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,547,380	282,562,270	864.7	8974.7	915.0	165,412	31.42
2000	8,884,540	323,010,620	435.5	4364.2	668.4	182,611	23.83
2005	10,519,562	393,767,940	302.4	2952.0	617.2	232,450	29.71
2007	9,971,575	367,746,560	229.9	2264.3	463.3	213,120	24.95
2010	10,473,359	377,735,330	185.2	1793.4	391.1	217,869	24.61
2014	11,179,501	393,461,060	149.3	1377.6	298.8	230,138	24.36
2017	11,582,747	403,020,260	130.6	1143.5	242.4	237,893	24.05
2020	11,961,135	414,267,300	116.7	966.4	199.3	244,742	23.82
2023	12,242,366	422,568,670	105.9	835.0	170.9	251,932	23.92

South Coast Summer Episodic On-Road Motor Vehicle Inventories With CO2 Bug Fix
(Calculated Using EMFAC2009 ver 2.503a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,547,380	282,562,270	864.7	8974.7	915.0	165,412	31.42
2000	8,884,540	323,010,620	435.5	4364.2	668.4	182,611	23.83
2005	10,519,562	393,767,940	302.4	2952.0	617.2	232,450	29.71
2007	9,971,575	367,746,560	230.1	2264.3	463.3	213,120	24.95
2010	10,473,359	377,735,330	185.4	1793.4	391.1	217,869	24.61
2014	11,179,501	393,461,060	149.7	1377.6	298.8	230,138	24.36
2017	11,582,747	403,020,260	131.2	1143.5	242.4	237,893	24.05
2020	11,961,135	414,267,300	117.4	966.4	199.3	244,742	23.82
2023	12,242,366	422,568,670	106.8	835.0	170.9	251,932	23.92

Difference (Ver. 2.503a - Ver. 2.501a) in South Coast Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.1	0.0	0.0	0	0.00
2007	0	0	0.1	0.0	0.0	0	0.00
2010	0	0	0.2	0.0	0.0	0	0.00
2014	0	0	0.4	0.0	0.0	0	0.00
2017	0	0	0.5	0.0	0.0	0	0.00
2020	0	0	0.7	0.0	0.0	0	0.00
2023	0	0	0.9	0.0	0.0	0	0.00

Percentage Change in South Coast Emission Inventories (relative to Ver. 2.501a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	0.12%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	0.26%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	0.42%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	0.62%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	0.84%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type Using Populations

12.3 FIX RESTING TIME IN HOT SOAK ALGORITHM

Please refer to Section 3.3.3.4. This change resulted in a general increase in hot soak evaporative emissions by less than 2%. This factor does not very significantly by area.

Table 12-13. Impact on Statewide Inventory of Change 12.3

Statewide Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.504)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,590,372	691,048,900	2,239	23,348	2,550	416,607	130.23
2000	22,238,334	799,849,410	1,181	11,621	1,990	468,244	102.21
2005	25,779,274	955,234,500	831	7,688	1,977	583,870	121.44
2007	25,431,560	923,189,120	686	6,327	1,628	557,268	108.46
2010	26,905,742	958,080,320	567	5,086	1,365	574,696	105.25
2014	28,886,264	1,016,926,600	455	3,865	1,026	614,608	102.87
2017	30,223,104	1,059,726,400	396	3,194	824	645,455	101.78
2020	31,543,406	1,104,525,600	353	2,702	676	673,689	101.76
2023	32,780,384	1,145,927,000	323	2,359	581	704,026	103.38

Statewide Summer Episodic On-Road Motor Vehicle Inventories With HS Resting time Bug Fix
(Calculated Using EMFAC2011 ver 2.504a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,590,372	691,048,900	2,269	23,348	2,550	416,607	130.23
2000	22,238,334	799,849,410	1,195	11,621	1,990	468,244	102.21
2005	25,779,274	955,234,500	841	7,688	1,977	583,870	121.44
2007	25,431,560	923,189,120	695	6,327	1,628	557,268	108.46
2010	26,905,742	958,080,320	574	5,086	1,365	574,696	105.25
2014	28,886,264	1,016,926,600	462	3,865	1,026	614,608	102.87
2017	30,223,104	1,059,726,400	403	3,194	824	645,455	101.78
2020	31,543,406	1,104,525,600	360	2,702	676	673,689	101.76
2023	32,780,384	1,145,927,000	329	2,359	581	704,026	103.38

Difference (Ver. 2.504a - Ver. 2.504) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	30.1	0.0	0.0	0	0.00
2000	0	0	13.6	0.0	0.0	0	0.00
2005	0	0	9.7	0.0	0.0	0	0.00
2007	0	0	8.5	0.0	0.0	0	0.00
2010	0	0	7.9	0.0	0.0	0	0.00
2014	0	0	7.4	0.0	0.0	0	0.00
2017	0	0	7.1	0.0	0.0	0	0.00
2020	0	0	6.7	0.0	0.0	0	0.00
2023	0	0	6.3	0.0	0.0	0	0.00

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.504)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	1.34%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	1.15%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	1.16%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	1.24%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	1.40%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	1.64%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	1.78%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	1.89%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	1.94%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-14. Impact on Sacramento Valley Air Basin Inventory of Change 12.3

Sacramento Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.504)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,386,228	50,471,784	184.3	1924.2	204.1	30,680	10.78
2000	1,640,564	57,266,724	97.3	940.5	161.2	33,798	8.03
2005	1,987,335	71,431,800	71.2	624.5	166.7	43,732	9.52
2007	1,965,067	68,937,656	60.7	524.4	143.4	42,404	8.64
2010	2,128,728	73,600,472	51.2	427.3	121.0	44,657	8.35
2014	2,322,148	80,409,520	41.0	320.8	90.3	48,892	8.13
2017	2,460,585	85,238,240	35.5	262.0	72.0	52,055	8.05
2020	2,597,983	89,913,688	31.7	220.2	58.7	54,995	8.08
2023	2,742,237	94,758,856	29.1	192.8	50.1	58,071	8.27

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With HS Resting time Bug Fix
(Calculated Using EMFAC2011 ver 2.504a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,386,228	50,471,784	187.0	1924.2	204.1	30,680	10.78
2000	1,640,564	57,266,724	98.6	940.5	161.2	33,798	8.03
2005	1,987,335	71,431,800	72.1	624.5	166.7	43,732	9.52
2007	1,965,067	68,937,656	61.6	524.4	143.4	42,404	8.64
2010	2,128,728	73,600,472	52.0	427.3	121.0	44,657	8.35
2014	2,322,148	80,409,520	41.7	320.8	90.3	48,892	8.13
2017	2,460,585	85,238,240	36.2	262.0	72.0	52,055	8.05
2020	2,597,983	89,913,688	32.3	220.2	58.7	54,995	8.08
2023	2,742,237	94,758,856	29.7	192.8	50.1	58,071	8.27

Difference (Ver. 2.504a - Ver. 2.504) in Sacramento Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	2.7	0.0	0.0	0	0.00
2000	0	0	1.3	0.0	0.0	0	0.00
2005	0	0	1.0	0.0	0.0	0	0.00
2007	0	0	0.9	0.0	0.0	0	0.00
2010	0	0	0.8	0.0	0.0	0	0.00
2014	0	0	0.7	0.0	0.0	0	0.00
2017	0	0	0.7	0.0	0.0	0	0.00
2020	0	0	0.6	0.0	0.0	0	0.00
2023	0	0	0.6	0.0	0.0	0	0.00

Percentage Change in Sacramento Emission Inventories (relative to Ver. 2.504)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	1.47%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	1.32%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	1.34%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	1.40%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	1.55%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	1.74%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	1.86%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	1.93%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	1.96%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-15. Impact on San Diego Air Basin Inventory of Change 12.3

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.504)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,617,505	65,249,804	196.5	2152.8	206.0	39,690	8.43
2000	1,930,488	74,567,480	95.5	1006.5	147.6	41,425	7.52
2005	2,229,147	87,943,704	63.5	655.9	122.9	50,220	8.69
2007	2,268,776	87,223,976	55.0	568.6	108.9	49,718	8.44
2010	2,329,644	86,948,128	45.0	452.8	89.3	49,336	8.23
2014	2,454,384	90,207,336	36.6	345.7	68.9	51,143	8.28
2017	2,552,306	93,440,464	32.5	289.6	57.3	52,884	8.38
2020	2,654,140	96,987,712	29.7	249.3	48.8	54,753	8.55
2023	2,749,925	100,077,350	27.7	222.6	42.7	56,764	8.78

San Diego Summer Episodic On-Road Motor Vehicle Inventories With HS Resting time Bug Fix
(Calculated Using EMFAC2011 ver 2.504a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,617,505	65,249,804	199	2153	206	39,690	8.43
2000	1,930,488	74,567,480	97	1006	148	41,425	7.52
2005	2,229,147	87,943,704	64	656	123	50,220	8.69
2007	2,268,776	87,223,976	56	569	109	49,718	8.44
2010	2,329,644	86,948,128	46	453	89	49,336	8.23
2014	2,454,384	90,207,336	37	346	69	51,143	8.28
2017	2,552,306	93,440,464	33	290	57	52,884	8.38
2020	2,654,140	96,987,712	30	249	49	54,753	8.55
2023	2,749,925	100,077,350	28	223	43	56,764	8.78

Difference (Ver. 2.504a - Ver. 2.504) in San Diego Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	2.3	0.0	0.0	0	0.00
2000	0	0	1.0	0.0	0.0	0	0.00
2005	0	0	0.7	0.0	0.0	0	0.00
2007	0	0	0.6	0.0	0.0	0	0.00
2010	0	0	0.6	0.0	0.0	0	0.00
2014	0	0	0.6	0.0	0.0	0	0.00
2017	0	0	0.6	0.0	0.0	0	0.00
2020	0	0	0.5	0.0	0.0	0	0.00
2023	0	0	0.5	0.0	0.0	0	0.00

Percentage Change in San Diego Emission Inventories (relative to Ver. 2.504)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	1.17%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	1.04%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	1.07%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	1.14%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	1.31%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	1.56%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	1.70%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	1.79%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	1.83%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-16. Impact on San Francisco Bay Air Basin Inventory of Change 12.3

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.504)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,934,775	132,557,540	424.5	4409.2	436.5	73,379	16.74
2000	4,710,441	154,959,550	226.0	2183.4	303.5	87,398	14.92
2005	4,931,748	163,791,250	145.9	1322.3	244.2	93,989	15.92
2007	5,036,958	164,750,560	126.1	1126.9	216.0	94,268	15.66
2010	5,292,343	170,504,560	103.4	896.9	177.8	97,377	15.66
2014	5,653,678	180,541,380	81.4	665.5	131.1	102,380	15.79
2017	5,903,513	187,522,510	70.7	545.5	105.6	107,075	16.07
2020	6,145,010	194,476,900	62.8	455.5	86.9	110,708	16.36
2023	6,396,572	201,903,140	57.1	393.5	74.1	114,571	16.76

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With HS Resting time Bug Fix
(Calculated Using EMFAC2011 ver 2.504a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,934,775	132,557,540	430.7	4409.2	436.5	73,379	16.74
2000	4,710,441	154,959,550	228.9	2183.4	303.5	87,398	14.92
2005	4,931,748	163,791,250	147.9	1322.3	244.2	93,989	15.92
2007	5,036,958	164,750,560	128.0	1126.9	216.0	94,268	15.66
2010	5,292,343	170,504,560	105.1	896.9	177.8	97,377	15.66
2014	5,653,678	180,541,380	83.0	665.5	131.1	102,380	15.79
2017	5,903,513	187,522,510	72.2	545.5	105.6	107,075	16.07
2020	6,145,010	194,476,900	64.1	455.5	86.9	110,708	16.36
2023	6,396,572	201,903,140	58.4	393.5	74.1	114,571	16.76

Difference (Ver. 2.504a - Ver. 2.504) in San Francisco Bay Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	6.3	0.0	0.0	0	0.00
2000	0	0	3.0	0.0	0.0	0	0.00
2005	0	0	2.0	0.0	0.0	0	0.00
2007	0	0	1.9	0.0	0.0	0	0.00
2010	0	0	1.7	0.0	0.0	0	0.00
2014	0	0	1.6	0.0	0.0	0	0.00
2017	0	0	1.5	0.0	0.0	0	0.00
2020	0	0	1.4	0.0	0.0	0	0.00
2023	0	0	1.3	0.0	0.0	0	0.00

Percentage Change in San Francisco Bay Emission Inventories (relative to Ver. 2.504)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	1.48%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	1.31%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	1.38%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	1.47%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	1.67%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	1.94%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	2.09%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	2.19%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	2.22%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-17. Impact on San Joaquin Valley Air Basin Inventory of Change 12.3

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.504)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,395,280	58,324,240	217.2	2295.9	336.1	42,187	24.89
2000	1,943,272	77,177,536	136.0	1329.0	334.8	53,215	17.96
2005	2,389,193	98,949,512	105.4	911.9	398.6	71,973	21.01
2007	2,407,275	97,362,808	91.1	779.7	351.6	70,282	18.71
2010	2,600,200	103,175,860	77.0	637.4	295.4	73,320	17.07
2014	2,830,493	113,057,020	60.9	480.9	219.2	80,735	15.47
2017	3,012,243	121,296,510	52.0	394.2	172.8	86,967	14.60
2020	3,203,419	129,483,600	45.9	334.8	139.7	93,173	14.16
2023	3,406,514	137,546,340	42.2	300.0	119.7	100,580	14.32

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With HS Resting time Bug Fix
(Calculated Using EMFAC2011 ver 2.504a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,395,280	58,324,240	220.0	2295.9	336.1	42,187	24.89
2000	1,943,272	77,177,536	137.6	1329.0	334.8	53,215	17.96
2005	2,389,193	98,949,512	106.5	911.9	398.6	71,973	21.01
2007	2,407,275	97,362,808	92.1	779.7	351.6	70,282	18.71
2010	2,600,200	103,175,860	78.0	637.4	295.4	73,320	17.07
2014	2,830,493	113,057,020	61.8	480.9	219.2	80,735	15.47
2017	3,012,243	121,296,510	52.8	394.2	172.8	86,967	14.60
2020	3,203,419	129,483,600	46.6	334.8	139.7	93,173	14.16
2023	3,406,514	137,546,340	42.9	300.0	119.7	100,580	14.32

Difference (Ver. 2.504a - Ver. 2.504) in San Joaquin Valley Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	2.8	0.0	0.0	0	0.00
2000	0	0	1.5	0.0	0.0	0	0.00
2005	0	0	1.2	0.0	0.0	0	0.00
2007	0	0	1.0	0.0	0.0	0	0.00
2010	0	0	1.0	0.0	0.0	0	0.00
2014	0	0	0.9	0.0	0.0	0	0.00
2017	0	0	0.8	0.0	0.0	0	0.00
2020	0	0	0.7	0.0	0.0	0	0.00
2023	0	0	0.7	0.0	0.0	0	0.00

Percentage Change in San Joaquin Valley Emission Inventories (relative to Ver. 2.504)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	1.30%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	1.13%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	1.10%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	1.15%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	1.27%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	1.43%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	1.53%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	1.60%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	1.62%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-18. Impact on South Coast Air Basin Inventory of Change 12.3

South Coast Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.504)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,547,380	282,562,270	864.7	8974.7	915.0	165,412	40.60
2000	8,884,540	323,010,620	435.5	4364.2	668.4	182,611	34.19
2005	10,519,562	393,767,940	302.4	2952.0	617.2	232,450	42.30
2007	9,971,575	367,746,560	230.1	2264.3	463.3	213,120	36.60
2010	10,473,359	377,735,330	185.4	1793.4	391.1	217,869	36.63
2014	11,179,501	393,461,060	149.7	1377.6	298.8	230,138	36.90
2017	11,582,747	403,020,260	131.2	1143.5	242.4	237,893	36.93
2020	11,961,135	414,267,300	117.4	966.4	199.3	244,742	37.06
2023	12,242,366	422,568,670	106.8	835.0	170.9	251,932	37.47

South Coast Summer Episodic On-Road Motor Vehicle Inventories With HS Resting time Bug Fix
(Calculated Using EMFAC2011 ver 2.504a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,547,380	282,562,270	876.2	8974.7	915.0	165,412	40.60
2000	8,884,540	323,010,620	440.3	4364.2	668.4	182,611	34.19
2005	10,519,562	393,767,940	305.9	2952.0	617.2	232,450	42.30
2007	9,971,575	367,746,560	232.9	2264.3	463.3	213,120	36.60
2010	10,473,359	377,735,330	188.1	1793.4	391.1	217,869	36.63
2014	11,179,501	393,461,060	152.2	1377.6	298.8	230,138	36.90
2017	11,582,747	403,020,260	133.6	1143.5	242.4	237,893	36.93
2020	11,961,135	414,267,300	119.7	966.4	199.3	244,742	37.06
2023	12,242,366	422,568,670	109.0	835.0	170.9	251,932	37.47

Difference (Ver. 2.504a - Ver. 2.504) in South Coast Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	11.5	0.0	0.0	0	0.00
2000	0	0	4.8	0.0	0.0	0	0.00
2005	0	0	3.4	0.0	0.0	0	0.00
2007	0	0	2.8	0.0	0.0	0	0.00
2010	0	0	2.6	0.0	0.0	0	0.00
2014	0	0	2.5	0.0	0.0	0	0.00
2017	0	0	2.4	0.0	0.0	0	0.00
2020	0	0	2.3	0.0	0.0	0	0.00
2023	0	0	2.2	0.0	0.0	0	0.00

Percentage Change in South Coast Emission Inventories (relative to Ver. 2.504)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	1.33%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	1.11%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	1.14%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	1.23%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	1.41%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	1.68%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	1.86%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	1.99%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	2.06%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type Using Populations

12.4 REVISE BRAKE WEAR PM EMISSION FACTOR

Please refer to Section 3.3.3.5. This update significantly increases PM10 emissions by 40 to 50%. The largest part of the change is due to moving the fleet away asbestos brakes which is independent of area. There is some regional variation largely because of fleet mix differences in heavy-duty trucks. It should be noted that brake ware tends to be larger particles, so the PM 2.5 disbenefit would be approximately 60% less.

Table 12-19. Impact on Statewide Inventory of Change 12.4

Statewide Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.503a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,590,372	691,048,900	2,239	23,348	2,550	416,607	107.71
2000	22,238,334	799,849,410	1,181	11,621	1,990	468,244	76.42
2005	25,779,274	955,234,500	831	7,688	1,977	583,870	90.36
2007	25,431,560	923,189,120	686	6,327	1,628	557,268	78.52
2010	26,905,742	958,080,320	567	5,086	1,365	574,696	74.11
2014	28,886,264	1,016,926,600	455	3,865	1,026	614,608	69.81
2017	30,223,104	1,059,726,400	396	3,194	824	645,455	67.30
2020	31,543,406	1,104,525,600	353	2,702	676	673,689	65.83
2023	32,780,384	1,145,927,000	323	2,359	581	704,026	66.04

Statewide Summer Episodic On-Road Motor Vehicle Inventories With Programming Change
(Calculated Using EMFAC2011 ver 2.504)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,590,372	691,048,900	2,239	23,348	2,550	416,607	130.23
2000	22,238,334	799,849,410	1,181	11,621	1,990	468,244	102.21
2005	25,779,274	955,234,500	831	7,688	1,977	583,870	121.44
2007	25,431,560	923,189,120	686	6,327	1,628	557,268	108.46
2010	26,905,742	958,080,320	567	5,086	1,365	574,696	105.25
2014	28,886,264	1,016,926,600	455	3,865	1,026	614,608	102.87
2017	30,223,104	1,059,726,400	396	3,194	824	645,455	101.78
2020	31,543,406	1,104,525,600	353	2,702	676	673,689	101.76
2023	32,780,384	1,145,927,000	323	2,359	581	704,026	103.38

Difference (Ver. 2.504 - Ver. 2.503a) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	22.52
2000	0	0	0.0	0.0	0.0	0	25.80
2005	0	0	0.0	0.0	0.0	0	31.08
2007	0	0	0.0	0.0	0.0	0	29.95
2010	0	0	0.0	0.0	0.0	0	31.14
2014	0	0	0.0	0.0	0.0	0	33.06
2017	0	0	0.0	0.0	0.0	0	34.48
2020	0	0	0.0	0.0	0.0	0	35.94
2023	0	0	0.0	0.0	0.0	0	37.34

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.503a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	20.91%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	33.76%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	34.40%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	38.14%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	42.02%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	47.36%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	51.23%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	54.60%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	56.54%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-20. Impact on Sacramento Valley Air Basin Inventory of Change 12.4

Sacramento Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.503a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,386,228	50,471,784	184.3	1924.2	204.1	30,680	9.13
2000	1,640,564	57,266,724	97.3	940.5	161.2	33,798	6.19
2005	1,987,335	71,431,800	71.2	624.5	166.7	43,732	7.19
2007	1,965,067	68,937,656	60.7	524.4	143.4	42,404	6.39
2010	2,128,728	73,600,472	51.2	427.3	121.0	44,657	5.95
2014	2,322,148	80,409,520	41.0	320.8	90.3	48,892	5.51
2017	2,460,585	85,238,240	35.5	262.0	72.0	52,055	5.27
2020	2,597,983	89,913,688	31.7	220.2	58.7	54,995	5.15
2023	2,742,237	94,758,856	29.1	192.8	50.1	58,071	5.18

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With Programming Change
(Calculated Using EMFAC2011 ver 2.504)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,386,228	50,471,784	184.3	1924.2	204.1	30,680	10.78
2000	1,640,564	57,266,724	97.3	940.5	161.2	33,798	8.03
2005	1,987,335	71,431,800	71.2	624.5	166.7	43,732	9.52
2007	1,965,067	68,937,656	60.7	524.4	143.4	42,404	8.64
2010	2,128,728	73,600,472	51.2	427.3	121.0	44,657	8.35
2014	2,322,148	80,409,520	41.0	320.8	90.3	48,892	8.13
2017	2,460,585	85,238,240	35.5	262.0	72.0	52,055	8.05
2020	2,597,983	89,913,688	31.7	220.2	58.7	54,995	8.08
2023	2,742,237	94,758,856	29.1	192.8	50.1	58,071	8.27

Difference (Ver. 2.504 - Ver. 2.503a) in Sacramento Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	1.65
2000	0	0	0.0	0.0	0.0	0	1.84
2005	0	0	0.0	0.0	0.0	0	2.33
2007	0	0	0.0	0.0	0.0	0	2.25
2010	0	0	0.0	0.0	0.0	0	2.41
2014	0	0	0.0	0.0	0.0	0	2.62
2017	0	0	0.0	0.0	0.0	0	2.78
2020	0	0	0.0	0.0	0.0	0	2.93
2023	0	0	0.0	0.0	0.0	0	3.09

Percentage Change in Sacramento Emission Inventories (relative to Ver. 2.503a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	18.10%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	29.75%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	32.42%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	35.30%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	40.47%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	47.60%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	52.70%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	56.94%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	59.67%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-21. Impact on San Diego Air Basin Inventory of Change 12.4

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.503a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,617,505	65,249,804	196.5	2152.8	206.0	39,690	6.40
2000	1,930,488	74,567,480	95.5	1006.5	147.6	41,425	5.20
2005	2,229,147	87,943,704	63.5	655.9	122.9	50,220	5.90
2007	2,268,776	87,223,976	55.0	568.6	108.9	49,718	5.67
2010	2,329,644	86,948,128	45.0	452.8	89.3	49,336	5.46
2014	2,454,384	90,207,336	36.6	345.7	68.9	51,143	5.41
2017	2,552,306	93,440,464	32.5	289.6	57.3	52,884	5.42
2020	2,654,140	96,987,712	29.7	249.3	48.8	54,753	5.48
2023	2,749,925	100,077,350	27.7	222.6	42.7	56,764	5.61

San Diego Summer Episodic On-Road Motor Vehicle Inventories With Programming Change
(Calculated Using EMFAC2011 ver 2.504)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,617,505	65,249,804	196	2153	206	39,690	8.43
2000	1,930,488	74,567,480	96	1006	148	41,425	7.52
2005	2,229,147	87,943,704	64	656	123	50,220	8.69
2007	2,268,776	87,223,976	55	569	109	49,718	8.44
2010	2,329,644	86,948,128	45	453	89	49,336	8.23
2014	2,454,384	90,207,336	37	346	69	51,143	8.28
2017	2,552,306	93,440,464	33	290	57	52,884	8.38
2020	2,654,140	96,987,712	30	249	49	54,753	8.55
2023	2,749,925	100,077,350	28	223	43	56,764	8.78

Difference (Ver. 2.504 - Ver. 2.503a) in San Diego Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	2.03
2000	0	0	0.0	0.0	0.0	0	2.32
2005	0	0	0.0	0.0	0.0	0	2.79
2007	0	0	0.0	0.0	0.0	0	2.77
2010	0	0	0.0	0.0	0.0	0	2.77
2014	0	0	0.0	0.0	0.0	0	2.87
2017	0	0	0.0	0.0	0.0	0	2.96
2020	0	0	0.0	0.0	0.0	0	3.07
2023	0	0	0.0	0.0	0.0	0	3.17

Percentage Change in San Diego Emission Inventories (relative to Ver. 2.503a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	31.75%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	44.54%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	47.31%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	48.95%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	50.61%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	52.95%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	54.69%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	56.08%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	56.43%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-22. Impact on San Francisco Bay Air Basin Inventory of Change 12.4

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.503a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,934,775	132,557,540	424.5	4409.2	436.5	73,379	12.40
2000	4,710,441	154,959,550	226.0	2183.4	303.5	87,398	9.82
2005	4,931,748	163,791,250	145.9	1322.3	244.2	93,989	10.45
2007	5,036,958	164,750,560	126.1	1126.9	216.0	94,268	10.16
2010	5,292,343	170,504,560	103.4	896.9	177.8	97,377	9.97
2014	5,653,678	180,541,380	81.4	665.5	131.1	102,380	9.79
2017	5,903,513	187,522,510	70.7	545.5	105.6	107,075	9.85
2020	6,145,010	194,476,900	62.8	455.5	86.9	110,708	9.91
2023	6,396,572	201,903,140	57.1	393.5	74.1	114,571	10.08

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With Programming Change
(Calculated Using EMFAC2011 ver 2.504)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,934,775	132,557,540	424.5	4409.2	436.5	73,379	16.74
2000	4,710,441	154,959,550	226.0	2183.4	303.5	87,398	14.92
2005	4,931,748	163,791,250	145.9	1322.3	244.2	93,989	15.92
2007	5,036,958	164,750,560	126.1	1126.9	216.0	94,268	15.66
2010	5,292,343	170,504,560	103.4	896.9	177.8	97,377	15.66
2014	5,653,678	180,541,380	81.4	665.5	131.1	102,380	15.79
2017	5,903,513	187,522,510	70.7	545.5	105.6	107,075	16.07
2020	6,145,010	194,476,900	62.8	455.5	86.9	110,708	16.36
2023	6,396,572	201,903,140	57.1	393.5	74.1	114,571	16.76

Difference (Ver. 2.504 - Ver. 2.503a) in San Francisco Bay Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	4.34
2000	0	0	0.0	0.0	0.0	0	5.09
2005	0	0	0.0	0.0	0.0	0	5.46
2007	0	0	0.0	0.0	0.0	0	5.50
2010	0	0	0.0	0.0	0.0	0	5.68
2014	0	0	0.0	0.0	0.0	0	6.00
2017	0	0	0.0	0.0	0.0	0	6.22
2020	0	0	0.0	0.0	0.0	0	6.45
2023	0	0	0.0	0.0	0.0	0	6.68

Percentage Change in San Francisco Bay Emission Inventories (relative to Ver. 2.503a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	35.01%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	51.82%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	52.27%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	54.11%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	57.00%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	61.31%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	63.18%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	65.04%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	66.31%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-23. Impact on San Joaquin Valley Air Basin Inventory of Change 12.4

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.503a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,395,280	58,324,240	217.2	2295.9	336.1	42,187	22.85
2000	1,943,272	77,177,536	136.0	1329.0	334.8	53,215	15.36
2005	2,389,193	98,949,512	105.4	911.9	398.6	71,973	17.65
2007	2,407,275	97,362,808	91.1	779.7	351.6	70,282	15.39
2010	2,600,200	103,175,860	77.0	637.4	295.4	73,320	13.55
2014	2,830,493	113,057,020	60.9	480.9	219.2	80,735	11.62
2017	3,012,243	121,296,510	52.0	394.2	172.8	86,967	10.47
2020	3,203,419	129,483,600	45.9	334.8	139.7	93,173	9.75
2023	3,406,514	137,546,340	42.2	300.0	119.7	100,580	9.63

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With Programming Change
(Calculated Using EMFAC2011 ver 2.504)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,395,280	58,324,240	217.2	2295.9	336.1	42,187	24.89
2000	1,943,272	77,177,536	136.0	1329.0	334.8	53,215	17.96
2005	2,389,193	98,949,512	105.4	911.9	398.6	71,973	21.01
2007	2,407,275	97,362,808	91.1	779.7	351.6	70,282	18.71
2010	2,600,200	103,175,860	77.0	637.4	295.4	73,320	17.07
2014	2,830,493	113,057,020	60.9	480.9	219.2	80,735	15.47
2017	3,012,243	121,296,510	52.0	394.2	172.8	86,967	14.60
2020	3,203,419	129,483,600	45.9	334.8	139.7	93,173	14.16
2023	3,406,514	137,546,340	42.2	300.0	119.7	100,580	14.32

Difference (Ver. 2.504 - Ver. 2.503a) in San Joaquin Valley Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	2.04
2000	0	0	0.0	0.0	0.0	0	2.60
2005	0	0	0.0	0.0	0.0	0	3.36
2007	0	0	0.0	0.0	0.0	0	3.32
2010	0	0	0.0	0.0	0.0	0	3.52
2014	0	0	0.0	0.0	0.0	0	3.85
2017	0	0	0.0	0.0	0.0	0	4.13
2020	0	0	0.0	0.0	0.0	0	4.41
2023	0	0	0.0	0.0	0.0	0	4.69

Percentage Change in San Joaquin Valley Emission Inventories (relative to Ver. 2.503a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	8.93%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	16.91%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	19.06%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	21.55%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	25.96%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	33.16%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	39.47%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	45.30%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	48.73%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-24. Impact on South Coast Air Basin Inventory of Change 12.4

South Coast Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.503a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,547,380	282,562,270	864.7	8974.7	915.0	165,412	31.42
2000	8,884,540	323,010,620	435.5	4364.2	668.4	182,611	23.83
2005	10,519,562	393,767,940	302.4	2952.0	617.2	232,450	29.71
2007	9,971,575	367,746,560	230.1	2264.3	463.3	213,120	24.95
2010	10,473,359	377,735,330	185.4	1793.4	391.1	217,869	24.61
2014	11,179,501	393,461,060	149.7	1377.6	298.8	230,138	24.36
2017	11,582,747	403,020,260	131.2	1143.5	242.4	237,893	24.05
2020	11,961,135	414,267,300	117.4	966.4	199.3	244,742	23.82
2023	12,242,366	422,568,670	106.8	835.0	170.9	251,932	23.92

South Coast Summer Episodic On-Road Motor Vehicle Inventories With Programming Change
(Calculated Using EMFAC2011 ver 2.504)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,547,380	282,562,270	864.7	8974.7	915.0	165,412	40.60
2000	8,884,540	323,010,620	435.5	4364.2	668.4	182,611	34.19
2005	10,519,562	393,767,940	302.4	2952.0	617.2	232,450	42.30
2007	9,971,575	367,746,560	230.1	2264.3	463.3	213,120	36.60
2010	10,473,359	377,735,330	185.4	1793.4	391.1	217,869	36.63
2014	11,179,501	393,461,060	149.7	1377.6	298.8	230,138	36.90
2017	11,582,747	403,020,260	131.2	1143.5	242.4	237,893	36.93
2020	11,961,135	414,267,300	117.4	966.4	199.3	244,742	37.06
2023	12,242,366	422,568,670	106.8	835.0	170.9	251,932	37.47

Difference (Ver. 2.504 - Ver. 2.503a) in South Coast Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	9.18
2000	0	0	0.0	0.0	0.0	0	10.35
2005	0	0	0.0	0.0	0.0	0	12.59
2007	0	0	0.0	0.0	0.0	0	11.65
2010	0	0	0.0	0.0	0.0	0	12.02
2014	0	0	0.0	0.0	0.0	0	12.54
2017	0	0	0.0	0.0	0.0	0	12.87
2020	0	0	0.0	0.0	0.0	0	13.24
2023	0	0	0.0	0.0	0.0	0	13.55

Percentage Change in South Coast Emission Inventories (relative to Ver. 2.503a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	29.23%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	43.45%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	42.36%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	46.70%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	48.82%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	51.48%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	53.52%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	55.58%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	56.67%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type Using Populations

12.5 HEAVY DUTY DIESEL TRUCK EMISSION FACTOR UPDATE

As described in Section 4.6, heavy duty diesel truck emission factors have been updated in accordance with new assumptions developed through the Statewide Truck and Bus Rule development process.

Table 12-25. Impact on Statewide Inventory of Change 12.5

Statewide Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.504a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,590,372	691,048,900	2,269	23,348	2,550	416,607	130.23
2000	22,238,334	799,849,410	1,195	11,621	1,990	468,244	102.21
2005	25,779,274	955,234,500	841	7,688	1,977	583,870	121.44
2007	25,431,560	923,189,120	695	6,327	1,628	557,268	108.46
2010	26,905,742	958,080,320	574	5,086	1,365	574,696	105.25
2014	28,886,264	1,016,926,600	462	3,865	1,026	614,608	102.87
2017	30,223,104	1,059,726,400	403	3,194	824	645,455	101.78
2020	31,543,406	1,104,525,600	360	2,702	676	673,689	101.76
2023	32,780,384	1,145,927,000	329	2,359	581	704,026	103.38

Statewide Summer Episodic On-Road Motor Vehicle Inventories With MHDT BER update
(Calculated Using EMFAC2011 ver 2.505)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,590,372	691,048,900	2,280	23,350	2,506	416,499	133.76
2000	22,238,334	799,849,410	1,200	11,620	1,968	463,492	104.43
2005	25,779,274	955,234,500	847	7,684	1,961	575,802	123.84
2007	25,431,560	923,189,120	699	6,323	1,621	549,751	110.52
2010	26,905,742	958,080,320	579	5,081	1,359	566,707	107.09
2014	28,886,264	1,016,926,700	466	3,859	1,018	605,152	104.12
2017	30,223,104	1,059,726,400	406	3,186	808	634,826	102.45
2020	31,543,406	1,104,525,600	362	2,692	652	662,065	101.80
2023	32,780,384	1,145,927,000	331	2,346	549	691,551	102.86

Difference (Ver. 2.505 - Ver. 2.504a) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	10.6	1.5	-43.5	-108	3.53
2000	0	0	5.5	-1.5	-22.8	-4,753	2.22
2005	0	0	5.7	-4.0	-15.4	-8,067	2.40
2007	0	0	4.9	-4.2	-7.2	-7,517	2.06
2010	0	0	4.5	-4.9	-5.7	-7,989	1.84
2014	0	100	3.7	-5.9	-7.9	-9,456	1.25
2017	0	0	2.9	-7.8	-15.4	-10,629	0.67
2020	0	0	2.1	-10.4	-23.7	-11,624	0.04
2023	0	0	1.4	-13.2	-31.7	-12,475	-0.53

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.504a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.47%	0.01%	-1.70%	-0.03%	2.71%
2000	0.00%	0.00%	0.46%	-0.01%	-1.15%	-1.02%	2.17%
2005	0.00%	0.00%	0.68%	-0.05%	-0.78%	-1.38%	1.97%
2007	0.00%	0.00%	0.70%	-0.07%	-0.44%	-1.35%	1.90%
2010	0.00%	0.00%	0.78%	-0.10%	-0.42%	-1.39%	1.75%
2014	0.00%	0.00%	0.80%	-0.15%	-0.77%	-1.54%	1.22%
2017	0.00%	0.00%	0.72%	-0.25%	-1.87%	-1.65%	0.66%
2020	0.00%	0.00%	0.58%	-0.39%	-3.50%	-1.73%	0.04%
2023	0.00%	0.00%	0.42%	-0.56%	-5.46%	-1.77%	-0.51%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-26. Impact on Sacramento Valley Air Basin Inventory of Change 12.5

Sacramento Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.504a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,386,228	50,471,784	187.0	1924.2	204.1	30,680	10.78
2000	1,640,564	57,266,724	98.6	940.5	161.2	33,798	8.03
2005	1,987,335	71,431,800	72.1	624.5	166.7	43,732	9.52
2007	1,965,067	68,937,656	61.6	524.4	143.4	42,404	8.64
2010	2,128,728	73,600,472	52.0	427.3	121.0	44,657	8.35
2014	2,322,148	80,409,520	41.7	320.8	90.3	48,892	8.13
2017	2,460,585	85,238,240	36.2	262.0	72.0	52,055	8.05
2020	2,597,983	89,913,688	32.3	220.2	58.7	54,995	8.08
2023	2,742,237	94,758,856	29.7	192.8	50.1	58,071	8.27

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With New MHDT BERs and Phase-in
(Calculated Using EMFAC2011 ver 2.505)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,386,228	50,471,784	187.9	1924.4	200.3	30,680	11.07
2000	1,640,564	57,266,724	99.1	940.4	159.8	33,423	8.23
2005	1,987,335	71,431,800	72.7	624.2	166.5	43,053	9.71
2007	1,965,067	68,937,656	62.0	524.1	143.7	41,730	8.82
2010	2,128,728	73,600,472	52.5	427.0	121.2	43,939	8.51
2014	2,322,148	80,409,528	42.1	320.3	90.0	48,029	8.24
2017	2,460,585	85,238,248	36.5	261.3	70.8	51,076	8.10
2020	2,597,983	89,913,688	32.5	219.3	56.6	53,913	8.07
2023	2,742,237	94,758,856	29.8	191.7	47.1	56,904	8.21

Difference (Ver. 2.505 - Ver. 2.504a) in Sacramento Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.9	0.2	-3.8	-1	0.29
2000	0	0	0.5	-0.1	-1.3	-375	0.19
2005	0	0	0.5	-0.3	-0.2	-680	0.19
2007	0	0	0.5	-0.3	0.2	-674	0.18
2010	0	0	0.5	-0.4	0.2	-717	0.15
2014	0	8	0.4	-0.5	-0.3	-864	0.10
2017	0	8	0.3	-0.7	-1.2	-979	0.05
2020	0	0	0.2	-0.9	-2.1	-1,082	-0.01
2023	0	0	0.2	-1.1	-3.0	-1,167	-0.05

Percentage Change in Sacramento Emission Inventories (relative to Ver. 2.504a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.47%	0.01%	-1.86%	0.00%	2.67%
2000	0.00%	0.00%	0.55%	-0.01%	-0.84%	-1.11%	2.42%
2005	0.00%	0.00%	0.74%	-0.05%	-0.09%	-1.55%	2.01%
2007	0.00%	0.00%	0.80%	-0.06%	0.15%	-1.59%	2.03%
2010	0.00%	0.00%	0.89%	-0.09%	0.20%	-1.61%	1.83%
2014	0.00%	0.00%	0.93%	-0.15%	-0.36%	-1.77%	1.26%
2017	0.00%	0.00%	0.86%	-0.25%	-1.64%	-1.88%	0.62%
2020	0.00%	0.00%	0.72%	-0.40%	-3.63%	-1.97%	-0.06%
2023	0.00%	0.00%	0.55%	-0.59%	-6.00%	-2.01%	-0.64%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-27. Impact on San Diego Air Basin Inventory of Change 12.5

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.504a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,617,505	65,249,804	198.8	2152.8	206.0	39,690	8.43
2000	1,930,488	74,567,480	96.5	1006.5	147.6	41,425	7.52
2005	2,229,147	87,943,704	64.2	655.9	122.9	50,220	8.69
2007	2,268,776	87,223,976	55.6	568.6	108.9	49,718	8.44
2010	2,329,644	86,948,128	45.6	452.8	89.3	49,336	8.23
2014	2,454,384	90,207,336	37.2	345.7	68.9	51,143	8.28
2017	2,552,306	93,440,464	33.1	289.6	57.3	52,884	8.38
2020	2,654,140	96,987,712	30.2	249.3	48.8	54,753	8.55
2023	2,749,925	100,077,350	28.2	222.6	42.7	56,764	8.78

San Diego Summer Episodic On-Road Motor Vehicle Inventories With New MHDT BERs and Phase-in
(Calculated Using EMFAC2011 ver 2.505)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,617,505	65,249,804	199	2153	203	39,643	8.67
2000	1,930,488	74,567,480	97	1006	147	41,158	7.68
2005	2,229,147	87,943,704	65	656	123	49,749	8.87
2007	2,268,776	87,223,976	56	568	110	49,233	8.60
2010	2,329,644	86,948,128	46	452	90	48,846	8.36
2014	2,454,384	90,207,336	38	345	70	50,603	8.36
2017	2,552,306	93,440,464	33	289	58	52,306	8.42
2020	2,654,140	96,987,712	30	248	49	54,142	8.54
2023	2,749,925	100,077,350	28	222	43	56,132	8.74

Difference (Ver. 2.505 - Ver. 2.504a) in San Diego Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.7	0.1	-2.8	-47	0.24
2000	0	0	0.5	-0.1	-0.9	-267	0.17
2005	0	0	0.5	-0.3	0.2	-471	0.18
2007	0	0	0.5	-0.4	0.6	-485	0.16
2010	0	0	0.4	-0.4	0.8	-490	0.13
2014	0	0	0.4	-0.5	0.8	-540	0.08
2017	0	0	0.3	-0.6	0.5	-578	0.04
2020	0	0	0.2	-0.8	0.2	-611	-0.01
2023	0	0	0.2	-1.0	0.0	-632	-0.04

Percentage Change in San Diego Emission Inventories (relative to Ver. 2.504a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.35%	0.00%	-1.36%	-0.12%	2.85%
2000	0.00%	0.00%	0.49%	-0.01%	-0.58%	-0.65%	2.21%
2005	0.00%	0.00%	0.79%	-0.05%	0.19%	-0.94%	2.06%
2007	0.00%	0.00%	0.87%	-0.06%	0.53%	-0.98%	1.93%
2010	0.00%	0.00%	0.96%	-0.09%	0.91%	-0.99%	1.62%
2014	0.00%	0.00%	0.96%	-0.15%	1.11%	-1.06%	1.02%
2017	0.00%	0.00%	0.87%	-0.22%	0.91%	-1.09%	0.46%
2020	0.00%	0.00%	0.72%	-0.32%	0.48%	-1.12%	-0.07%
2023	0.00%	0.00%	0.58%	-0.43%	-0.02%	-1.11%	-0.50%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-28. Impact on San Francisco Bay Air Basin Inventory of Change 12.5

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.504a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,934,775	132,557,540	430.7	4409.2	436.5	73,379	16.74
2000	4,710,441	154,959,550	228.9	2183.4	303.5	87,398	14.92
2005	4,931,748	163,791,250	147.9	1322.3	244.2	93,989	15.92
2007	5,036,958	164,750,560	128.0	1126.9	216.0	94,268	15.66
2010	5,292,343	170,504,560	105.1	896.9	177.8	97,377	15.66
2014	5,653,678	180,541,380	83.0	665.5	131.1	102,380	15.79
2017	5,903,513	187,522,510	72.2	545.5	105.6	107,075	16.07
2020	6,145,010	194,476,900	64.1	455.5	86.9	110,708	16.36
2023	6,396,572	201,903,140	58.4	393.5	74.1	114,571	16.76

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With Updated MHDT BERs and Phase-in
(Calculated Using EMFAC2011 ver 2.505)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,934,775	132,557,540	432.7	4409.5	428.0	73,171	17.40
2000	4,710,441	154,959,550	230.1	2183.1	301.0	86,687	15.35
2005	4,931,748	163,791,250	149.0	1321.8	244.5	93,002	16.28
2007	5,036,958	164,750,560	129.0	1126.2	217.0	93,255	15.99
2010	5,292,343	170,504,580	106.1	896.1	179.1	96,332	15.92
2014	5,653,678	180,541,380	83.8	664.5	132.2	101,220	15.95
2017	5,903,513	187,522,510	72.8	544.2	106.1	105,834	16.13
2020	6,145,010	194,476,900	64.6	453.9	86.7	109,394	16.33
2023	6,396,572	201,903,140	58.7	391.6	73.3	113,194	16.66

Difference (Ver. 2.505 - Ver. 2.504a) in San Francisco Bay Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	1.9	0.3	-8.4	-208	0.66
2000	0	0	1.2	-0.3	-2.5	-711	0.43
2005	0	0	1.0	-0.6	0.3	-987	0.36
2007	0	0	1.0	-0.7	1.0	-1,013	0.33
2010	0	20	0.9	-0.8	1.4	-1,045	0.27
2014	0	0	0.7	-1.0	1.1	-1,160	0.16
2017	0	0	0.6	-1.3	0.5	-1,241	0.06
2020	0	0	0.5	-1.6	-0.2	-1,314	-0.03
2023	0	0	0.4	-2.0	-0.8	-1,377	-0.10

Percentage Change in San Francisco Bay Emission Inventories (relative to Ver. 2.504a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.45%	0.01%	-1.94%	-0.28%	3.96%
2000	0.00%	0.00%	0.52%	-0.01%	-0.81%	-0.81%	2.88%
2005	0.00%	0.00%	0.70%	-0.04%	0.13%	-1.05%	2.28%
2007	0.00%	0.00%	0.77%	-0.06%	0.46%	-1.07%	2.12%
2010	0.00%	0.00%	0.86%	-0.09%	0.76%	-1.07%	1.70%
2014	0.00%	0.00%	0.90%	-0.15%	0.84%	-1.13%	1.00%
2017	0.00%	0.00%	0.83%	-0.24%	0.49%	-1.16%	0.40%
2020	0.00%	0.00%	0.72%	-0.36%	-0.20%	-1.19%	-0.15%
2023	0.00%	0.00%	0.60%	-0.50%	-1.07%	-1.20%	-0.59%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-29. Impact on San Joaquin Valley Air Basin Inventory of Change 12.5

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.504a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,395,280	58,324,240	220.0	2295.9	336.1	42,187	24.89
2000	1,943,272	77,177,536	137.6	1329.0	334.8	53,215	17.96
2005	2,389,193	98,949,512	106.5	911.9	398.6	71,973	21.01
2007	2,407,275	97,362,808	92.1	779.7	351.6	70,282	18.71
2010	2,600,200	103,175,860	78.0	637.4	295.4	73,320	17.07
2014	2,830,493	113,057,020	61.8	480.9	219.2	80,735	15.47
2017	3,012,243	121,296,510	52.8	394.2	172.8	86,967	14.60
2020	3,203,419	129,483,600	46.6	334.8	139.7	93,173	14.16
2023	3,406,514	137,546,340	42.9	300.0	119.7	100,580	14.32

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With new MHDT BERs and Phase-in
(Calculated Using EMFAC2011 ver 2.505)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,395,280	58,324,240	221.5	2296.1	330.5	42,412	25.36
2000	1,943,272	77,177,536	138.5	1328.8	332.5	52,477	18.31
2005	2,389,193	98,949,512	107.5	911.4	398.1	70,456	21.34
2007	2,407,275	97,362,808	93.1	779.1	351.8	68,755	19.03
2010	2,600,200	103,175,860	78.8	636.7	295.4	71,728	17.38
2014	2,830,493	113,057,020	62.5	480.0	217.2	78,777	15.69
2017	3,012,243	121,296,520	53.4	393.0	168.1	84,689	14.71
2020	3,203,419	129,483,600	46.9	332.9	132.0	90,593	14.15
2023	3,406,514	137,546,340	43.1	297.5	109.4	97,767	14.20

Difference (Ver. 2.505 - Ver. 2.504a) in San Joaquin Valley Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	1.5	0.2	-5.6	224	0.48
2000	0	0	1.0	-0.2	-2.3	-738	0.35
2005	0	0	1.0	-0.5	-0.5	-1,517	0.33
2007	0	0	0.9	-0.6	0.2	-1,527	0.32
2010	0	0	0.9	-0.7	-0.1	-1,592	0.31
2014	0	0	0.7	-0.8	-2.0	-1,958	0.22
2017	0	10	0.5	-1.2	-4.7	-2,278	0.11
2020	0	0	0.4	-1.8	-7.7	-2,579	-0.01
2023	0	0	0.2	-2.5	-10.3	-2,813	-0.12

Percentage Change in San Joaquin Valley Emission Inventories (relative to Ver. 2.504a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.66%	0.01%	-1.66%	0.53%	1.91%
2000	0.00%	0.00%	0.71%	-0.02%	-0.69%	-1.39%	1.92%
2005	0.00%	0.00%	0.92%	-0.06%	-0.12%	-2.11%	1.58%
2007	0.00%	0.00%	0.99%	-0.08%	0.06%	-2.17%	1.73%
2010	0.00%	0.00%	1.10%	-0.11%	-0.03%	-2.17%	1.80%
2014	0.00%	0.00%	1.14%	-0.17%	-0.93%	-2.43%	1.41%
2017	0.00%	0.00%	1.01%	-0.31%	-2.73%	-2.62%	0.75%
2020	0.00%	0.00%	0.76%	-0.55%	-5.49%	-2.77%	-0.09%
2023	0.00%	0.00%	0.45%	-0.83%	-8.61%	-2.80%	-0.85%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-30. Impact on South Coast Air Basin Inventory of Change 12.5

South Coast Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.504a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,547,380	282,562,270	876.2	8974.7	915.0	165,412	40.60
2000	8,884,540	323,010,620	440.3	4364.2	668.4	182,611	34.19
2005	10,519,562	393,767,940	305.9	2952.0	617.2	232,450	42.30
2007	9,971,575	367,746,560	232.9	2264.3	463.3	213,120	36.60
2010	10,473,359	377,735,330	188.1	1793.4	391.1	217,869	36.63
2014	11,179,501	393,461,060	152.2	1377.6	298.8	230,138	36.90
2017	11,582,747	403,020,260	133.6	1143.5	242.4	237,893	36.93
2020	11,961,135	414,267,300	119.7	966.4	199.3	244,742	37.06
2023	12,242,366	422,568,670	109.0	835.0	170.9	251,932	37.47

South Coast Summer Episodic On-Road Motor Vehicle Inventories With new MHDT BERs and Phase-in
(Calculated Using EMFAC2011 ver 2.505)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,547,380	282,562,270	880.6	8975.3	897.2	165,057	42.04
2000	8,884,540	323,010,620	442.0	4363.5	656.0	180,651	34.99
2005	10,519,562	393,767,940	307.8	2950.2	605.5	229,571	43.29
2007	9,971,575	367,746,560	234.2	2262.6	456.5	210,709	37.35
2010	10,473,359	377,735,330	189.3	1791.5	385.8	215,245	37.30
2014	11,179,501	393,461,060	153.2	1375.3	295.3	227,114	37.35
2017	11,582,747	403,020,290	134.4	1140.5	237.8	234,559	37.20
2020	11,961,135	414,267,300	120.3	962.6	193.6	241,178	37.12
2023	12,242,366	422,568,670	109.3	830.5	163.9	248,143	37.34

Difference (Ver. 2.505 - Ver. 2.504a) in South Coast Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	4.4	0.6	-17.8	-355	1.44
2000	0	0	1.6	-0.7	-12.4	-1,960	0.80
2005	0	0	1.9	-1.8	-11.7	-2,879	1.00
2007	0	0	1.4	-1.7	-6.8	-2,411	0.75
2010	0	0	1.2	-1.9	-5.3	-2,624	0.67
2014	0	0	1.0	-2.3	-3.5	-3,024	0.45
2017	0	30	0.8	-3.0	-4.6	-3,334	0.27
2020	0	0	0.5	-3.7	-5.7	-3,564	0.06
2023	0	0	0.3	-4.6	-7.1	-3,789	-0.13

Percentage Change in South Coast Emission Inventories (relative to Ver. 2.504a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.50%	0.01%	-1.95%	-0.21%	3.56%
2000	0.00%	0.00%	0.37%	-0.02%	-1.85%	-1.07%	2.34%
2005	0.00%	0.00%	0.62%	-0.06%	-1.90%	-1.24%	2.36%
2007	0.00%	0.00%	0.58%	-0.07%	-1.47%	-1.13%	2.04%
2010	0.00%	0.00%	0.64%	-0.11%	-1.36%	-1.20%	1.82%
2014	0.00%	0.00%	0.65%	-0.17%	-1.16%	-1.31%	1.22%
2017	0.00%	0.00%	0.58%	-0.26%	-1.91%	-1.40%	0.73%
2020	0.00%	0.00%	0.45%	-0.39%	-2.87%	-1.46%	0.15%
2023	0.00%	0.00%	0.31%	-0.55%	-4.14%	-1.50%	-0.36%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type Using Populations

12.6 HEAVY DUTY T6/T7 EXPANSION

This update was made to EMFAC but ultimately not used in EMFAC2011-LDV because MHDDT and HHDDT emissions are generated from EMFAC2011-HD.

Table 12-31. Impact on Statewide Inventory of Change 12.6

Statewide Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.506)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,589,834	657,667,390	2,630	26,244	2,657	406,902	134.46
2000	22,238,334	799,849,410	1,199	11,613	1,960	464,900	104.06
2005	25,779,274	955,234,500	845	7,675	1,947	579,553	123.44
2007	25,431,556	930,013,120	697	6,291	1,596	556,330	110.11
2010	26,905,730	976,336,700	567	5,013	1,321	578,421	106.84
2014	28,886,172	1,052,095,200	423	3,647	968	625,339	104.28
2017	30,222,932	1,103,817,200	341	2,852	754	660,104	102.76
2020	31,543,150	1,153,718,100	283	2,294	600	690,508	102.15
2023	32,780,034	1,198,555,400	251	1,929	502	722,345	103.21

Statewide Summer Episodic On-Road Motor Vehicle Inventories With New T6/T7 Categories/Pops/Accruals
(Calculated Using EMFAC2010 ver 2.507e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,665,808	693,786,560	2,317	23,358	2,559	422,428	125.28
2000	22,316,218	804,194,820	1,201	11,513	2,061	471,882	92.63
2005	25,801,910	950,032,770	829	7,541	1,717	566,290	106.55
2007	25,453,716	919,583,940	684	6,209	1,375	543,289	97.23
2010	26,930,604	953,876,160	564	4,985	1,111	558,556	95.50
2014	28,913,014	1,008,486,200	458	3,800	862	589,623	96.10
2017	30,251,150	1,047,308,500	405	3,153	731	612,246	97.06
2020	31,572,478	1,088,821,100	366	2,678	633	633,705	98.15
2023	32,810,362	1,128,081,400	338	2,345	573	659,453	100.23

Difference (Ver. 2.507e - Ver. 2.506) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	75,974	36,119,170	-312.5	-2886.3	-98.3	15,526	-9.18
2000	77,884	4,345,410	2.0	-100.4	101.5	6,982	-11.43
2005	22,636	-5,201,730	-16.3	-134.7	-230.3	-13,263	-16.89
2007	22,160	-10,429,180	-13.7	-81.9	-220.1	-13,041	-12.88
2010	24,874	-22,460,540	-2.4	-27.9	-210.7	-19,865	-11.34
2014	26,842	-43,609,000	35.0	152.5	-106.7	-35,716	-8.18
2017	28,218	-56,508,700	63.4	301.3	-23.3	-47,857	-5.70
2020	29,328	-64,897,000	82.5	383.6	33.2	-56,804	-4.00
2023	30,328	-70,474,000	86.9	416.7	71.1	-62,891	-2.99

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.506)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.41%	5.49%	-11.88%	-11.00%	-3.70%	3.82%	-6.83%
2000	0.35%	0.54%	0.17%	-0.86%	5.18%	1.50%	-10.98%
2005	0.09%	-0.54%	-1.92%	-1.75%	-11.83%	-2.29%	-13.68%
2007	0.09%	-1.12%	-1.96%	-1.30%	-13.79%	-2.34%	-11.70%
2010	0.09%	-2.30%	-0.43%	-0.56%	-15.94%	-3.43%	-10.61%
2014	0.09%	-4.14%	8.27%	4.18%	-11.02%	-5.71%	-7.84%
2017	0.09%	-5.12%	18.58%	10.57%	-3.08%	-7.25%	-5.54%
2020	0.09%	-5.63%	29.13%	16.72%	5.53%	-8.23%	-3.92%
2023	0.09%	-5.88%	34.66%	21.61%	14.17%	-8.71%	-2.89%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-32. Impact on Sacramento Valley Air Basin Inventory of Change 12.6

Sacramento Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.506)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,386,117	47,687,332	214.5	2140.3	211.1	29,814	11.17
2000	1,640,564	57,266,724	99.0	939.7	159.1	33,549	8.19
2005	1,987,335	71,431,800	72.5	623.3	165.1	43,386	9.67
2007	1,965,067	69,355,912	62.2	525.0	141.5	42,248	8.77
2010	2,128,723	74,675,936	52.4	431.6	118.2	44,753	8.47
2014	2,322,124	82,988,688	39.5	316.7	86.3	49,564	8.26
2017	2,460,544	88,857,680	31.7	245.5	66.8	53,133	8.16
2020	2,597,919	94,183,600	26.1	194.6	52.7	56,346	8.16
2023	2,742,155	99,436,240	23.1	162.2	43.5	59,591	8.32

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With New T6/T7 Categories
(Calculated Using EMFAC2010 ver 2.507e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,394,479	50,672,340	187.1	1916.5	203.6	31,075	10.27
2000	1,649,156	57,586,440	97.5	926.4	165.8	33,955	7.03
2005	1,990,785	70,935,288	69.8	608.7	142.8	42,016	8.20
2007	1,968,651	68,579,312	59.4	510.9	119.1	40,956	7.62
2010	2,132,849	73,205,224	50.1	415.2	96.8	43,030	7.49
2014	2,326,865	79,631,664	40.4	312.2	74.1	46,439	7.53
2017	2,465,686	84,103,120	35.4	255.7	62.2	48,852	7.60
2020	2,603,439	88,483,016	31.8	215.7	53.4	51,171	7.70
2023	2,748,041	93,168,168	29.4	189.3	47.6	53,890	7.90

Difference (Ver. 2.507e - Ver. 2.506) in Sacramento Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	8362	2985008	-27.5	-223.7	-7.5	1,262	-0.90
2000	8592	319716	-1.5	-13.3	6.7	406	-1.16
2005	3450	-496512	-2.7	-14.6	-22.3	-1,370	-1.47
2007	3584	-776600	-2.8	-14.2	-22.3	-1,291	-1.15
2010	4126	-1470712	-2.3	-16.4	-21.4	-1,723	-0.97
2014	4741	-3357024	0.9	-4.5	-12.2	-3,124	-0.73
2017	5142	-4754560	3.7	10.2	-4.6	-4,281	-0.57
2020	5520	-5700584	5.7	21.1	0.8	-5,176	-0.47
2023	5886	-6268072	6.3	27.1	4.1	-5,701	-0.41

Percentage Change in Sacramento Emission Inventories (relative to Ver. 2.506)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.60%	6.26%	-12.80%	-10.45%	-3.57%	4.23%	-8.03%
2000	0.52%	0.56%	-1.55%	-1.41%	4.24%	1.21%	-14.14%
2005	0.17%	-0.70%	-3.72%	-2.34%	-13.52%	-3.16%	-15.24%
2007	0.18%	-1.12%	-4.48%	-2.70%	-15.79%	-3.06%	-13.08%
2010	0.19%	-1.97%	-4.38%	-3.81%	-18.11%	-3.85%	-11.48%
2014	0.20%	-4.05%	2.26%	-1.44%	-14.11%	-6.30%	-8.83%
2017	0.21%	-5.35%	11.72%	4.17%	-6.84%	-8.06%	-6.93%
2020	0.21%	-6.05%	21.75%	10.84%	1.48%	-9.19%	-5.72%
2023	0.21%	-6.30%	27.07%	16.73%	9.32%	-9.57%	-4.96%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-33. Impact on San Diego Air Basin Inventory of Change 12.6

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.506)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,617,475	61,840,940	234.4	2457.4	216.3	38,565	8.63
2000	1,930,488	74,567,480	96.9	1006.1	146.4	41,243	7.67
2005	2,229,147	87,943,704	64.7	655.2	122.6	49,951	8.85
2007	2,268,776	88,395,248	55.5	560.6	107.5	49,950	8.60
2010	2,329,644	89,562,128	44.2	436.1	86.5	50,210	8.39
2014	2,454,383	94,253,912	33.0	314.8	64.4	52,660	8.42
2017	2,552,306	98,096,680	27.1	248.4	51.9	54,685	8.48
2020	2,654,140	101,946,790	23.1	203.8	43.1	56,708	8.60
2023	2,749,926	105,317,070	20.8	175.4	37.2	58,877	8.80

San Diego Summer Episodic On-Road Motor Vehicle Inventories With New T6/T7 Categories
(Calculated Using EMFAC2010 ver 2.507e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,624,564	65,528,924	200	2158	209	40,173	8.55
2000	1,938,446	74,991,368	96	1001	156	41,974	7.32
2005	2,234,307	87,936,400	64	649	119	49,825	8.31
2007	2,273,919	87,207,744	55	563	103	49,287	8.14
2010	2,334,764	86,859,984	45	448	82	48,730	7.94
2014	2,459,716	89,958,456	37	343	64	50,200	8.01
2017	2,557,805	93,097,080	33	287	54	51,737	8.11
2020	2,659,812	96,587,824	30	247	47	53,482	8.24
2023	2,755,727	99,663,704	28	221	41	55,458	8.44

Difference (Ver. 2.507e - Ver. 2.506) in San Diego Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,089	3,687,984	-34.6	-299.8	-7.7	1,608	-0.08
2000	7,958	423,888	-0.5	-5.3	9.6	731	-0.35
2005	5,160	-7,304	-1.1	-5.9	-3.7	-126	-0.54
2007	5,143	-1,187,504	-0.4	2.3	-4.3	-663	-0.47
2010	5,120	-2,702,144	1.0	12.0	-4.1	-1,480	-0.45
2014	5,333	-4,295,456	3.9	27.7	-0.6	-2,460	-0.41
2017	5,499	-4,999,600	5.9	38.8	2.0	-2,948	-0.37
2020	5,672	-5,358,966	7.1	43.5	3.4	-3,225	-0.36
2023	5,801	-5,653,366	7.4	45.5	4.1	-3,420	-0.37

Percentage Change in San Diego Emission Inventories (relative to Ver. 2.506)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.44%	5.96%	-14.76%	-12.20%	-3.57%	4.17%	-0.87%
2000	0.41%	0.57%	-0.54%	-0.52%	6.53%	1.77%	-4.53%
2005	0.23%	-0.01%	-1.63%	-0.90%	-3.03%	-0.25%	-6.10%
2007	0.23%	-1.34%	-0.76%	0.40%	-4.01%	-1.33%	-5.44%
2010	0.22%	-3.02%	2.37%	2.76%	-4.69%	-2.95%	-5.36%
2014	0.22%	-4.56%	11.95%	8.81%	-0.98%	-4.67%	-4.85%
2017	0.22%	-5.10%	21.85%	15.61%	3.87%	-5.39%	-4.39%
2020	0.21%	-5.26%	30.73%	21.34%	7.86%	-5.69%	-4.22%
2023	0.21%	-5.37%	35.60%	25.97%	11.01%	-5.81%	-4.16%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-34. Impact on San Francisco Bay Air Basin Inventory of Change 12.6

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.506)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,934,750	126,570,600	508.8	5091.7	463.8	71,905	17.51
2000	4,710,441	154,959,550	230.0	2182.5	300.3	86,913	15.31
2005	4,931,748	163,791,250	148.8	1321.0	243.3	93,415	16.25
2007	5,036,958	165,888,140	128.3	1120.2	213.4	94,212	15.94
2010	5,292,342	173,551,680	102.8	881.3	173.2	98,153	15.90
2014	5,653,678	186,284,220	73.7	615.5	123.7	104,269	15.96
2017	5,903,514	194,840,240	57.9	466.3	96.2	109,720	16.14
2020	6,145,010	202,564,850	47.3	364.0	76.9	113,701	16.32
2023	6,396,570	210,436,450	42.0	306.0	64.7	117,744	16.63

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With New T6/T7 Categories
(Calculated Using EMFAC2010 ver 2.507e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,948,878	133,723,100	479.8	4458.4	461.3	76,222	19.70
2000	4,724,726	156,271,180	248.3	2208.1	339.1	89,810	15.82
2005	4,936,224	164,056,700	163.5	1338.5	249.1	94,241	15.98
2007	5,041,512	165,108,000	141.1	1142.2	217.1	94,645	15.76
2010	5,296,710	170,781,230	116.2	912.3	174.2	97,406	15.72
2014	5,657,796	180,488,980	93.2	684.1	134.4	101,805	15.91
2017	5,907,515	187,260,050	82.0	565.5	113.4	106,078	16.19
2020	6,148,934	194,075,760	73.7	476.6	97.7	109,433	16.42
2023	6,400,411	201,447,360	67.8	415.5	87.0	113,179	16.76

Difference (Ver. 2.507e - Ver. 2.506) in San Francisco Bay Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	14,128	7,152,500	-29.0	-633.3	-2.5	4,317	2.19
2000	14,285	1,311,630	18.3	25.6	38.7	2,897	0.50
2005	4,476	265,450	14.7	17.5	5.8	826	-0.27
2007	4,554	-780,140	12.8	21.9	3.7	433	-0.19
2010	4,368	-2,770,450	13.3	31.0	1.0	-748	-0.17
2014	4,118	-5,795,240	19.5	68.6	10.7	-2,464	-0.05
2017	4,001	-7,580,190	24.2	99.2	17.3	-3,642	0.05
2020	3,924	-8,489,090	26.4	112.6	20.8	-4,268	0.10
2023	3,841	-8,989,090	25.8	109.5	22.3	-4,565	0.13

Percentage Change in San Francisco Bay Emission Inventories (relative to Ver. 2.506)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.36%	5.65%	-5.70%	-12.44%	-0.55%	6.00%	12.48%
2000	0.30%	0.85%	7.95%	1.17%	12.90%	3.33%	3.28%
2005	0.09%	0.16%	9.85%	1.33%	2.39%	0.88%	-1.64%
2007	0.09%	-0.47%	9.97%	1.96%	1.72%	0.46%	-1.18%
2010	0.08%	-1.60%	12.97%	3.52%	0.58%	-0.76%	-1.10%
2014	0.07%	-3.11%	26.44%	11.15%	8.63%	-2.36%	-0.34%
2017	0.07%	-3.89%	41.77%	21.27%	17.97%	-3.32%	0.30%
2020	0.06%	-4.19%	55.88%	30.93%	27.06%	-3.75%	0.64%
2023	0.06%	-4.27%	61.35%	35.80%	34.42%	-3.88%	0.75%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-35. Impact on San Joaquin Valley Air Basin Inventory of Change 12.6

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.506)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,395,175	55,468,272	247.8	2537.4	341.2	41,131	25.39
2000	1,943,272	77,177,536	138.2	1327.0	330.1	52,748	18.20
2005	2,389,193	98,949,512	107.1	909.0	394.0	71,319	21.23
2007	2,407,275	98,375,648	92.5	774.0	346.4	70,076	18.94
2010	2,600,200	105,634,770	77.2	629.3	288.9	73,651	17.34
2014	2,830,493	117,297,570	57.9	462.1	210.1	81,724	15.74
2017	3,012,242	126,354,730	46.4	363.2	160.8	88,275	14.79
2020	3,203,419	134,943,280	38.6	295.9	125.1	94,639	14.25
2023	3,406,514	143,350,660	34.3	254.6	103.1	102,241	14.30

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With New T6/T7 Categories
(Calculated Using EMFAC2010 ver 2.507e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,405,114	58,580,652	219.0	2299.7	331.9	42,756	22.06
2000	1,953,670	77,852,040	133.2	1295.6	344.3	53,500	14.06
2005	2,389,626	97,397,040	98.3	869.2	320.3	67,037	16.20
2007	2,408,237	96,145,336	84.4	741.6	268.3	66,019	14.80
2010	2,601,884	101,880,540	71.1	604.4	212.5	68,742	13.76
2014	2,832,668	110,655,900	57.2	456.9	160.1	73,869	13.15
2017	3,014,826	117,719,150	49.7	376.5	133.8	77,712	12.92
2020	3,206,450	124,790,200	44.6	321.3	114.8	81,640	12.84
2023	3,410,038	132,194,620	41.5	288.6	103.3	87,649	13.15

Difference (Ver. 2.507e - Ver. 2.506) in San Joaquin Valley Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	9,939	3,112,380	-28.9	-237.8	-9.3	1,626	-3.33
2000	10,398	674,504	-5.0	-31.5	14.1	752	-4.14
2005	433	-1,552,472	-8.8	-39.8	-73.7	-4,282	-5.03
2007	962	-2,230,312	-8.1	-32.4	-78.0	-4,057	-4.14
2010	1,684	-3,754,230	-6.0	-24.9	-76.4	-4,909	-3.58
2014	2,175	-6,641,670	-0.7	-5.2	-50.0	-7,855	-2.59
2017	2,584	-8,635,580	3.3	13.2	-27.0	-10,564	-1.87
2020	3,031	-10,153,080	6.1	25.4	-10.4	-12,999	-1.41
2023	3,524	-11,156,040	7.2	34.0	0.1	-14,591	-1.15

Percentage Change in San Joaquin Valley Emission Inventories (relative to Ver. 2.506)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.71%	5.61%	-11.65%	-9.37%	-2.72%	3.95%	-13.10%
2000	0.54%	0.87%	-3.64%	-2.37%	4.28%	1.42%	-22.76%
2005	0.02%	-1.57%	-8.22%	-4.38%	-18.71%	-6.00%	-23.70%
2007	0.04%	-2.27%	-8.77%	-4.18%	-22.53%	-5.79%	-21.87%
2010	0.06%	-3.55%	-7.79%	-3.95%	-26.45%	-6.67%	-20.66%
2014	0.08%	-5.66%	-1.27%	-1.13%	-23.79%	-9.61%	-16.45%
2017	0.09%	-6.83%	7.13%	3.64%	-16.79%	-11.97%	-12.66%
2020	0.09%	-7.52%	15.71%	8.57%	-8.29%	-13.73%	-9.86%
2023	0.10%	-7.78%	21.01%	13.37%	0.14%	-14.27%	-8.04%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-36. Impact on South Coast Air Basin Inventory of Change 12.6

South Coast Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.506)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,547,190	269,279,940	1017.9	10012.5	956.3	161,692	42.44
2000	8,884,540	323,010,620	441.7	4362.0	654.3	181,129	34.91
2005	10,519,562	393,767,940	307.5	2948.3	602.5	230,707	43.21
2007	9,971,575	369,926,690	233.5	2250.4	449.6	212,629	37.23
2010	10,473,358	384,491,940	184.3	1757.5	373.5	219,250	37.19
2014	11,179,501	407,362,660	137.7	1281.0	278.4	234,650	37.37
2017	11,582,748	420,267,420	112.2	1009.6	220.1	243,918	37.24
2020	11,961,132	433,515,070	94.1	817.5	176.9	251,624	37.16
2023	12,242,366	443,030,180	82.8	683.1	148.9	259,363	37.37

South Coast Summer Episodic On-Road Motor Vehicle Inventories With New T6/T7 Categories
(Calculated Using EMFAC2010 ver 2.507e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,587,541	284,337,980	882.2	8983.9	935.1	168,928	41.96
2000	8,926,638	325,417,540	439.9	4337.8	708.1	185,478	34.06
2005	10,551,385	393,939,550	301.0	2913.0	583.1	230,533	40.55
2007	9,997,372	368,084,260	228.8	2235.2	430.8	211,870	35.37
2010	10,501,053	378,033,630	184.3	1766.7	356.3	216,185	35.53
2014	11,209,772	392,913,630	150.6	1360.9	285.1	226,596	36.46
2017	11,614,586	401,614,560	133.7	1134.1	246.0	232,508	37.06
2020	11,994,158	412,199,680	121.0	962.3	215.6	237,963	37.53
2023	12,277,238	420,057,220	111.2	835.0	199.5	244,167	38.17

Difference (Ver. 2.507e - Ver. 2.506) in South Coast Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	40,351	15,058,040	-135.6	-1028.5	-21.3	7,236	-0.49
2000	42,098	2,406,920	-1.8	-24.2	53.8	4,349	-0.85
2005	31,823	171,610	-6.4	-35.3	-19.4	-174	-2.66
2007	25,797	-1,842,430	-4.6	-15.2	-18.8	-760	-1.86
2010	27,695	-6,458,310	0.0	9.1	-17.3	-3,065	-1.66
2014	30,271	-14,449,030	12.9	79.9	6.7	-8,053	-0.91
2017	31,838	-18,652,860	21.5	124.5	25.9	-11,410	-0.19
2020	33,026	-21,315,390	26.9	144.8	38.7	-13,661	0.38
2023	34,872	-22,972,960	28.4	151.9	50.6	-15,195	0.80

Percentage Change in South Coast Emission Inventories (relative to Ver. 2.506)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.53%	5.59%	-13.33%	-10.27%	-2.22%	4.48%	-1.15%
2000	0.47%	0.75%	-0.40%	-0.56%	8.22%	2.40%	-2.43%
2005	0.30%	0.04%	-2.08%	-1.20%	-3.23%	-0.08%	-6.16%
2007	0.26%	-0.50%	-1.98%	-0.68%	-4.18%	-0.36%	-4.99%
2010	0.26%	-1.68%	0.01%	0.52%	-4.62%	-1.40%	-4.47%
2014	0.27%	-3.55%	9.35%	6.24%	2.39%	-3.43%	-2.43%
2017	0.27%	-4.44%	19.18%	12.33%	11.77%	-4.68%	-0.51%
2020	0.28%	-4.92%	28.56%	17.71%	21.90%	-5.43%	1.01%
2023	0.28%	-5.19%	34.24%	22.24%	33.97%	-5.86%	2.14%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type Using Populations

12.7 NEW SURVIVAL RATES AND LIFETIME MILEAGE CALCULATIONS FOR MOTOR VEHICLES

Please refer to Section 3.3.4.3. This update includes two distinct changes, only one of which made its way into the final model. There are two separate effects. First, originally staff had planned to update survival rates for all vehicle categories, and this change was made here. The survival rates tend to make the fleet younger into the future. Ultimately, these survival rates were removed and only two were updated as described in Section 3.3.4.2. That change is discussed later in this section. Second, the new lifetime mileage calculation tends to reduce the odometer and therefore reduces the emissions. The first effect can be seen in the VMT. There is a slight increase because newer vehicles travel more. CO2 follows the VMT because there is not a strong age dependency, and there are no deterioration rates. The second effect is much more difficult to observe. The lower odometer values will reduce emissions, but the amount of production is dependent upon the smog check program in place and the area-specific accrual rates.

Table 12-37. Impact on Statewide Inventory of Change 12.7

Statewide Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.505)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,590,372	691,048,900	2,278	23,342	2,501	414,325	133.12
2000	22,238,334	799,849,410	1,199	11,613	1,960	464,900	104.06
2005	25,779,274	955,234,500	845	7,675	1,947	579,553	123.44
2007	25,431,560	923,189,120	698	6,315	1,607	553,343	110.21
2010	26,905,742	958,080,320	578	5,074	1,347	570,532	106.85
2014	28,886,264	1,016,926,700	465	3,851	1,006	610,197	103.95
2017	30,223,104	1,059,726,400	405	3,179	797	640,847	102.33
2020	31,543,406	1,104,525,600	361	2,684	643	668,884	101.71
2023	32,780,384	1,145,927,000	330	2,338	540	699,032	102.79

Statewide Summer Episodic On-Road Motor Vehicle Inventories With New Survival Rates
(Calculated Using EMFAC2010 ver 2.506)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,589,834	657,667,390	2,630	26,244	2,657	406,902	134.46
2000	22,238,334	799,849,410	1,199	11,613	1,960	464,900	104.06
2005	25,779,274	955,234,500	845	7,675	1,947	579,553	123.44
2007	25,431,556	930,013,120	697	6,291	1,596	556,330	110.11
2010	26,905,730	976,336,700	567	5,013	1,321	578,421	106.84
2014	28,886,172	1,052,095,200	423	3,647	968	625,339	104.28
2017	30,222,932	1,103,817,200	341	2,852	754	660,104	102.76
2020	31,543,150	1,153,718,100	283	2,294	600	690,508	102.15
2023	32,780,034	1,198,555,400	251	1,929	502	722,345	103.21

Difference (Ver. 2.506 - Ver. 2.505) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-538	-33,381,510	352.2	2902.2	156.6	-7,423	1.34
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	-4	6,824,000	-0.8	-24.1	-11.9	2,987	-0.10
2010	-12	18,256,380	-11.2	-61.1	-25.2	7,889	-0.01
2014	-92	35,168,500	-41.4	-204.1	-37.8	15,142	0.33
2017	-172	44,090,800	-64.0	-327.2	-43.2	19,257	0.43
2020	-256	49,192,500	-77.4	-389.9	-43.0	21,624	0.44
2023	-350	52,628,400	-79.0	-409.7	-38.8	23,312	0.42

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.505)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	-4.83%	15.46%	12.43%	6.26%	-1.79%	1.01%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.74%	-0.12%	-0.38%	-0.74%	0.54%	-0.09%
2010	0.00%	1.91%	-1.93%	-1.20%	-1.87%	1.38%	-0.01%
2014	0.00%	3.46%	-8.91%	-5.30%	-3.76%	2.48%	0.32%
2017	0.00%	4.16%	-15.79%	-10.29%	-5.41%	3.00%	0.42%
2020	0.00%	4.45%	-21.45%	-14.53%	-6.68%	3.23%	0.43%
2023	0.00%	4.59%	-23.95%	-17.52%	-7.17%	3.33%	0.41%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-38. Impact on Sacramento Valley Air Basin Inventory of Change 12.7

Sacramento Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.505)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,386,228	50,471,784	187.7	1923.6	199.8	30,480	11.00
2000	1,640,564	57,266,724	99.0	939.7	159.1	33,549	8.19
2005	1,987,335	71,431,800	72.5	623.3	165.1	43,386	9.67
2007	1,965,067	68,937,656	61.9	523.3	142.3	42,067	8.79
2010	2,128,728	73,600,472	52.4	426.2	120.0	44,300	8.48
2014	2,322,148	80,409,528	42.0	319.6	88.8	48,508	8.22
2017	2,460,585	85,238,248	36.4	260.5	69.7	51,650	8.09
2020	2,597,983	89,913,688	32.4	218.5	55.6	54,567	8.07
2023	2,742,237	94,758,856	29.7	190.9	46.2	57,622	8.21

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With New Survival Rates
(Calculated Using EMFAC2010 ver 2.506)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,386,117	47,687,332	214.5	2140.3	211.1	29,814	11.17
2000	1,640,564	57,266,724	99.0	939.7	159.1	33,549	8.19
2005	1,987,335	71,431,800	72.5	623.3	165.1	43,386	9.67
2007	1,965,067	69,355,912	62.2	525.0	141.5	42,248	8.77
2010	2,128,723	74,675,936	52.4	431.6	118.2	44,753	8.47
2014	2,322,124	82,988,688	39.5	316.7	86.3	49,564	8.26
2017	2,460,544	88,857,680	31.7	245.5	66.8	53,133	8.16
2020	2,597,919	94,183,600	26.1	194.6	52.7	56,346	8.16
2023	2,742,155	99,436,240	23.1	162.2	43.5	59,591	8.32

Difference (Ver. 2.506 - Ver. 2.505) in Sacramento Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-111	-2784452	26.9	216.6	11.3	-666	0.17
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	0	418256	0.3	1.7	-0.8	181	-0.01
2010	-5	1075464	0.0	5.4	-1.8	453	-0.02
2014	-24	2579160	-2.5	-2.8	-2.5	1,056	0.04
2017	-41	3619432	-4.7	-15.1	-2.9	1,483	0.07
2020	-64	4269912	-6.3	-23.9	-3.0	1,779	0.10
2023	-82	4677384	-6.6	-28.7	-2.7	1,969	0.11

Percentage Change in Sacramento Emission Inventories (relative to Ver. 2.505)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-0.01%	-5.52%	14.31%	11.26%	5.67%	-2.19%	1.51%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.61%	0.49%	0.33%	-0.59%	0.43%	-0.17%
2010	0.00%	1.46%	0.02%	1.27%	-1.46%	1.02%	-0.20%
2014	0.00%	3.21%	-5.88%	-0.89%	-2.77%	2.18%	0.46%
2017	0.00%	4.25%	-13.02%	-5.79%	-4.16%	2.87%	0.92%
2020	0.00%	4.75%	-19.40%	-10.95%	-5.34%	3.26%	1.19%
2023	0.00%	4.94%	-22.22%	-15.05%	-5.93%	3.42%	1.31%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-39. Impact on San Diego Air Basin Inventory of Change 12.7

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.505)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,617,505	65,249,804	199.4	2152.6	203.0	39,560	8.64
2000	1,930,488	74,567,480	96.9	1006.1	146.4	41,243	7.67
2005	2,229,147	87,943,704	64.7	655.2	122.6	49,951	8.85
2007	2,268,776	87,223,976	56.1	567.9	109.0	49,448	8.59
2010	2,329,644	86,948,128	46.0	452.1	89.6	49,068	8.35
2014	2,454,384	90,207,336	37.5	344.9	69.1	50,869	8.35
2017	2,552,306	93,440,464	33.3	288.7	57.3	52,603	8.42
2020	2,654,140	96,987,712	30.4	248.2	48.6	54,464	8.54
2023	2,749,925	100,077,350	28.3	221.3	42.3	56,466	8.73

San Diego Summer Episodic On-Road Motor Vehicle Inventories With New Survival Rates
(Calculated Using EMFAC2010 ver 2.506)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,617,475	61,840,940	234	2457	216	38,565	8.63
2000	1,930,488	74,567,480	97	1006	146	41,243	7.67
2005	2,229,147	87,943,704	65	655	123	49,951	8.85
2007	2,268,776	88,395,248	56	561	107	49,950	8.60
2010	2,329,644	89,562,128	44	436	86	50,210	8.39
2014	2,454,383	94,253,912	33	315	64	52,660	8.42
2017	2,552,306	98,096,680	27	248	52	54,685	8.48
2020	2,654,140	101,946,790	23	204	43	56,708	8.60
2023	2,749,926	105,317,070	21	175	37	58,877	8.80

Difference (Ver. 2.506 - Ver. 2.505) in San Diego Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-30	-3,408,864	35.0	304.8	13.3	-995	-0.02
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	0	1,171,272	-0.6	-7.3	-1.5	502	0.02
2010	0	2,614,000	-1.9	-16.0	-3.2	1,142	0.04
2014	-1	4,046,576	-4.5	-30.1	-4.7	1,791	0.06
2017	0	4,656,216	-6.3	-40.3	-5.4	2,082	0.07
2020	0	4,959,078	-7.3	-44.3	-5.5	2,244	0.07
2023	1	5,239,720	-7.5	-46.0	-5.1	2,411	0.07

Percentage Change in San Diego Emission Inventories (relative to Ver. 2.505)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	-5.22%	17.56%	14.16%	6.58%	-2.52%	-0.19%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	1.34%	-0.99%	-1.28%	-1.37%	1.02%	0.18%
2010	0.00%	3.01%	-4.08%	-3.54%	-3.54%	2.33%	0.48%
2014	0.00%	4.49%	-11.94%	-8.74%	-6.83%	3.52%	0.77%
2017	0.00%	4.98%	-18.82%	-13.96%	-9.42%	3.96%	0.79%
2020	0.00%	5.11%	-24.02%	-17.86%	-11.28%	4.12%	0.77%
2023	0.00%	5.24%	-26.57%	-20.76%	-12.08%	4.27%	0.78%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-40. Impact on San Francisco Bay Air Basin Inventory of Change 12.7

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.505)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,934,775	132,557,540	432.5	4408.7	427.5	73,005	17.34
2000	4,710,441	154,959,550	230.0	2182.5	300.3	86,913	15.31
2005	4,931,748	163,791,250	148.8	1321.0	243.3	93,415	16.25
2007	5,036,958	164,750,560	128.9	1125.4	215.8	93,687	15.96
2010	5,292,343	170,504,580	106.0	895.4	178.0	96,780	15.90
2014	5,653,678	180,541,380	83.7	663.8	131.2	101,758	15.93
2017	5,903,513	187,522,510	72.7	543.5	105.2	106,432	16.12
2020	6,145,010	194,476,900	64.5	453.2	85.9	110,043	16.32
2023	6,396,572	201,903,140	58.6	390.9	72.6	113,881	16.65

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With New Survival Rates
(Calculated Using EMFAC2010 ver 2.506)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,934,750	126,570,600	508.8	5091.7	463.8	71,905	17.51
2000	4,710,441	154,959,550	230.0	2182.5	300.3	86,913	15.31
2005	4,931,748	163,791,250	148.8	1321.0	243.3	93,415	16.25
2007	5,036,958	165,888,140	128.3	1120.2	213.4	94,212	15.94
2010	5,292,342	173,551,680	102.8	881.3	173.2	98,153	15.90
2014	5,653,678	186,284,220	73.7	615.5	123.7	104,269	15.96
2017	5,903,514	194,840,240	57.9	466.3	96.2	109,720	16.14
2020	6,145,010	202,564,850	47.3	364.0	76.9	113,701	16.32
2023	6,396,570	210,436,450	42.0	306.0	64.7	117,744	16.63

Difference (Ver. 2.506 - Ver. 2.505) in San Francisco Bay Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-25	-5,986,940	76.3	683.0	36.3	-1,100	0.17
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	0	1,137,580	-0.6	-5.2	-2.4	525	-0.02
2010	-1	3,047,100	-3.1	-14.1	-4.8	1,373	-0.01
2014	0	5,742,840	-10.0	-48.4	-7.5	2,511	0.03
2017	1	7,317,730	-14.8	-77.2	-9.0	3,288	0.02
2020	0	8,087,950	-17.2	-89.2	-9.1	3,658	0.00
2023	-2	8,533,310	-16.6	-84.9	-7.9	3,863	-0.02

Percentage Change in San Francisco Bay Emission Inventories (relative to Ver. 2.505)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	-4.52%	17.65%	15.49%	8.48%	-1.51%	0.98%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.69%	-0.43%	-0.46%	-1.09%	0.56%	-0.12%
2010	0.00%	1.79%	-2.95%	-1.57%	-2.69%	1.42%	-0.03%
2014	0.00%	3.18%	-11.95%	-7.28%	-5.70%	2.47%	0.20%
2017	0.00%	3.90%	-20.42%	-14.20%	-8.58%	3.09%	0.12%
2020	0.00%	4.16%	-26.70%	-19.68%	-10.57%	3.32%	-0.02%
2023	0.00%	4.23%	-28.32%	-21.72%	-10.85%	3.39%	-0.12%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-41. Impact on San Joaquin Valley Air Basin Inventory of Change 12.7

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.505)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,395,280	58,324,240	220.9	2294.3	329.0	41,812	25.19
2000	1,943,272	77,177,536	138.2	1327.0	330.1	52,748	18.20
2005	2,389,193	98,949,512	107.1	909.0	394.0	71,319	21.23
2007	2,407,275	97,362,808	92.7	776.9	347.7	69,641	18.94
2010	2,600,200	103,175,860	78.5	634.6	291.5	72,654	17.30
2014	2,830,493	113,057,020	62.2	477.9	213.6	80,019	15.63
2017	3,012,243	121,296,520	53.1	390.9	164.8	86,207	14.67
2020	3,203,419	129,483,600	46.7	330.7	129.1	92,367	14.12
2023	3,406,514	137,546,340	42.8	295.2	106.8	99,728	14.18

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With New Survival Rates
(Calculated Using EMFAC2010 ver 2.506)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,395,175	55,468,272	247.8	2537.4	341.2	41,131	25.39
2000	1,943,272	77,177,536	138.2	1327.0	330.1	52,748	18.20
2005	2,389,193	98,949,512	107.1	909.0	394.0	71,319	21.23
2007	2,407,275	98,375,648	92.5	774.0	346.4	70,076	18.94
2010	2,600,200	105,634,770	77.2	629.3	288.9	73,651	17.34
2014	2,830,493	117,297,570	57.9	462.1	210.1	81,724	15.74
2017	3,012,242	126,354,730	46.4	363.2	160.8	88,275	14.79
2020	3,203,419	134,943,280	38.6	295.9	125.1	94,639	14.25
2023	3,406,514	143,350,660	34.3	254.6	103.1	102,241	14.30

Difference (Ver. 2.506 - Ver. 2.505) in San Joaquin Valley Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-105	-2,855,968	26.9	243.1	12.1	-681	0.20
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	0	1,012,840	-0.2	-2.8	-1.3	435	0.00
2010	0	2,458,910	-1.3	-5.4	-2.5	997	0.04
2014	0	4,240,550	-4.3	-15.8	-3.5	1,706	0.10
2017	-1	5,058,210	-6.7	-27.6	-4.0	2,068	0.12
2020	0	5,459,680	-8.1	-34.8	-4.0	2,272	0.13
2023	0	5,804,320	-8.5	-40.6	-3.7	2,513	0.12

Percentage Change in San Joaquin Valley Emission Inventories (relative to Ver. 2.505)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-0.01%	-4.90%	12.19%	10.60%	3.69%	-1.63%	0.79%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	1.04%	-0.18%	-0.36%	-0.38%	0.62%	0.02%
2010	0.00%	2.38%	-1.68%	-0.84%	-0.87%	1.37%	0.24%
2014	0.00%	3.75%	-6.96%	-3.30%	-1.65%	2.13%	0.65%
2017	0.00%	4.17%	-12.54%	-7.06%	-2.44%	2.40%	0.82%
2020	0.00%	4.22%	-17.40%	-10.53%	-3.09%	2.46%	0.90%
2023	0.00%	4.22%	-19.91%	-13.76%	-3.46%	2.52%	0.87%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-42. Impact on South Coast Air Basin Inventory of Change 12.7

South Coast Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.505)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,547,380	282,562,270	880.1	8973.4	895.9	164,587	41.91
2000	8,884,540	323,010,620	441.7	4362.0	654.3	181,129	34.91
2005	10,519,562	393,767,940	307.5	2948.3	602.5	230,707	43.21
2007	9,971,575	367,746,560	234.0	2261.2	454.0	211,679	37.30
2010	10,473,359	377,735,330	189.1	1790.0	383.3	216,301	37.25
2014	11,179,501	393,461,060	153.0	1373.7	292.9	228,495	37.32
2017	11,582,747	403,020,290	134.2	1138.9	235.6	236,187	37.17
2020	11,961,135	414,267,300	120.1	961.0	191.6	242,982	37.10
2023	12,242,366	422,568,670	109.1	828.7	162.0	250,127	37.33

South Coast Summer Episodic On-Road Motor Vehicle Inventories With New Survival Rates
(Calculated Using EMFAC2010 ver 2.506)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,547,190	269,279,940	1017.9	10012.5	956.3	161,692	42.44
2000	8,884,540	323,010,620	441.7	4362.0	654.3	181,129	34.91
2005	10,519,562	393,767,940	307.5	2948.3	602.5	230,707	43.21
2007	9,971,575	369,926,690	233.5	2250.4	449.6	212,629	37.23
2010	10,473,358	384,491,940	184.3	1757.5	373.5	219,250	37.19
2014	11,179,501	407,362,660	137.7	1281.0	278.4	234,650	37.37
2017	11,582,748	420,267,420	112.2	1009.6	220.1	243,918	37.24
2020	11,961,132	433,515,070	94.1	817.5	176.9	251,624	37.16
2023	12,242,366	443,030,180	82.8	683.1	148.9	259,363	37.37

Difference (Ver. 2.506 - Ver. 2.505) in South Coast Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-190	-13,282,330	137.8	1039.1	60.4	-2,896	0.54
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	0	2,180,130	-0.6	-10.8	-4.4	950	-0.06
2010	-1	6,756,610	-4.8	-32.4	-9.8	2,949	-0.06
2014	0	13,901,600	-15.3	-92.7	-14.5	6,155	0.05
2017	1	17,247,130	-22.0	-129.3	-15.5	7,732	0.07
2020	-3	19,247,770	-25.9	-143.4	-14.7	8,642	0.06
2023	0	20,461,510	-26.3	-145.6	-13.1	9,236	0.04

Percentage Change in South Coast Emission Inventories (relative to Ver. 2.505)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	-4.70%	15.65%	11.58%	6.74%	-1.76%	1.28%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.59%	-0.24%	-0.48%	-0.98%	0.45%	-0.17%
2010	0.00%	1.79%	-2.52%	-1.81%	-2.55%	1.36%	-0.15%
2014	0.00%	3.53%	-10.00%	-6.75%	-4.94%	2.69%	0.13%
2017	0.00%	4.28%	-16.43%	-11.35%	-6.57%	3.27%	0.19%
2020	0.00%	4.65%	-21.60%	-14.93%	-7.69%	3.56%	0.16%
2023	0.00%	4.84%	-24.10%	-17.57%	-8.09%	3.69%	0.10%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type Using Populations

12.8 REVISE GREENHOUSE GAS EMISSION FACTORS AND GASOLINE PM

Please refer to Section 3.3.3.1. and Section 3.3.3.6. These components were added to the model and the incremental emissions are discussed here together. The change in CO2 emissions are small, generally reducing by 0 to 2% independent of region. PM generally went down significantly, as much as 20% in the future. This is due to lower emission factors for newer vehicles and LEV. There was some increase in the past as older vehicles were found to be higher emitting in the Kansas City study.

Table 12-43. Impact on Statewide Inventory of Change 12.8

Statewide Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.50.7e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,665,808	693,786,560	2,317	23,358	2,559	422,428	125.28
2000	22,316,218	804,194,820	1,201	11,513	2,061	471,882	92.63
2005	25,801,910	950,032,770	829	7,541	1,717	566,290	106.55
2007	25,453,716	919,583,940	684	6,209	1,375	543,289	97.23
2010	26,930,604	953,876,160	564	4,985	1,111	558,556	95.50
2014	28,913,014	1,008,486,200	458	3,800	862	589,623	96.10
2017	30,251,150	1,047,308,500	405	3,153	731	612,246	97.06
2020	31,572,478	1,088,821,100	366	2,678	633	633,705	98.15
2023	32,810,362	1,128,081,400	338	2,345	573	659,453	100.23

Statewide Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs/Gasoline PM BERs
(Calculated Using EMFAC2010 ver 2.509e))

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,665,456	660,180,670	2,621	26,029	2,692	416,365	138.90
2000	22,316,218	804,194,820	1,169	11,274	2,033	461,826	91.01
2005	25,801,910	950,032,770	809	7,394	1,704	558,598	96.96
2007	25,453,712	926,450,180	667	6,047	1,355	540,049	85.64
2010	26,930,592	972,253,500	544	4,814	1,082	563,855	80.79
2014	28,912,956	1,043,885,300	416	3,565	828	612,723	78.31
2017	30,251,038	1,091,683,800	349	2,888	699	649,197	77.83
2020	31,572,304	1,138,232,200	305	2,451	610	682,234	77.99
2023	32,810,114	1,180,801,200	283	2,192	562	717,559	78.96

Difference (Ver. 2.509e - Ver. 2.507e) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-352	-33,605,890	303.6	2670.9	133.0	-6,063	13.62
2000	0	0	-32.4	-238.8	-28.0	-10,056	-1.62
2005	0	0	-20.4	-146.7	-13.0	-7,692	-9.60
2007	-4	6,866,240	-16.7	-161.8	-20.7	-3,241	-11.59
2010	-12	18,377,340	-20.6	-171.0	-28.6	5,299	-14.71
2014	-58	35,399,100	-42.1	-234.3	-33.3	23,101	-17.79
2017	-112	44,375,300	-56.2	-264.8	-31.6	36,951	-19.23
2020	-174	49,411,100	-60.9	-226.5	-23.1	48,529	-20.16
2023	-248	52,719,800	-54.8	-152.7	-10.2	58,105	-21.27

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.507e)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	-4.84%	13.10%	11.43%	5.20%	-1.44%	10.87%
2000	0.00%	0.00%	-2.70%	-2.07%	-1.36%	-2.13%	-1.75%
2005	0.00%	0.00%	-2.46%	-1.95%	-0.76%	-1.36%	-9.01%
2007	0.00%	0.75%	-2.45%	-2.61%	-1.51%	-0.60%	-11.92%
2010	0.00%	1.93%	-3.64%	-3.43%	-2.57%	0.95%	-15.40%
2014	0.00%	3.51%	-9.19%	-6.17%	-3.87%	3.92%	-18.51%
2017	0.00%	4.24%	-13.88%	-8.40%	-4.32%	6.04%	-19.81%
2020	0.00%	4.54%	-16.63%	-8.46%	-3.65%	7.66%	-20.54%
2023	0.00%	4.67%	-16.23%	-6.51%	-1.79%	8.81%	-21.22%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-44. Impact on Sacramento Valley Air Basin Inventory of Change 12.8

Sacramento Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.507e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,394,479	50,672,340	187.1	1916.5	203.6	31,075	10.27
2000	1,649,156	57,586,440	97.5	926.4	165.8	33,955	7.03
2005	1,990,785	70,935,288	69.8	608.7	142.8	42,016	8.20
2007	1,968,651	68,579,312	59.4	510.9	119.1	40,956	7.62
2010	2,132,849	73,205,224	50.1	415.2	96.8	43,030	7.49
2014	2,326,865	79,631,664	40.4	312.2	74.1	46,439	7.53
2017	2,465,686	84,103,120	35.4	255.7	62.2	48,852	7.60
2020	2,603,439	88,483,016	31.8	215.7	53.4	51,171	7.70
2023	2,748,041	93,168,168	29.4	189.3	47.6	53,890	7.90

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.509e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,394,423	47,858,188	210.8	2121.6	212.9	30,547	11.17
2000	1,649,156	57,586,440	95.1	908.5	163.8	33,351	6.90
2005	1,990,785	70,935,288	68.3	597.7	141.9	41,473	7.53
2007	1,968,651	69,001,744	58.4	501.5	117.8	40,685	6.80
2010	2,132,846	74,276,584	49.2	411.4	95.3	43,265	6.46
2014	2,326,848	82,219,424	37.6	307.0	72.6	48,105	6.30
2017	2,465,655	87,740,744	31.0	246.6	60.9	51,749	6.30
2020	2,603,390	92,759,936	26.7	207.1	52.9	55,106	6.34
2023	2,747,977	97,836,016	24.6	184.2	48.2	58,681	6.47

Difference (Ver. 2.509e - Ver. 2.507e) in Sacramento Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-56	-2814152	23.8	205.0	9.3	-528	0.89
2000	0	0	-2.3	-17.9	-2.0	-605	-0.13
2005	0	0	-1.5	-11.0	-0.9	-543	-0.66
2007	0	422432	-1.0	-9.4	-1.4	-271	-0.83
2010	-3	1071360	-0.9	-3.8	-1.5	235	-1.04
2014	-17	2587760	-2.8	-5.2	-1.6	1,665	-1.23
2017	-31	3637624	-4.4	-9.1	-1.3	2,896	-1.30
2020	-49	4276920	-5.2	-8.6	-0.5	3,936	-1.36
2023	-64	4667848	-4.8	-5.2	0.6	4,791	-1.44

Percentage Change in Sacramento Emission Inventories (relative to Ver. 2.507e)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	-5.55%	12.70%	10.70%	4.55%	-1.70%	8.68%
2000	0.00%	0.00%	-2.37%	-1.93%	-1.20%	-1.78%	-1.88%
2005	0.00%	0.00%	-2.14%	-1.81%	-0.65%	-1.29%	-8.10%
2007	0.00%	0.62%	-1.68%	-1.83%	-1.16%	-0.66%	-10.83%
2010	0.00%	1.46%	-1.80%	-0.92%	-1.59%	0.55%	-13.83%
2014	0.00%	3.25%	-6.87%	-1.66%	-2.10%	3.59%	-16.28%
2017	0.00%	4.33%	-12.36%	-3.55%	-2.13%	5.93%	-17.12%
2020	0.00%	4.83%	-16.19%	-4.00%	-1.01%	7.69%	-17.65%
2023	0.00%	5.01%	-16.39%	-2.72%	1.36%	8.89%	-18.17%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-45. Impact on San Diego Air Basin Inventory of Change 12.8

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.507e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,624,564	65,528,924	199.8	2157.6	208.6	40,173	8.55
2000	1,938,446	74,991,368	96.4	1000.8	156.0	41,974	7.32
2005	2,234,307	87,936,400	63.6	649.3	118.8	49,825	8.31
2007	2,273,919	87,207,744	55.1	562.9	103.2	49,287	8.14
2010	2,334,764	86,859,984	45.2	448.1	82.4	48,730	7.94
2014	2,459,716	89,958,456	37.0	342.5	63.8	50,200	8.01
2017	2,557,805	93,097,080	33.0	287.1	54.0	51,737	8.11
2020	2,659,812	96,587,824	30.2	247.4	46.5	53,482	8.24
2023	2,755,727	99,663,704	28.2	220.9	41.3	55,458	8.44

San Diego Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.509e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,624,538	62,118,796	230	2436	220	39,680	9.92
2000	1,938,446	74,991,368	94	981	153	41,159	7.03
2005	2,234,307	87,936,400	62	637	118	49,217	7.27
2007	2,273,918	88,381,360	53	543	101	49,303	6.87
2010	2,334,764	89,490,896	42	422	79	49,730	6.42
2014	2,459,717	94,034,376	32	309	59	52,762	6.24
2017	2,557,806	97,781,896	27	252	49	55,419	6.25
2020	2,659,812	101,558,500	24	216	43	58,097	6.32
2023	2,755,726	104,891,340	22	197	39	60,886	6.41

Difference (Ver. 2.509e - Ver. 2.507e) in San Diego Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-26	-3,410,128	30.5	278.2	11.6	-493	1.37
2000	0	0	-2.6	-19.9	-2.6	-815	-0.29
2005	0	0	-1.6	-12.8	-1.1	-608	-1.04
2007	-1	1,173,616	-1.9	-19.7	-2.4	16	-1.26
2010	0	2,630,912	-2.8	-25.7	-3.8	1,000	-1.53
2014	1	4,075,920	-4.8	-33.1	-4.7	2,563	-1.77
2017	1	4,684,816	-6.0	-35.5	-4.7	3,682	-1.86
2020	0	4,970,676	-6.3	-31.1	-3.9	4,614	-1.93
2023	-1	5,227,636	-5.9	-24.3	-2.8	5,429	-2.02

Percentage Change in San Diego Emission Inventories (relative to Ver. 2.507e)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	-5.20%	15.26%	12.89%	5.54%	-1.23%	16.03%
2000	0.00%	0.00%	-2.67%	-1.99%	-1.66%	-1.94%	-3.89%
2005	0.00%	0.00%	-2.53%	-1.96%	-0.96%	-1.22%	-12.48%
2007	0.00%	1.35%	-3.52%	-3.51%	-2.35%	0.03%	-15.52%
2010	0.00%	3.03%	-6.30%	-5.73%	-4.61%	2.05%	-19.20%
2014	0.00%	4.53%	-13.06%	-9.66%	-7.33%	5.10%	-22.10%
2017	0.00%	5.03%	-18.11%	-12.37%	-8.75%	7.12%	-22.95%
2020	0.00%	5.15%	-20.95%	-12.56%	-8.47%	8.63%	-23.36%
2023	0.00%	5.25%	-20.87%	-10.98%	-6.69%	9.79%	-24.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-46. Impact on San Francisco Bay Air Basin Inventory of Change 12.8

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.507e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,948,878	133,723,100	479.8	4458.4	461.3	76,222	19.70
2000	4,724,726	156,271,180	248.3	2208.1	339.1	89,810	15.82
2005	4,936,224	164,056,700	163.5	1338.5	249.1	94,241	15.98
2007	5,041,512	165,108,000	141.1	1142.2	217.1	94,645	15.76
2010	5,296,710	170,781,230	116.2	912.3	174.2	97,406	15.72
2014	5,657,796	180,488,980	93.2	684.1	134.4	101,805	15.91
2017	5,907,515	187,260,050	82.0	565.5	113.4	106,078	16.19
2020	6,148,934	194,075,760	73.7	476.6	97.7	109,433	16.42
2023	6,400,411	201,447,360	67.8	415.5	87.0	113,179	16.76

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.509e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,948,864	127,727,790	542.7	5081.8	493.4	74,729	22.73
2000	4,724,726	156,271,180	241.5	2157.6	333.5	87,079	16.01
2005	4,936,224	164,056,700	159.3	1305.9	246.1	92,360	14.76
2007	5,041,512	166,244,540	138.0	1108.1	212.8	93,523	14.07
2010	5,296,710	173,828,480	113.3	877.6	168.5	97,828	13.45
2014	5,657,793	186,259,340	86.7	633.1	127.1	105,475	13.12
2017	5,907,514	194,613,550	73.1	505.1	105.9	112,442	13.12
2020	6,148,931	202,176,860	64.9	425.7	91.6	117,930	13.21
2023	6,400,408	209,965,740	61.6	389.5	83.8	123,397	13.44

Difference (Ver. 2.509e - Ver. 2.507e) in San Francisco Bay Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-14	-5,995,310	62.9	623.4	32.2	-1,494	3.03
2000	0	0	-6.8	-50.5	-5.5	-2,731	0.19
2005	0	0	-4.2	-32.6	-3.0	-1,880	-1.22
2007	0	1,136,540	-3.1	-34.1	-4.3	-1,122	-1.68
2010	0	3,047,250	-2.9	-34.7	-5.7	422	-2.27
2014	-3	5,770,360	-6.5	-51.0	-7.3	3,670	-2.79
2017	-1	7,353,500	-8.9	-60.3	-7.5	6,364	-3.07
2020	-3	8,101,100	-8.8	-50.9	-6.0	8,497	-3.21
2023	-3	8,518,380	-6.2	-26.1	-3.2	10,218	-3.32

Percentage Change in San Francisco Bay Emission Inventories (relative to Ver. 2.507e)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	-4.48%	13.11%	13.98%	6.97%	-1.96%	15.39%
2000	0.00%	0.00%	-2.75%	-2.29%	-1.64%	-3.04%	1.20%
2005	0.00%	0.00%	-2.56%	-2.44%	-1.21%	-2.00%	-7.66%
2007	0.00%	0.69%	-2.18%	-2.99%	-1.97%	-1.19%	-10.68%
2010	0.00%	1.78%	-2.49%	-3.81%	-3.27%	0.43%	-14.47%
2014	0.00%	3.20%	-6.95%	-7.46%	-5.44%	3.61%	-17.55%
2017	0.00%	3.93%	-10.83%	-10.67%	-6.65%	6.00%	-18.97%
2020	0.00%	4.17%	-11.97%	-10.68%	-6.18%	7.76%	-19.55%
2023	0.00%	4.23%	-9.14%	-6.27%	-3.69%	9.03%	-19.81%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-47. Impact on San Joaquin Valley Air Basin Inventory of Change 12.8

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.507e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,405,114	58,580,652	219.0	2299.7	331.9	42,756	22.06
2000	1,953,670	77,852,040	133.2	1295.6	344.3	53,500	14.06
2005	2,389,626	97,397,040	98.3	869.2	320.3	67,037	16.20
2007	2,408,237	96,145,336	84.4	741.6	268.3	66,019	14.80
2010	2,601,884	101,880,540	71.1	604.4	212.5	68,742	13.76
2014	2,832,668	110,655,900	57.2	456.9	160.1	73,869	13.15
2017	3,014,826	117,719,150	49.7	376.5	133.8	77,712	12.92
2020	3,206,450	124,790,200	44.6	321.3	114.8	81,640	12.84
2023	3,410,038	132,194,620	41.5	288.6	103.3	87,649	13.15

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.509e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,405,043	55,697,916	242.3	2525.9	341.7	42,250	22.79
2000	1,953,670	77,852,040	129.9	1271.8	341.4	52,789	13.67
2005	2,389,626	97,397,040	96.0	853.7	318.6	66,368	15.07
2007	2,408,237	97,169,640	82.2	723.3	265.6	65,892	13.49
2010	2,601,884	104,381,480	68.2	586.3	208.9	69,519	12.16
2014	2,832,668	114,960,370	51.9	437.1	156.4	76,429	11.27
2017	3,014,826	122,836,810	43.1	355.9	130.6	81,641	10.92
2020	3,206,450	130,277,340	37.5	305.7	112.7	86,705	10.72
2023	3,410,038	137,987,070	34.8	278.2	102.7	93,782	10.76

Difference (Ver. 2.509e - Ver. 2.507e) in San Joaquin Valley Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-71	-2,882,736	23.3	226.3	9.8	-506	0.73
2000	0	0	-3.2	-23.8	-2.9	-711	-0.39
2005	0	0	-2.3	-15.5	-1.7	-669	-1.13
2007	0	1,024,304	-2.2	-18.4	-2.7	-127	-1.31
2010	0	2,500,940	-2.9	-18.1	-3.6	777	-1.60
2014	0	4,304,470	-5.2	-19.8	-3.7	2,560	-1.88
2017	0	5,117,660	-6.7	-20.6	-3.3	3,930	-2.00
2020	0	5,487,140	-7.1	-15.6	-2.1	5,064	-2.13
2023	0	5,792,450	-6.6	-10.3	-0.6	6,133	-2.39

Percentage Change in San Joaquin Valley Emission Inventories (relative to Ver. 2.507e)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-0.01%	-4.92%	10.65%	9.84%	2.94%	-1.18%	3.29%
2000	0.00%	0.00%	-2.42%	-1.84%	-0.83%	-1.33%	-2.75%
2005	0.00%	0.00%	-2.34%	-1.79%	-0.52%	-1.00%	-6.95%
2007	0.00%	1.07%	-2.59%	-2.48%	-1.01%	-0.19%	-8.88%
2010	0.00%	2.45%	-4.13%	-3.00%	-1.68%	1.13%	-11.63%
2014	0.00%	3.89%	-9.14%	-4.34%	-2.32%	3.47%	-14.28%
2017	0.00%	4.35%	-13.42%	-5.47%	-2.45%	5.06%	-15.50%
2020	0.00%	4.40%	-16.02%	-4.85%	-1.80%	6.20%	-16.56%
2023	0.00%	4.38%	-16.03%	-3.58%	-0.55%	7.00%	-18.17%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-48. Impact on South Coast Air Basin Inventory of Change 12.8

South Coast Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.507e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,587,541	284,337,980	882.2	8983.9	935.1	168,928	41.96
2000	8,926,638	325,417,540	439.9	4337.8	708.1	185,478	34.06
2005	10,551,385	393,939,550	301.0	2913.0	583.1	230,533	40.55
2007	9,997,372	368,084,260	228.8	2235.2	430.8	211,870	35.37
2010	10,501,053	378,033,630	184.3	1766.7	356.3	216,185	35.53
2014	11,209,772	392,913,630	150.6	1360.9	285.1	226,596	36.46
2017	11,614,586	401,614,560	133.7	1134.1	246.0	232,508	37.06
2020	11,994,158	412,199,680	121.0	962.3	215.6	237,963	37.53
2023	12,277,238	420,057,220	111.2	835.0	199.5	244,167	38.17

South Coast Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.509e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,587,395	270,934,940	1001.9	9919.6	985.7	167,087	47.67
2000	8,926,638	325,417,540	427.4	4245.3	697.2	181,740	33.25
2005	10,551,385	393,939,550	293.2	2855.1	578.0	227,723	36.28
2007	9,997,371	370,286,240	222.4	2174.5	423.4	210,810	30.47
2010	10,501,055	384,846,080	175.5	1694.8	345.8	218,693	29.31
2014	11,209,772	406,880,000	133.8	1257.2	272.8	236,382	28.81
2017	11,614,590	418,954,500	112.6	1025.6	234.9	247,561	28.73
2020	11,994,159	431,569,890	98.7	873.9	207.8	257,501	28.81
2023	12,277,239	440,648,480	90.5	775.7	195.9	267,283	29.02

Difference (Ver. 2.509e - Ver. 2.507e) in South Coast Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-146	-13,403,040	119.6	935.7	50.6	-1,841	5.72
2000	0	0	-12.6	-92.4	-10.9	-3,738	-0.82
2005	0	0	-7.8	-58.0	-5.0	-2,810	-4.27
2007	-1	2,201,980	-6.4	-60.6	-7.4	-1,060	-4.91
2010	2	6,812,450	-8.8	-71.9	-10.5	2,508	-6.22
2014	0	13,966,370	-16.8	-103.7	-12.3	9,786	-7.66
2017	4	17,339,940	-21.1	-108.5	-11.1	15,053	-8.33
2020	1	19,370,210	-22.4	-88.4	-7.8	19,538	-8.73
2023	1	20,591,260	-20.6	-59.3	-3.6	23,116	-9.14

Percentage Change in South Coast Emission Inventories (relative to Ver. 2.507e)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	-4.71%	13.56%	10.42%	5.41%	-1.09%	13.62%
2000	0.00%	0.00%	-2.85%	-2.13%	-1.54%	-2.02%	-2.40%
2005	0.00%	0.00%	-2.60%	-1.99%	-0.86%	-1.22%	-10.52%
2007	0.00%	0.60%	-2.81%	-2.71%	-1.71%	-0.50%	-13.87%
2010	0.00%	1.80%	-4.75%	-4.07%	-2.93%	1.16%	-17.50%
2014	0.00%	3.55%	-11.18%	-7.62%	-4.32%	4.32%	-21.00%
2017	0.00%	4.32%	-15.77%	-9.57%	-4.50%	6.47%	-22.47%
2020	0.00%	4.70%	-18.48%	-9.18%	-3.62%	8.21%	-23.25%
2023	0.00%	4.90%	-18.55%	-7.10%	-1.82%	9.47%	-23.95%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type Using Populations

12.9 VMT AND SPEED DISTRIBUTIONS (FIRST ROUND)

Please refer to Section 3.3.2. This change is complex and highly regional specific. In general, the future VMT projections are lower. Intuitively, one would expect the future emissions to be lower. However, the slowdown in growth means fewer new vehicle sales, so the fleet actually gets older and new technologies are not introduced as quickly.

Table 12-49. Impact on Statewide Inventory of Change 12.9

Statewide Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.50.09e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,665,456	660,180,670	2,621	26,029	2,692	416,365	138.90
2000	22,316,218	804,194,820	1,169	11,274	2,033	461,826	91.01
2005	25,801,910	950,032,770	809	7,394	1,704	558,598	96.96
2007	25,453,712	926,450,180	667	6,047	1,355	540,049	85.64
2010	26,930,592	972,253,500	544	4,814	1,082	563,855	80.79
2014	28,912,956	1,043,885,300	416	3,565	828	612,723	78.31
2017	30,251,038	1,091,683,800	349	2,888	699	649,197	77.83
2020	31,572,304	1,138,232,200	305	2,451	610	682,234	77.99
2023	32,810,114	1,180,801,200	283	2,192	562	717,559	78.96

Statewide Summer Episodic On-Road Motor Vehicle Inventories With 09 Populations VMT matched
(Calculated Using EMFAC2010 ver 2.50.20a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,378,444	689,422,780	2,574	25,824	2,725	430,674	145.38
2000	22,181,680	839,893,380	1,102	10,866	2,158	490,598	94.16
2005	23,631,408	895,163,970	734	6,764	1,631	531,065	92.19
2007	24,447,824	923,793,790	643	5,871	1,469	552,134	89.30
2010	26,118,692	946,227,260	573	5,083	1,287	568,335	84.68
2014	28,247,534	999,628,350	487	4,142	1,033	609,254	80.78
2017	29,519,084	1,044,801,900	429	3,486	886	646,130	77.98
2020	30,517,106	1,089,757,700	383	2,980	777	680,375	77.12
2023	31,298,652	1,130,831,900	351	2,573	702	716,532	77.51

Difference (Ver. 2.5020a - Ver. 2.509e) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-287,012	29,242,110	-46.9	-205.0	33.3	14,309	6.48
2000	-134,538	35,698,560	-66.6	-407.9	124.8	28,772	3.15
2005	-2,170,502	-54,868,800	-75.1	-630.3	-72.6	-27,533	-4.76
2007	-1,005,888	-2,656,390	-24.5	-176.4	114.6	12,086	3.66
2010	-811,900	-26,026,240	29.0	269.2	204.9	4,480	3.89
2014	-665,422	-44,256,950	70.3	576.7	205.1	-3,470	2.47
2017	-731,954	-46,881,900	80.1	598.0	187.0	-3,067	0.15
2020	-1,055,198	-48,474,500	78.0	529.0	167.6	-1,859	-0.87
2023	-1,511,462	-49,969,300	67.9	380.9	139.4	-1,027	-1.45

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.509e)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-1.54%	4.43%	-1.79%	-0.79%	1.24%	3.44%	4.67%
2000	-0.60%	4.44%	-5.70%	-3.62%	6.14%	6.23%	3.46%
2005	-8.41%	-5.78%	-9.29%	-8.52%	-4.26%	-4.93%	-4.91%
2007	-3.95%	-0.29%	-3.67%	-2.92%	8.46%	2.24%	4.27%
2010	-3.01%	-2.68%	5.33%	5.59%	18.93%	0.79%	4.82%
2014	-2.30%	-4.24%	16.88%	16.18%	24.76%	-0.57%	3.15%
2017	-2.42%	-4.29%	22.98%	20.71%	26.73%	-0.47%	0.19%
2020	-3.34%	-4.26%	25.58%	21.58%	27.48%	-0.27%	-1.12%
2023	-4.61%	-4.23%	24.01%	17.38%	24.78%	-0.14%	-1.84%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-50. Impact on Sacramento Valley Air Basin Inventory of Change 12.9

Sacramento Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.509e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,394,423	47,858,188	210.8	2121.6	212.9	30,547	11.17
2000	1,649,156	57,586,440	95.1	908.5	163.8	33,351	6.90
2005	1,990,785	70,935,288	68.3	597.7	141.9	41,473	7.53
2007	1,968,651	69,001,744	58.4	501.5	117.8	40,685	6.80
2010	2,132,846	74,276,584	49.2	411.4	95.3	43,265	6.46
2014	2,326,848	82,219,424	37.6	307.0	72.6	48,105	6.30
2017	2,465,655	87,740,744	31.0	246.6	60.9	51,749	6.30
2020	2,603,390	92,759,936	26.7	207.1	52.9	55,106	6.34
2023	2,747,977	97,836,016	24.6	184.2	48.2	58,681	6.47

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With 09 Populations VMT matched
(Calculated Using EMFAC2010 ver 2.5020a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,362,128	51,431,120	210.9	2186.2	218.7	32,506	11.56
2000	1,634,783	63,336,324	87.9	877.5	179.3	37,337	7.40
2005	1,780,274	68,268,976	60.6	548.7	136.5	40,405	7.19
2007	1,860,962	70,353,144	54.6	486.4	123.9	42,177	6.97
2010	2,030,439	72,283,584	50.8	436.4	109.5	43,271	6.61
2014	2,285,447	78,601,864	45.8	376.9	91.0	47,483	6.44
2017	2,424,266	82,960,408	41.4	323.9	79.5	50,604	6.27
2020	2,522,620	87,144,888	37.3	277.8	70.7	53,555	6.25
2023	2,604,611	91,737,016	34.2	234.4	64.2	56,833	6.35

Difference (Ver. 2.5020a - Ver. 2.509e) in Sacramento Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-32295	3572932	0.1	64.7	5.8	1,959	0.40
2000	-14373	5749884	-7.2	-31.0	15.4	3,987	0.50
2005	-210511	-2666312	-7.8	-49.0	-5.4	-1,068	-0.34
2007	-107689	1351400	-3.9	-15.2	6.1	1,492	0.17
2010	-102407	-1993000	1.6	25.0	14.2	6	0.15
2014	-41401	-3617560	8.2	69.9	18.5	-622	0.14
2017	-41389	-4780336	10.4	77.3	18.6	-1,145	-0.03
2020	-80770	-5615048	10.7	70.8	17.8	-1,552	-0.09
2023	-143366	-6099000	9.6	50.2	16.0	-1,848	-0.11

Percentage Change in Sacramento Emission Inventories (relative to Ver. 2.509e)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-2.32%	7.47%	0.05%	3.05%	2.74%	6.41%	3.54%
2000	-0.87%	9.98%	-7.59%	-3.41%	9.42%	11.95%	7.31%
2005	-10.57%	-3.76%	-11.34%	-8.20%	-3.81%	-2.57%	-4.51%
2007	-5.47%	1.96%	-6.61%	-3.02%	5.17%	3.67%	2.52%
2010	-4.80%	-2.68%	3.17%	6.08%	14.95%	0.01%	2.38%
2014	-1.78%	-4.40%	21.84%	22.76%	25.42%	-1.29%	2.15%
2017	-1.68%	-5.45%	33.54%	31.33%	30.54%	-2.21%	-0.50%
2020	-3.10%	-6.05%	39.97%	34.17%	33.69%	-2.82%	-1.36%
2023	-5.22%	-6.23%	39.01%	27.28%	33.11%	-3.15%	-1.78%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-51. Impact on San Diego Air Basin Inventory of Change 12.9

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.509e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,624,538	62,118,796	230.3	2435.8	220.2	39,680	9.92
2000	1,938,446	74,991,368	93.8	980.9	153.4	41,159	7.03
2005	2,234,307	87,936,400	62.0	636.6	117.7	49,217	7.27
2007	2,273,918	88,381,360	53.2	543.2	100.7	49,303	6.87
2010	2,334,764	89,490,896	42.4	422.4	78.6	49,730	6.42
2014	2,459,717	94,034,376	32.1	309.4	59.1	52,762	6.24
2017	2,557,806	97,781,896	27.0	251.6	49.2	55,419	6.25
2020	2,659,812	101,558,500	23.9	216.3	42.6	58,097	6.32
2023	2,755,726	104,891,340	22.3	196.7	38.5	60,886	6.41

San Diego Summer Episodic On-Road Motor Vehicle Inventories With 09 Populations VMT matched
(Calculated Using EMFAC2010 ver 2.5020a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,615,290	60,116,672	226	2341	210	37,836	9.61
2000	1,930,842	73,980,216	86	888	145	40,705	6.82
2005	2,066,461	79,199,328	55	542	104	44,397	6.56
2007	2,138,676	81,365,584	48	471	94	46,080	6.40
2010	2,277,702	82,533,536	43	408	83	47,215	6.16
2014	2,432,722	85,930,752	36	325	66	49,539	5.94
2017	2,480,927	88,470,176	30	263	55	51,374	5.80
2020	2,523,581	90,974,512	26	221	47	53,291	5.77
2023	2,599,894	94,694,160	24	195	43	56,424	5.90

Difference (Ver. 2.5020a - Ver. 2.509e) in San Diego Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-9,248	-2,002,124	-4.2	-94.5	-9.7	-1,844	-0.32
2000	-7,604	-1,011,152	-7.9	-93.0	-8.6	-454	-0.21
2005	-167,846	-8,737,072	-7.4	-94.5	-13.4	-4,820	-0.72
2007	-135,242	-7,015,776	-5.4	-71.7	-6.6	-3,224	-0.47
2010	-57,062	-6,957,360	0.3	-14.5	4.2	-2,514	-0.26
2014	-26,995	-8,103,624	3.6	15.5	6.9	-3,223	-0.30
2017	-76,879	-9,311,720	3.3	11.6	5.9	-4,045	-0.45
2020	-136,231	-10,583,988	2.5	4.3	4.8	-4,806	-0.55
2023	-155,832	-10,197,180	1.7	-2.0	4.2	-4,462	-0.51

Percentage Change in San Diego Emission Inventories (relative to Ver. 2.509e)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-0.57%	-3.22%	-1.80%	-3.88%	-4.41%	-4.65%	-3.20%
2000	-0.39%	-1.35%	-8.47%	-9.48%	-5.63%	-1.10%	-2.99%
2005	-7.51%	-9.94%	-11.94%	-14.85%	-11.35%	-9.79%	-9.83%
2007	-5.95%	-7.94%	-10.13%	-13.20%	-6.58%	-6.54%	-6.87%
2010	-2.44%	-7.77%	0.78%	-3.44%	5.32%	-5.06%	-4.03%
2014	-1.10%	-8.62%	11.13%	5.01%	11.64%	-6.11%	-4.77%
2017	-3.01%	-9.52%	12.22%	4.59%	11.98%	-7.30%	-7.21%
2020	-5.12%	-10.42%	10.42%	1.97%	11.35%	-8.27%	-8.67%
2023	-5.65%	-9.72%	7.74%	-1.01%	10.95%	-7.33%	-8.03%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-52. Impact on San Francisco Bay Air Basin Inventory of Change 12.9

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.509e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,948,864	127,727,790	542.7	5081.8	493.4	74,729	22.73
2000	4,724,726	156,271,180	241.5	2157.6	333.5	87,079	16.01
2005	4,936,224	164,056,700	159.3	1305.9	246.1	92,360	14.76
2007	5,041,512	166,244,540	138.0	1108.1	212.8	93,523	14.07
2010	5,296,710	173,828,480	113.3	877.6	168.5	97,828	13.45
2014	5,657,793	186,259,340	86.7	633.1	127.1	105,475	13.12
2017	5,907,514	194,613,550	73.1	505.1	105.9	112,442	13.12
2020	6,148,931	202,176,860	64.9	425.7	91.6	117,930	13.21
2023	6,400,408	209,965,740	61.6	389.5	83.8	123,397	13.44

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With 09 Populations VMT matched
(Calculated Using EMFAC2010 ver 2.5020a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,877,920	137,914,140	533.6	5124.9	515.7	80,787	24.46
2000	4,700,962	168,181,650	233.8	2179.6	364.4	95,856	17.05
2005	4,757,890	169,061,820	154.3	1321.5	264.7	96,931	15.47
2007	4,815,908	170,597,250	132.7	1115.4	233.8	98,995	14.79
2010	5,024,152	171,597,970	116.6	943.9	200.2	100,898	13.99
2014	5,426,317	181,193,380	98.7	752.5	157.9	106,970	13.43
2017	5,621,512	188,394,240	86.0	617.8	132.7	113,179	13.07
2020	5,754,138	195,584,700	76.0	514.4	114.4	118,446	12.99
2023	5,893,056	202,578,720	69.8	444.3	102.4	123,719	13.11

Difference (Ver. 2.5020a - Ver. 2.509e) in San Francisco Bay Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-70,944	10,186,350	-9.1	43.1	22.3	6,058	1.73
2000	-23,764	11,910,470	-7.6	22.0	30.8	8,776	1.05
2005	-178,334	5,005,120	-5.0	15.5	18.6	4,571	0.72
2007	-225,604	4,352,710	-5.3	7.3	20.9	5,473	0.71
2010	-272,558	-2,230,510	3.4	66.3	31.7	3,070	0.55
2014	-231,476	-5,065,960	12.0	119.5	30.8	1,495	0.31
2017	-286,002	-6,219,310	12.9	112.6	26.8	737	-0.05
2020	-394,793	-6,592,160	11.1	88.7	22.8	517	-0.23
2023	-507,352	-7,387,020	8.2	54.8	18.6	322	-0.33

Percentage Change in San Francisco Bay Emission Inventories (relative to Ver. 2.509e)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-1.80%	7.98%	-1.67%	0.85%	4.51%	8.11%	7.61%
2000	-0.50%	7.62%	-3.16%	1.02%	9.25%	10.08%	6.54%
2005	-3.61%	3.05%	-3.17%	1.19%	7.56%	4.95%	4.86%
2007	-4.47%	2.62%	-3.86%	0.66%	9.84%	5.85%	5.06%
2010	-5.15%	-1.28%	2.96%	7.56%	18.82%	3.14%	4.06%
2014	-4.09%	-2.72%	13.79%	18.87%	24.23%	1.42%	2.36%
2017	-4.84%	-3.20%	17.61%	22.30%	25.28%	0.66%	-0.35%
2020	-6.42%	-3.26%	17.11%	20.83%	24.86%	0.44%	-1.72%
2023	-7.93%	-3.52%	13.26%	14.07%	22.26%	0.26%	-2.48%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-53 Impact on San Joaquin Valley Air Basin Inventory of Change 12.9

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.509e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,405,043	55,697,916	242.3	2525.9	341.7	42,250	22.79
2000	1,953,670	77,852,040	129.9	1271.8	341.4	52,789	13.67
2005	2,389,626	97,397,040	96.0	853.7	318.6	66,368	15.07
2007	2,408,237	97,169,640	82.2	723.3	265.6	65,892	13.49
2010	2,601,884	104,381,480	68.2	586.3	208.9	69,519	12.16
2014	2,832,668	114,960,370	51.9	437.1	156.4	76,429	11.27
2017	3,014,826	122,836,810	43.1	355.9	130.6	81,641	10.92
2020	3,206,450	130,277,340	37.5	305.7	112.7	86,705	10.72
2023	3,410,038	137,987,070	34.8	278.2	102.7	93,782	10.76

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With 09 Populations VMT matched
(Calculated Using EMFAC2010 ver 2.5020a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,371,368	58,661,744	230.8	2441.8	342.4	43,703	23.49
2000	1,936,457	83,696,632	112.4	1130.8	356.7	57,176	13.86
2005	2,141,954	91,088,576	81.5	736.0	284.7	61,976	13.66
2007	2,254,768	94,929,168	73.8	657.2	258.4	64,939	13.13
2010	2,493,321	98,407,960	70.3	604.7	226.2	67,570	12.17
2014	2,852,481	107,711,930	65.4	539.9	181.0	74,969	11.52
2017	3,115,979	116,216,320	60.8	478.8	155.1	81,282	10.89
2020	3,309,582	124,193,760	55.7	419.0	134.7	87,075	10.64
2023	3,430,952	131,662,430	51.1	360.2	119.6	93,918	10.55

Difference (Ver. 2.5020a - Ver. 2.509e) in San Joaquin Valley Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-33,675	2,963,828	-11.5	-84.1	0.7	1,453	0.70
2000	-17,213	5,844,592	-17.5	-141.0	15.3	4,387	0.19
2005	-247,672	-6,308,464	-14.5	-117.6	-33.9	-4,393	-1.41
2007	-153,469	-2,240,472	-8.4	-66.1	-7.2	-953	-0.36
2010	-108,563	-5,973,520	2.1	18.4	17.2	-1,949	0.01
2014	19,813	-7,248,440	13.5	102.8	24.6	-1,460	0.25
2017	101,153	-6,620,490	17.7	123.0	24.6	-360	-0.03
2020	103,132	-6,083,580	18.2	113.4	22.0	370	-0.08
2023	20,914	-6,324,640	16.3	82.0	16.9	136	-0.22

Percentage Change in San Joaquin Valley Emission Inventories (relative to Ver. 2.509e)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-2.40%	5.32%	-4.76%	-3.33%	0.22%	3.44%	3.09%
2000	-0.88%	7.51%	-13.48%	-11.09%	4.49%	8.31%	1.40%
2005	-10.36%	-6.48%	-15.10%	-13.78%	-10.64%	-6.62%	-9.37%
2007	-6.37%	-2.31%	-10.24%	-9.14%	-2.72%	-1.45%	-2.66%
2010	-4.17%	-5.72%	3.05%	3.14%	8.25%	-2.80%	0.05%
2014	0.70%	-6.31%	25.99%	23.52%	15.72%	-1.91%	2.23%
2017	3.36%	-5.39%	41.12%	34.55%	18.81%	-0.44%	-0.31%
2020	3.22%	-4.67%	48.63%	37.08%	19.52%	0.43%	-0.74%
2023	0.61%	-4.58%	46.73%	29.45%	16.47%	0.15%	-2.03%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-54. Impact on South Coast Air Basin Inventory of Change 12.9

South Coast Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.509e)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,587,395	270,934,940	1001.9	9919.6	985.7	167,087	47.67
2000	8,926,638	325,417,540	427.4	4245.3	697.2	181,740	33.25
2005	10,551,385	393,939,550	293.2	2855.1	578.0	227,723	36.28
2007	9,997,371	370,286,240	222.4	2174.5	423.4	210,810	30.47
2010	10,501,055	384,846,080	175.5	1694.8	345.8	218,693	29.31
2014	11,209,772	406,880,000	133.8	1257.2	272.8	236,382	28.81
2017	11,614,590	418,954,500	112.6	1025.6	234.9	247,561	28.73
2020	11,994,159	431,569,890	98.7	873.9	207.8	257,501	28.81
2023	12,277,239	440,648,480	90.5	775.7	195.9	267,283	29.02

South Coast Summer Episodic On-Road Motor Vehicle Inventories With 09 Populations VMT matched
(Calculated Using EMFAC2010 ver 2.5020a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,534,778	267,446,580	970.4	9422.9	943.0	162,610	46.35
2000	8,888,948	316,402,500	396.8	3896.1	677.3	177,802	31.97
2005	9,572,533	342,575,040	259.4	2439.1	510.6	199,026	31.73
2007	9,927,914	355,912,900	222.9	2082.6	457.8	207,711	30.87
2010	10,537,437	365,239,650	190.0	1734.1	400.3	213,641	29.58
2014	11,072,442	377,542,370	150.3	1321.6	318.4	225,504	28.07
2017	11,422,403	389,182,050	128.2	1080.8	272.4	236,806	27.30
2020	11,709,373	400,561,250	112.6	914.0	238.4	246,987	26.88
2023	11,886,469	407,786,110	102.2	797.5	216.3	256,607	26.77

Difference (Ver. 2.5020a - Ver. 2.509e) in South Coast Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-52,617	-3,488,360	-31.5	-496.7	-42.7	-4,477	-1.32
2000	-37,690	-9,015,040	-30.6	-349.3	-19.9	-3,937	-1.27
2005	-978,852	-51,364,510	-33.8	-416.0	-67.4	-28,697	-4.55
2007	-69,457	-14,373,340	0.5	-91.9	34.5	-3,098	0.41
2010	36,382	-19,606,430	14.4	39.4	54.5	-5,051	0.27
2014	-137,330	-29,337,630	16.6	64.4	45.6	-10,878	-0.73
2017	-192,187	-29,772,450	15.6	55.2	37.5	-10,755	-1.43
2020	-284,786	-31,008,640	14.0	40.0	30.6	-10,514	-1.93
2023	-390,770	-32,862,370	11.7	21.8	20.5	-10,676	-2.25

Percentage Change in South Coast Emission Inventories (relative to Ver. 2.509e)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-0.69%	-1.29%	-3.14%	-5.01%	-4.33%	-2.68%	-2.77%
2000	-0.42%	-2.77%	-7.16%	-8.23%	-2.86%	-2.17%	-3.83%
2005	-9.28%	-13.04%	-11.53%	-14.57%	-11.67%	-12.60%	-12.55%
2007	-0.69%	-3.88%	0.23%	-4.23%	8.14%	-1.47%	1.33%
2010	0.35%	-5.09%	8.23%	2.32%	15.75%	-2.31%	0.93%
2014	-1.23%	-7.21%	12.40%	5.12%	16.71%	-4.60%	-2.55%
2017	-1.65%	-7.11%	13.90%	5.38%	15.96%	-4.34%	-4.97%
2020	-2.37%	-7.19%	14.14%	4.58%	14.73%	-4.08%	-6.69%
2023	-3.18%	-7.46%	12.89%	2.81%	10.44%	-3.99%	-7.76%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type Using Populations

12.10 TEMPERATURE AND RELATIVE HUMIDITY PROFILES

Please refer to Section 3.3.4.4. These changes are regionally dependent as well as seasonal. The incremental changes shown below are for summer. There would be other differences for winter or monthly. In general, where emissions increase the temperatures have gotten warmer and/or more humid. This results in more air conditioning usage. NOx is more complex in that higher humidity lowers NOx formation, but simultaneously increases air conditioning usage. This update also includes a change to the fleet mix update for 2000-2008 relative to connecting current and historical fleet mix estimates using multiple DMV analysis methods as described in Section 3.3.1.

Table 12-55. Impact on Statewide Inventory of Change 12.10

Statewide Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5020a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,378,444	689,422,780	2,574	25,824	2,725	430,674	145.38
2000	22,181,680	839,893,380	1,102	10,866	2,158	490,598	94.16
2005	23,631,408	895,163,970	734	6,764	1,631	531,065	92.19
2007	24,447,824	923,793,790	643	5,871	1,469	552,134	89.30
2010	26,118,692	946,227,260	573	5,083	1,287	568,335	84.68
2014	28,247,534	999,628,350	487	4,142	1,033	609,254	80.78
2017	29,519,084	1,044,801,900	429	3,486	886	646,130	77.98
2020	30,517,106	1,089,757,700	383	2,980	777	680,375	77.12
2023	31,298,652	1,130,831,900	351	2,573	702	716,532	77.51

Statewide Summer Episodic On-Road Motor Vehicle Inventories With Updated Temp/RH Profiles
(Calculated Using EMFAC2010 ver 2.5021a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,378,444	689,422,780	2,527	24,167	2,594	424,355	145.38
2000	22,181,680	839,893,380	1,079	10,004	2,066	477,035	94.16
2005	23,631,408	895,163,970	720	6,222	1,571	514,640	92.19
2007	24,447,824	923,793,790	631	5,402	1,417	534,851	89.30
2010	26,118,692	946,227,260	564	4,682	1,243	550,560	84.68
2014	28,247,534	999,628,350	480	3,816	999	590,254	80.78
2017	29,519,084	1,044,801,900	423	3,214	858	625,966	77.98
2020	30,517,106	1,089,757,700	379	2,752	754	659,117	77.12
2023	31,298,652	1,130,831,900	347	2,378	682	694,108	77.51

Difference (Ver. 2.5021a - Ver. 2.5020a) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	-47.1	-1656.9	-131.0	-6,319	0.00
2000	0	0	-23.2	-861.3	-92.3	-13,563	0.00
2005	0	0	-13.5	-542.2	-60.1	-16,425	0.00
2007	0	0	-11.2	-468.5	-52.1	-17,283	0.00
2010	0	0	-9.0	-401.1	-44.5	-17,774	0.00
2014	0	0	-6.8	-326.7	-34.4	-19,000	0.00
2017	0	0	-5.4	-272.5	-28.3	-20,164	0.00
2020	0	0	-4.4	-228.4	-23.6	-21,258	0.00
2023	0	0	-3.7	-195.5	-20.2	-22,423	0.00

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.5020a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	-1.83%	-6.42%	-4.81%	-1.47%	0.00%
2000	0.00%	0.00%	-2.11%	-7.93%	-4.28%	-2.76%	0.00%
2005	0.00%	0.00%	-1.84%	-8.02%	-3.69%	-3.09%	0.00%
2007	0.00%	0.00%	-1.74%	-7.98%	-3.55%	-3.13%	0.00%
2010	0.00%	0.00%	-1.58%	-7.89%	-3.46%	-3.13%	0.00%
2014	0.00%	0.00%	-1.39%	-7.89%	-3.33%	-3.12%	0.00%
2017	0.00%	0.00%	-1.26%	-7.82%	-3.19%	-3.12%	0.00%
2020	0.00%	0.00%	-1.14%	-7.66%	-3.03%	-3.12%	0.00%
2023	0.00%	0.00%	-1.06%	-7.60%	-2.87%	-3.13%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-56. Impact on Sacramento Valley Air Basin Inventory of Change 12.10

Sacramento Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5020a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,362,128	51,431,120	210.9	2186.2	218.7	32,506	11.56
2000	1,634,783	63,336,324	87.9	877.5	179.3	37,337	7.40
2005	1,780,274	68,268,976	60.6	548.7	136.5	40,405	7.19
2007	1,860,962	70,353,144	54.6	486.4	123.9	42,177	6.97
2010	2,030,439	72,283,584	50.8	436.4	109.5	43,271	6.61
2014	2,285,447	78,601,864	45.8	376.9	91.0	47,483	6.44
2017	2,424,266	82,960,408	41.4	323.9	79.5	50,604	6.27
2020	2,522,620	87,144,888	37.3	277.8	70.7	53,555	6.25
2023	2,604,611	91,737,016	34.2	234.4	64.2	56,833	6.35

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With Updated Temp/RH Profiles
(Calculated Using EMFAC2010 ver 2.5021a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,362,128	51,431,120	212.0	2058.3	205.6	31,912	11.56
2000	1,634,783	63,336,324	88.2	807.1	170.3	36,070	7.40
2005	1,780,274	68,268,976	61.5	503.3	130.6	38,864	7.19
2007	1,860,962	70,353,144	55.4	446.0	118.7	40,550	6.97
2010	2,030,439	72,283,584	51.6	401.0	105.0	41,620	6.61
2014	2,285,447	78,601,864	46.6	346.2	87.4	45,687	6.44
2017	2,424,266	82,960,408	42.1	297.5	76.4	48,693	6.27
2020	2,522,620	87,144,888	38.0	255.4	68.1	51,535	6.25
2023	2,604,611	91,737,016	34.9	215.3	62.0	54,684	6.35

Difference (Ver. 2.5021a - Ver. 2.5020a) in Sacramento Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	1.1	-127.9	-13.0	-594	0.00
2000	0	0	0.3	-70.4	-9.0	-1,267	0.00
2005	0	0	0.9	-45.4	-5.9	-1,542	0.00
2007	0	0	0.8	-40.3	-5.2	-1,627	0.00
2010	0	0	0.8	-35.4	-4.5	-1,651	0.00
2014	0	0	0.8	-30.7	-3.7	-1,796	0.00
2017	0	0	0.8	-26.3	-3.1	-1,911	0.00
2020	0	0	0.7	-22.4	-2.6	-2,020	0.00
2023	0	0	0.7	-19.1	-2.2	-2,149	0.00

Percentage Change in Sacramento Emission Inventories (relative to Ver. 2.5020a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.52%	-5.85%	-5.97%	-1.83%	0.00%
2000	0.00%	0.00%	0.36%	-8.02%	-5.01%	-3.39%	0.00%
2005	0.00%	0.00%	1.47%	-8.27%	-4.34%	-3.82%	0.00%
2007	0.00%	0.00%	1.50%	-8.29%	-4.20%	-3.86%	0.00%
2010	0.00%	0.00%	1.62%	-8.12%	-4.13%	-3.81%	0.00%
2014	0.00%	0.00%	1.71%	-8.15%	-4.01%	-3.78%	0.00%
2017	0.00%	0.00%	1.81%	-8.13%	-3.84%	-3.78%	0.00%
2020	0.00%	0.00%	1.94%	-8.06%	-3.64%	-3.77%	0.00%
2023	0.00%	0.00%	2.05%	-8.15%	-3.43%	-3.78%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-57. Impact on San Diego Air Basin Inventory of Change 12.10

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5020a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,615,290	60,116,672	226.1	2341.3	210.5	37,836	9.61
2000	1,930,842	73,980,216	85.9	887.9	144.7	40,705	6.82
2005	2,066,461	79,199,328	54.6	542.0	104.3	44,397	6.56
2007	2,138,676	81,365,584	47.8	471.4	94.1	46,080	6.40
2010	2,277,702	82,533,536	42.7	407.9	82.8	47,215	6.16
2014	2,432,722	85,930,752	35.7	324.9	66.0	49,539	5.94
2017	2,480,927	88,470,176	30.3	263.2	55.1	51,374	5.80
2020	2,523,581	90,974,512	26.3	220.5	47.4	53,291	5.77
2023	2,599,894	94,694,160	24.0	194.7	42.8	56,424	5.90

San Diego Summer Episodic On-Road Motor Vehicle Inventories With Updated Temp/RH Profiles
(Calculated Using EMFAC2010 ver 2.5021a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,615,290	60,116,672	220	2196	201	37,319	9.61
2000	1,930,842	73,980,216	84	828	139	39,689	6.82
2005	2,066,461	79,199,328	53	505	101	43,181	6.56
2007	2,138,676	81,365,584	47	439	91	44,817	6.40
2010	2,277,702	82,533,536	42	381	80	45,936	6.16
2014	2,432,722	85,930,752	35	303	64	48,205	5.94
2017	2,480,927	88,470,176	30	246	53	49,992	5.80
2020	2,523,581	90,974,512	26	207	46	51,862	5.77
2023	2,599,894	94,694,160	24	183	42	54,913	5.90

Difference (Ver. 2.5021a - Ver. 2.5020a) in San Diego Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	-5.7	-145.8	-9.3	-517	0.00
2000	0	0	-2.3	-60.1	-6.0	-1,016	0.00
2005	0	0	-1.5	-37.2	-3.7	-1,216	0.00
2007	0	0	-1.3	-32.0	-3.2	-1,263	0.00
2010	0	0	-1.0	-27.3	-2.7	-1,279	0.00
2014	0	0	-0.8	-21.5	-2.1	-1,334	0.00
2017	0	0	-0.7	-17.0	-1.6	-1,382	0.00
2020	0	0	-0.5	-13.7	-1.3	-1,429	0.00
2023	0	0	-0.5	-11.8	-1.1	-1,511	0.00

Percentage Change in San Diego Emission Inventories (relative to Ver. 2.5020a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	-2.51%	-6.23%	-4.43%	-1.37%	0.00%
2000	0.00%	0.00%	-2.63%	-6.77%	-4.11%	-2.50%	0.00%
2005	0.00%	0.00%	-2.71%	-6.85%	-3.56%	-2.74%	0.00%
2007	0.00%	0.00%	-2.62%	-6.78%	-3.41%	-2.74%	0.00%
2010	0.00%	0.00%	-2.46%	-6.69%	-3.28%	-2.71%	0.00%
2014	0.00%	0.00%	-2.29%	-6.60%	-3.14%	-2.69%	0.00%
2017	0.00%	0.00%	-2.17%	-6.45%	-2.99%	-2.69%	0.00%
2020	0.00%	0.00%	-2.09%	-6.22%	-2.83%	-2.68%	0.00%
2023	0.00%	0.00%	-2.03%	-6.08%	-2.68%	-2.68%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-58. Impact on San Francisco Bay Air Basin Inventory of Change 12.10

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5020a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,877,920	137,914,140	533.6	5124.9	515.7	80,787	24.46
2000	4,700,962	168,181,650	233.8	2179.6	364.4	95,856	17.05
2005	4,757,890	169,061,820	154.3	1321.5	264.7	96,931	15.47
2007	4,815,908	170,597,250	132.7	1115.4	233.8	98,995	14.79
2010	5,024,152	171,597,970	116.6	943.9	200.2	100,898	13.99
2014	5,426,317	181,193,380	98.7	752.5	157.9	106,970	13.43
2017	5,621,512	188,394,240	86.0	617.8	132.7	113,179	13.07
2020	5,754,138	195,584,700	76.0	514.4	114.4	118,446	12.99
2023	5,893,056	202,578,720	69.8	444.3	102.4	123,719	13.11

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With Updated Temp/RH Profiles
(Calculated Using EMFAC2010 ver 2.5021a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,877,920	137,914,140	519.4	4752.4	488.0	79,483	24.46
2000	4,700,962	168,181,650	226.9	1997.8	346.3	92,987	17.05
2005	4,757,890	169,061,820	149.5	1211.0	253.5	93,745	15.47
2007	4,815,908	170,597,250	128.7	1023.1	224.4	95,720	14.79
2010	5,024,152	171,597,970	113.4	866.8	192.4	97,561	13.99
2014	5,426,317	181,193,380	96.1	692.4	152.0	103,433	13.43
2017	5,621,512	188,394,240	84.0	569.9	128.0	109,430	13.07
2020	5,754,138	195,584,700	74.3	476.7	110.7	114,527	12.99
2023	5,893,056	202,578,720	68.3	413.6	99.3	119,639	13.11

Difference (Ver. 2.5021a - Ver. 2.5020a) in San Francisco Bay Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	-14.2	-372.5	-27.6	-1,304	0.00
2000	0	0	-7.0	-181.8	-18.0	-2,868	0.00
2005	0	0	-4.8	-110.5	-11.3	-3,186	0.00
2007	0	0	-4.0	-92.3	-9.4	-3,276	0.00
2010	0	0	-3.2	-77.1	-7.8	-3,337	0.00
2014	0	0	-2.5	-60.1	-5.9	-3,537	0.00
2017	0	0	-2.1	-47.9	-4.6	-3,749	0.00
2020	0	0	-1.7	-37.7	-3.7	-3,919	0.00
2023	0	0	-1.5	-30.7	-3.1	-4,080	0.00

Percentage Change in San Francisco Bay Emission Inventories (relative to Ver. 2.5020a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	-2.66%	-7.27%	-5.36%	-1.61%	0.00%
2000	0.00%	0.00%	-2.98%	-8.34%	-4.95%	-2.99%	0.00%
2005	0.00%	0.00%	-3.10%	-8.36%	-4.26%	-3.29%	0.00%
2007	0.00%	0.00%	-2.98%	-8.28%	-4.03%	-3.31%	0.00%
2010	0.00%	0.00%	-2.79%	-8.17%	-3.91%	-3.31%	0.00%
2014	0.00%	0.00%	-2.55%	-7.99%	-3.71%	-3.31%	0.00%
2017	0.00%	0.00%	-2.39%	-7.75%	-3.49%	-3.31%	0.00%
2020	0.00%	0.00%	-2.23%	-7.32%	-3.25%	-3.31%	0.00%
2023	0.00%	0.00%	-2.10%	-6.90%	-3.03%	-3.30%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-59. Impact on San Joaquin Valley Air Basin Inventory of Change 12.10

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5020a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,371,368	58,661,744	230.8	2441.8	342.4	43,703	23.49
2000	1,936,457	83,696,632	112.4	1130.8	356.7	57,176	13.86
2005	2,141,954	91,088,576	81.5	736.0	284.7	61,976	13.66
2007	2,254,768	94,929,168	73.8	657.2	258.4	64,939	13.13
2010	2,493,321	98,407,960	70.3	604.7	226.2	67,570	12.17
2014	2,852,481	107,711,930	65.4	539.9	181.0	74,969	11.52
2017	3,115,979	116,216,320	60.8	478.8	155.1	81,282	10.89
2020	3,309,582	124,193,760	55.7	419.0	134.7	87,075	10.64
2023	3,430,952	131,662,430	51.1	360.2	119.6	93,918	10.55

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With Updated Temp/RH Profiles
(Calculated Using EMFAC2010 ver 2.5021a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,371,368	58,661,744	229.3	2274.8	329.8	43,044	23.49
2000	1,936,457	83,696,632	111.3	1027.2	345.6	55,489	13.86
2005	2,141,954	91,088,576	81.3	668.2	277.1	59,889	13.66
2007	2,254,768	94,929,168	73.7	597.0	251.6	62,723	13.13
2010	2,493,321	98,407,960	70.3	549.8	220.2	65,272	12.17
2014	2,852,481	107,711,930	65.5	490.4	176.2	72,448	11.52
2017	3,115,979	116,216,320	60.9	435.1	151.1	78,545	10.89
2020	3,309,582	124,193,760	55.9	381.0	131.3	84,127	10.64
2023	3,430,952	131,662,430	51.3	327.0	116.7	90,667	10.55

Difference (Ver. 2.5021a - Ver. 2.5020a) in San Joaquin Valley Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	-1.5	-167.0	-12.6	-659	0.00
2000	0	0	-1.1	-103.5	-11.2	-1,686	0.00
2005	0	0	-0.1	-67.9	-7.7	-2,087	0.00
2007	0	0	-0.1	-60.2	-6.8	-2,216	0.00
2010	0	0	0.0	-54.9	-6.0	-2,298	0.00
2014	0	0	0.1	-49.5	-4.8	-2,521	0.00
2017	0	0	0.2	-43.8	-4.0	-2,736	0.00
2020	0	0	0.2	-38.0	-3.4	-2,948	0.00
2023	0	0	0.2	-33.1	-2.9	-3,251	0.00

Percentage Change in San Joaquin Valley Emission Inventories (relative to Ver. 2.5020a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	-0.63%	-6.84%	-3.69%	-1.51%	0.00%
2000	0.00%	0.00%	-0.97%	-9.16%	-3.13%	-2.95%	0.00%
2005	0.00%	0.00%	-0.18%	-9.22%	-2.70%	-3.37%	0.00%
2007	0.00%	0.00%	-0.10%	-9.15%	-2.62%	-3.41%	0.00%
2010	0.00%	0.00%	0.01%	-9.08%	-2.64%	-3.40%	0.00%
2014	0.00%	0.00%	0.14%	-9.16%	-2.64%	-3.36%	0.00%
2017	0.00%	0.00%	0.26%	-9.14%	-2.59%	-3.37%	0.00%
2020	0.00%	0.00%	0.38%	-9.08%	-2.50%	-3.39%	0.00%
2023	0.00%	0.00%	0.44%	-9.20%	-2.40%	-3.46%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-60. Impact on South Coast Air Basin Inventory of Change 12.10

South Coast Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5020a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,534,778	267,446,580	970.4	9422.9	943.0	162,610	46.35
2000	8,888,948	316,402,500	396.8	3896.1	677.3	177,802	31.97
2005	9,572,533	342,575,040	259.4	2439.1	510.6	199,026	31.73
2007	9,927,914	355,912,900	222.9	2082.6	457.8	207,711	30.87
2010	10,537,437	365,239,650	190.0	1734.1	400.3	213,641	29.58
2014	11,072,442	377,542,370	150.3	1321.6	318.4	225,504	28.07
2017	11,422,403	389,182,050	128.2	1080.8	272.4	236,806	27.30
2020	11,709,373	400,561,250	112.6	914.0	238.4	246,987	26.88
2023	11,886,469	407,786,110	102.2	797.5	216.3	256,607	26.77

South Coast Summer Episodic On-Road Motor Vehicle Inventories With Updated Temp/RH Profiles
(Calculated Using EMFAC2010 ver 2.5021a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,534,778	267,446,580	957.7	8953.6	902.1	160,572	46.35
2000	8,888,948	316,402,500	390.4	3640.6	650.2	173,500	31.97
2005	9,572,533	342,575,040	255.8	2275.2	493.0	193,670	31.73
2007	9,927,914	355,912,900	220.0	1942.5	442.7	202,045	30.87
2010	10,537,437	365,239,650	187.8	1618.8	387.7	207,811	29.58
2014	11,072,442	377,542,370	148.8	1233.9	309.0	219,395	28.07
2017	11,422,403	389,182,050	127.1	1010.1	265.0	230,433	27.30
2020	11,709,373	400,561,250	111.7	855.6	232.3	240,364	26.88
2023	11,886,469	407,786,110	101.5	747.3	211.2	249,784	26.77

Difference (Ver. 2.5021a - Ver. 2.5020a8) in South Coast Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	-12.6	-469.3	-40.8	-2,038	0.00
2000	0	0	-6.4	-255.4	-27.1	-4,302	0.00
2005	0	0	-3.6	-163.8	-17.6	-5,356	0.00
2007	0	0	-2.9	-140.1	-15.1	-5,666	0.00
2010	0	0	-2.2	-115.3	-12.6	-5,830	0.00
2014	0	0	-1.5	-87.7	-9.3	-6,109	0.00
2017	0	0	-1.2	-70.7	-7.5	-6,374	0.00
2020	0	0	-0.9	-58.3	-6.1	-6,622	0.00
2023	0	0	-0.7	-50.1	-5.2	-6,823	0.00

Percentage Change in South Coast Emission Inventories (relative to Ver. 2.5020a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	-1.30%	-4.98%	-4.33%	-1.25%	0.00%
2000	0.00%	0.00%	-1.61%	-6.56%	-3.99%	-2.42%	0.00%
2005	0.00%	0.00%	-1.39%	-6.72%	-3.45%	-2.69%	0.00%
2007	0.00%	0.00%	-1.31%	-6.73%	-3.30%	-2.73%	0.00%
2010	0.00%	0.00%	-1.17%	-6.65%	-3.15%	-2.73%	0.00%
2014	0.00%	0.00%	-1.02%	-6.63%	-2.93%	-2.71%	0.00%
2017	0.00%	0.00%	-0.90%	-6.54%	-2.75%	-2.69%	0.00%
2020	0.00%	0.00%	-0.79%	-6.38%	-2.56%	-2.68%	0.00%
2023	0.00%	0.00%	-0.72%	-6.28%	-2.39%	-2.66%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type Using Populations

12.11 UPDATES TO SPEED DISTRIBUTIONS

Please refer to Section 3.3.2. This updated the latest speed profiles provided by the local transportation planning agencies. The incremental changes vary by region but tend to be small.

Table 12-61. Impact on Statewide Inventory of Change 12.11

Statewide Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.50.21a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,378,444	689,422,780	2,527	24,167	2,594	424,355	145.38
2000	22,181,680	839,893,380	1,079	10,004	2,066	477,035	94.16
2005	23,631,408	895,163,970	720	6,222	1,571	514,640	92.19
2007	24,447,824	923,793,790	631	5,402	1,417	534,851	89.30
2010	26,118,692	946,227,260	564	4,682	1,243	550,560	84.68
2014	28,247,534	999,628,350	480	3,816	999	590,254	80.78
2017	29,519,084	1,044,801,900	423	3,214	858	625,966	77.98
2020	30,517,106	1,089,757,700	379	2,752	754	659,117	77.12
2023	31,298,652	1,130,831,900	347	2,378	682	694,108	77.51

Statewide Summer Episodic On-Road Motor Vehicle Inventories With Updated Speed Distributions
(Calculated Using EMFAC2010 ver 2.50.22)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,378,444	689,422,780	2,561	25,718	2,646	430,610	145.38
2000	22,181,680	839,893,380	1,097	10,839	2,102	490,506	94.16
2005	23,631,408	895,163,970	729	6,751	1,592	531,002	92.19
2007	24,447,824	923,793,790	639	5,861	1,435	552,087	89.30
2010	26,118,692	946,227,260	570	5,075	1,257	568,306	84.69
2014	28,247,534	999,628,350	484	4,137	1,010	609,254	80.83
2017	29,519,084	1,044,801,900	427	3,483	867	646,157	78.08
2020	30,517,106	1,089,757,700	381	2,978	762	680,428	77.26
2023	31,298,652	1,130,831,900	349	2,573	688	716,609	77.67

Difference (Ver. 2.5022 - Ver. 2.5021a) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	34.0	1550.9	52.1	6,255	0.00
2000	0	0	17.7	835.0	36.3	13,471	0.00
2005	0	0	9.2	528.9	21.2	16,362	0.00
2007	0	0	7.9	458.5	18.2	17,236	0.00
2010	0	0	5.6	393.1	14.4	17,746	0.01
2014	0	0	4.2	320.8	11.3	19,000	0.05
2017	0	0	3.8	268.8	9.4	20,191	0.10
2020	0	0	2.4	226.3	7.5	21,311	0.14
2023	0	0	2.2	194.7	6.2	22,501	0.16

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.5021a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	1.35%	6.42%	2.01%	1.47%	0.00%
2000	0.00%	0.00%	1.64%	8.35%	1.76%	2.82%	0.00%
2005	0.00%	0.00%	1.28%	8.50%	1.35%	3.18%	0.00%
2007	0.00%	0.00%	1.26%	8.49%	1.28%	3.22%	0.00%
2010	0.00%	0.00%	1.00%	8.40%	1.16%	3.22%	0.01%
2014	0.00%	0.00%	0.87%	8.41%	1.13%	3.22%	0.07%
2017	0.00%	0.00%	0.90%	8.36%	1.10%	3.23%	0.12%
2020	0.00%	0.00%	0.63%	8.22%	1.00%	3.23%	0.18%
2023	0.00%	0.00%	0.64%	8.19%	0.91%	3.24%	0.21%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-62. Impact on Sacramento Valley Air Basin Inventory of Change 12.11

Sacramento Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5021a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,362,128	51,431,120	212.0	2058.3	205.6	31,912	11.56
2000	1,634,783	63,336,324	88.2	807.1	170.3	36,070	7.40
2005	1,780,274	68,268,976	61.5	503.3	130.6	38,864	7.19
2007	1,860,962	70,353,144	55.4	446.0	118.7	40,550	6.97
2010	2,030,439	72,283,584	51.6	401.0	105.0	41,620	6.61
2014	2,285,447	78,601,864	46.6	346.2	87.4	45,687	6.44
2017	2,424,266	82,960,408	42.1	297.5	76.4	48,693	6.27
2020	2,522,620	87,144,888	38.0	255.4	68.1	51,535	6.25
2023	2,604,611	91,737,016	34.9	215.3	62.0	54,684	6.35

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With Updated Speed Distributions
(Calculated Using EMFAC2010 ver 2.5022)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,362,128	51,431,120	216.2	2252.9	211.8	32,597	11.56
2000	1,634,783	63,336,324	90.2	903.2	174.6	37,528	7.40
2005	1,780,274	68,268,976	62.5	564.3	133.1	40,636	7.19
2007	1,860,962	70,353,144	56.2	500.1	120.8	42,420	6.97
2010	2,030,439	72,283,584	52.3	448.6	106.8	43,516	6.61
2014	2,285,447	78,601,864	47.1	387.2	88.9	47,749	6.44
2017	2,424,266	82,960,408	42.6	332.6	77.7	50,887	6.27
2020	2,522,620	87,144,888	38.4	285.0	69.2	53,854	6.26
2023	2,604,611	91,737,016	35.1	240.2	62.8	57,152	6.37

Difference (Ver. 2.5022 - Ver. 2.5021a) in Sacramento Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	4.2	194.6	6.2	685	0.00
2000	0	0	2.0	96.1	4.3	1,458	0.00
2005	0	0	1.0	61.0	2.5	1,772	0.00
2007	0	0	0.8	54.1	2.1	1,870	0.00
2010	0	0	0.7	47.6	1.8	1,896	0.00
2014	0	0	0.5	41.0	1.5	2,062	0.00
2017	0	0	0.5	35.1	1.3	2,194	0.00
2020	0	0	0.4	29.6	1.1	2,319	0.01
2023	0	0	0.2	24.9	0.8	2,468	0.02

Percentage Change in Sacramento Emission Inventories (relative to Ver. 2.5021a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	1.96%	9.45%	3.00%	2.15%	0.01%
2000	0.00%	0.00%	2.23%	11.91%	2.50%	4.04%	0.06%
2005	0.00%	0.00%	1.57%	12.13%	1.88%	4.56%	0.03%
2007	0.00%	0.00%	1.51%	12.14%	1.77%	4.61%	-0.01%
2010	0.00%	0.00%	1.28%	11.86%	1.73%	4.56%	0.03%
2014	0.00%	0.00%	1.17%	11.84%	1.69%	4.51%	0.04%
2017	0.00%	0.00%	1.10%	11.78%	1.68%	4.51%	0.07%
2020	0.00%	0.00%	0.96%	11.60%	1.56%	4.50%	0.20%
2023	0.00%	0.00%	0.66%	11.57%	1.33%	4.51%	0.26%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-63. Impact on San Diego Air Basin Inventory of Change 12.11

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5021a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,615,290	60,116,672	220.0	2196.0	201.0	37,319	9.61
2000	1,930,842	73,980,216	84.0	828.0	139.0	39,689	6.82
2005	2,066,461	79,199,328	53.0	505.0	101.0	43,181	6.56
2007	2,138,676	81,365,584	47.0	439.0	91.0	44,817	6.40
2010	2,277,702	82,533,536	42.0	381.0	80.0	45,936	6.16
2014	2,432,722	85,930,752	35.0	303.0	64.0	48,205	5.94
2017	2,480,927	88,470,176	30.0	246.0	53.0	49,992	5.80
2020	2,523,581	90,974,512	26.0	207.0	46.0	51,862	5.77
2023	2,599,894	94,694,160	24.0	183.0	42.0	54,913	5.90

San Diego Summer Episodic On-Road Motor Vehicle Inventories With Updated Speed Distributions
(Calculated Using EMFAC2010 ver 2.5022)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,615,290	60,116,672	223	2306	205	37,786	9.61
2000	1,930,842	73,980,216	85	878	141	40,606	6.82
2005	2,066,461	79,199,328	54	536	102	44,278	6.56
2007	2,138,676	81,365,584	47	467	92	45,956	6.40
2010	2,277,702	82,533,536	42	404	81	47,090	6.16
2014	2,432,722	85,930,752	35	322	65	49,408	5.95
2017	2,480,927	88,470,176	30	261	54	51,238	5.80
2020	2,523,581	90,974,512	26	219	47	53,150	5.78
2023	2,599,894	94,694,160	24	193	42	56,274	5.91

Difference (Ver. 2.5022 - Ver. 2.5021a) in San Diego Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	3.1	110.5	3.9	467	0.00
2000	0	0	0.7	50.3	2.2	917	0.00
2005	0	0	0.7	31.4	1.0	1,097	0.00
2007	0	0	0.0	27.6	1.0	1,139	0.00
2010	0	0	0.0	22.8	1.0	1,154	0.00
2014	0	0	0.2	18.8	0.6	1,203	0.01
2017	0	0	-0.1	14.9	1.1	1,246	0.00
2020	0	0	0.0	11.9	0.5	1,288	0.01
2023	0	0	-0.3	10.4	0.0	1,361	0.01

Percentage Change in San Diego Emission Inventories (relative to Ver. 2.5021a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	1.40%	5.03%	1.92%	1.25%	-0.05%
2000	0.00%	0.00%	0.84%	6.08%	1.58%	2.31%	0.05%
2005	0.00%	0.00%	1.23%	6.22%	0.97%	2.54%	-0.03%
2007	0.00%	0.00%	-0.07%	6.28%	1.14%	2.54%	0.02%
2010	0.00%	0.00%	-0.01%	5.99%	1.27%	2.51%	0.02%
2014	0.00%	0.00%	0.49%	6.22%	0.98%	2.50%	0.09%
2017	0.00%	0.00%	-0.48%	6.07%	1.98%	2.49%	0.07%
2020	0.00%	0.00%	-0.16%	5.75%	1.14%	2.48%	0.10%
2023	0.00%	0.00%	-1.27%	5.71%	0.00%	2.48%	0.09%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-64. Impact on San Francisco Bay Air Basin Inventory of Change 12.11

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5021a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,877,920	137,914,140	519.4	4752.4	488.0	79,483	24.46
2000	4,700,962	168,181,650	226.9	1997.8	346.3	92,987	17.05
2005	4,757,890	169,061,820	149.5	1211.0	253.5	93,745	15.47
2007	4,815,908	170,597,250	128.7	1023.1	224.4	95,720	14.79
2010	5,024,152	171,597,970	113.4	866.8	192.4	97,561	13.99
2014	5,426,317	181,193,380	96.1	692.4	152.0	103,433	13.43
2017	5,621,512	188,394,240	84.0	569.9	128.0	109,430	13.07
2020	5,754,138	195,584,700	74.3	476.7	110.7	114,527	12.99
2023	5,893,056	202,578,720	68.3	413.6	99.3	119,639	13.11

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With Updated Speed Distributions
(Calculated Using EMFAC2010 ver 2.5022)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,877,920	137,914,140	525.7	5054.4	498.4	80,677	24.46
2000	4,700,962	168,181,650	230.3	2155.2	353.3	95,617	17.05
2005	4,757,890	169,061,820	151.3	1307.5	257.5	96,667	15.47
2007	4,815,908	170,597,250	130.1	1103.8	227.6	98,725	14.79
2010	5,024,152	171,597,970	114.4	934.3	195.0	100,622	13.99
2014	5,426,317	181,193,380	96.9	745.4	154.0	106,678	13.44
2017	5,621,512	188,394,240	84.5	612.5	129.5	112,871	13.09
2020	5,754,138	195,584,700	74.7	510.7	111.9	118,124	13.01
2023	5,893,056	202,578,720	68.6	441.8	100.3	123,383	13.13

Difference (Ver. 2.5022 - Ver. 2.5021a) in San Francisco Bay Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	6.3	302.0	10.4	1,194	0.00
2000	0	0	3.4	157.4	7.0	2,630	0.00
2005	0	0	1.8	96.5	4.0	2,922	0.00
2007	0	0	1.4	80.7	3.2	3,005	0.00
2010	0	0	1.0	67.5	2.6	3,061	0.00
2014	0	0	0.8	53.0	2.0	3,245	0.01
2017	0	0	0.5	42.6	1.5	3,441	0.02
2020	0	0	0.4	34.0	1.2	3,597	0.02
2023	0	0	0.3	28.2	1.0	3,744	0.02

Percentage Change in San Francisco Bay Emission Inventories (relative to Ver. 2.5021a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	1.21%	6.35%	2.14%	1.50%	0.00%
2000	0.00%	0.00%	1.48%	7.88%	2.03%	2.83%	0.02%
2005	0.00%	0.00%	1.17%	7.97%	1.57%	3.12%	0.02%
2007	0.00%	0.00%	1.10%	7.88%	1.43%	3.14%	-0.02%
2010	0.00%	0.00%	0.92%	7.79%	1.34%	3.14%	0.03%
2014	0.00%	0.00%	0.80%	7.66%	1.30%	3.14%	0.05%
2017	0.00%	0.00%	0.60%	7.48%	1.21%	3.14%	0.15%
2020	0.00%	0.00%	0.55%	7.13%	1.05%	3.14%	0.15%
2023	0.00%	0.00%	0.49%	6.81%	0.97%	3.13%	0.19%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-65. Impact on San Joaquin Valley Air Basin Inventory of Change 12.11

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5021a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,371,368	58,661,744	229.3	2274.8	329.8	43,044	23.49
2000	1,936,457	83,696,632	111.3	1027.2	345.6	55,489	13.86
2005	2,141,954	91,088,576	81.3	668.2	277.1	59,889	13.66
2007	2,254,768	94,929,168	73.7	597.0	251.6	62,723	13.13
2010	2,493,321	98,407,960	70.3	549.8	220.2	65,272	12.17
2014	2,852,481	107,711,930	65.5	490.4	176.2	72,448	11.52
2017	3,115,979	116,216,320	60.9	435.1	151.1	78,545	10.89
2020	3,309,582	124,193,760	55.9	381.0	131.3	84,127	10.64
2023	3,430,952	131,662,430	51.3	327.0	116.7	90,667	10.55

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With Updated Speed Distributions
(Calculated Using EMFAC2010 ver 2.5022)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,371,368	58,661,744	233.6	2481.1	336.5	43,742	23.49
2000	1,936,457	83,696,632	113.8	1148.0	351.3	57,276	13.86
2005	2,141,954	91,088,576	82.6	746.8	280.5	62,098	13.66
2007	2,254,768	94,929,168	74.8	666.7	254.6	65,069	13.13
2010	2,493,321	98,407,960	71.2	613.4	222.8	67,704	12.17
2014	2,852,481	107,711,930	66.3	547.7	178.4	75,116	11.53
2017	3,115,979	116,216,320	61.5	485.7	153.0	81,442	10.90
2020	3,309,582	124,193,760	56.4	424.9	132.9	87,246	10.65
2023	3,430,952	131,662,430	51.7	365.1	118.1	94,108	10.57

Difference (Ver. 2.5022 - Ver. 2.5021a) in San Joaquin Valley Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	4.3	206.3	6.7	698	0.00
2000	0	0	2.5	120.8	5.7	1,787	0.00
2005	0	0	1.3	78.6	3.4	2,209	0.00
2007	0	0	1.1	69.7	3.0	2,346	0.00
2010	0	0	0.9	63.6	2.6	2,432	0.00
2014	0	0	0.8	57.3	2.2	2,668	0.01
2017	0	0	0.6	50.6	1.9	2,897	0.01
2020	0	0	0.5	43.9	1.6	3,119	0.01
2023	0	0	0.4	38.1	1.4	3,441	0.02

Percentage Change in San Joaquin Valley Emission Inventories (relative to Ver. 2.5021a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	1.86%	9.07%	2.04%	1.62%	0.01%
2000	0.00%	0.00%	2.22%	11.76%	1.64%	3.22%	0.02%
2005	0.00%	0.00%	1.61%	11.77%	1.21%	3.69%	-0.01%
2007	0.00%	0.00%	1.50%	11.68%	1.18%	3.74%	-0.02%
2010	0.00%	0.00%	1.31%	11.57%	1.17%	3.73%	-0.01%
2014	0.00%	0.00%	1.20%	11.68%	1.23%	3.68%	0.06%
2017	0.00%	0.00%	1.05%	11.62%	1.23%	3.69%	0.06%
2020	0.00%	0.00%	0.87%	11.52%	1.24%	3.71%	0.13%
2023	0.00%	0.00%	0.85%	11.65%	1.19%	3.80%	0.17%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-66. Impact on South Coast Air Basin Inventory of Change 12.11

South Coast Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5021a)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,534,778	267,446,580	957.7	8953.6	902.1	160,572	46.35
2000	8,888,948	316,402,500	390.4	3640.6	650.2	173,500	31.97
2005	9,572,533	342,575,040	255.8	2275.2	493.0	193,670	31.73
2007	9,927,914	355,912,900	220.0	1942.5	442.7	202,045	30.87
2010	10,537,437	365,239,650	187.8	1618.8	387.7	207,811	29.58
2014	11,072,442	377,542,370	148.8	1233.9	309.0	219,395	28.07
2017	11,422,403	389,182,050	127.1	1010.1	265.0	230,433	27.30
2020	11,709,373	400,561,250	111.7	855.6	232.3	240,364	26.88
2023	11,886,469	407,786,110	101.5	747.3	211.2	249,784	26.77

South Coast Summer Episodic On-Road Motor Vehicle Inventories With Updated Speed Distributions
(Calculated Using EMFAC2010 ver 2.5022)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,534,778	267,446,580	968.1	9412.1	917.6	162,586	46.35
2000	8,888,948	316,402,500	395.9	3894.1	661.0	177,774	31.97
2005	9,572,533	342,575,040	258.7	2438.3	499.3	198,998	31.73
2007	9,927,914	355,912,900	222.3	2082.0	448.0	207,685	30.88
2010	10,537,437	365,239,650	189.5	1733.7	391.8	213,617	29.59
2014	11,072,442	377,542,370	150.0	1321.4	312.0	225,484	28.09
2017	11,422,403	389,182,050	127.9	1080.8	267.2	236,789	27.34
2020	11,709,373	400,561,250	112.4	914.2	234.1	246,976	26.93
2023	11,886,469	407,786,110	102.0	797.8	212.7	256,602	26.84

Difference (Ver. 2.5022 - Ver. 2.5021a) in South Coast Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	10.4	458.5	15.5	2,014	0.00
2000	0	0	5.5	253.5	10.8	4,274	0.00
2005	0	0	2.9	163.1	6.3	5,328	0.00
2007	0	0	2.3	139.5	5.3	5,640	0.01
2010	0	0	1.7	114.9	4.1	5,806	0.01
2014	0	0	1.2	87.5	3.0	6,089	0.02
2017	0	0	0.8	70.7	2.2	6,356	0.04
2020	0	0	0.7	58.6	1.8	6,612	0.05
2023	0	0	0.5	50.5	1.5	6,818	0.07

Percentage Change in South Coast Emission Inventories (relative to Ver. 2.5021a)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	1.08%	5.12%	1.72%	1.25%	0.00%
2000	0.00%	0.00%	1.41%	6.96%	1.66%	2.46%	0.01%
2005	0.00%	0.00%	1.12%	7.17%	1.27%	2.75%	0.00%
2007	0.00%	0.00%	1.04%	7.18%	1.19%	2.79%	0.02%
2010	0.00%	0.00%	0.89%	7.10%	1.06%	2.79%	0.03%
2014	0.00%	0.00%	0.78%	7.09%	0.97%	2.78%	0.08%
2017	0.00%	0.00%	0.66%	7.00%	0.85%	2.76%	0.14%
2020	0.00%	0.00%	0.59%	6.85%	0.76%	2.75%	0.20%
2023	0.00%	0.00%	0.49%	6.76%	0.69%	2.73%	0.25%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type Using Populations

12.12 2004 - 2010 LEV 2 AND DIESEL BASELINE UPDATES

During the development of the LEV3 regulation it became apparent that many of the assumptions regarding the LEV2 program were obsolete and should be adjusted. Additionally, new registration data pointed out that many of our assumptions regarding light duty diesel technology were also obsolete. We updated EMFAC for what was actually sold. This generally reduced emissions, regardless of region.

Table 12-67. Impact on Statewide Inventory of Change 12.12

Statewide Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.50.22)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,378,444	689,422,780	2,561	25,718	2,646	430,610	145.38
2000	22,181,680	839,893,380	1,097	10,839	2,102	490,506	94.16
2005	23,631,408	895,163,970	729	6,751	1,592	531,002	92.19
2007	24,447,824	923,793,790	639	5,861	1,435	552,087	89.30
2010	26,118,692	946,227,260	570	5,075	1,257	568,306	84.69
2014	28,247,534	999,628,350	484	4,137	1,010	609,254	80.83
2017	29,519,084	1,044,801,900	427	3,483	867	646,157	78.08
2020	30,517,106	1,089,757,700	381	2,978	762	680,428	77.26
2023	31,298,652	1,130,831,900	349	2,573	688	716,609	77.67

Statewide Summer Episodic On-Road Motor Vehicle Inventories With Revised Speed Profiles
(Calculated Using EMFAC2010 ver 2.50.23)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,502,400	683,627,650	2,555	25,299	2,596	428,274	144.37
2000	22,167,354	832,353,470	1,094	10,806	2,060	494,731	93.59
2005	23,289,752	876,678,210	706	6,519	1,515	518,485	89.72
2007	24,181,280	910,324,160	621	5,688	1,379	544,418	87.50
2010	26,118,692	946,227,200	563	4,998	1,241	572,977	84.05
2014	28,247,532	999,628,290	478	4,069	996	612,245	80.43
2017	29,519,082	1,044,801,800	422	3,426	854	648,525	77.69
2020	30,517,098	1,089,757,600	377	2,932	749	682,840	76.97
2023	31,298,648	1,130,831,700	345	2,532	676	716,693	77.42

Difference (Ver. 2.5023 - Ver. 2.5022) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	123,956	-5,795,130	-6.5	-419.5	-50.1	-2,336	-1.01
2000	-14,326	-7,539,910	-3.3	-32.5	-42.0	4,225	-0.57
2005	-341,656	-18,485,760	-22.8	-231.6	-76.8	-12,517	-2.47
2007	-266,544	-13,469,630	-17.6	-172.8	-55.5	-7,669	-1.80
2010	0	-60	-7.5	-76.8	-15.7	4,671	-0.64
2014	-2	-60	-6.1	-68.2	-14.2	2,991	-0.40
2017	-2	-100	-5.3	-57.1	-13.5	2,368	-0.39
2020	-8	-100	-3.8	-45.5	-13.0	2,412	-0.29
2023	-4	-200	-3.6	-41.3	-11.6	84	-0.25

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.5022)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.67%	-0.84%	-0.25%	-1.63%	-1.89%	-0.54%	-0.70%
2000	-0.06%	-0.90%	-0.30%	-0.30%	-2.00%	0.86%	-0.60%
2005	-1.45%	-2.07%	-3.13%	-3.43%	-4.82%	-2.36%	-2.68%
2007	-1.09%	-1.46%	-2.75%	-2.95%	-3.87%	-1.39%	-2.02%
2010	0.00%	0.00%	-1.31%	-1.51%	-1.25%	0.82%	-0.76%
2014	0.00%	0.00%	-1.25%	-1.65%	-1.41%	0.49%	-0.49%
2017	0.00%	0.00%	-1.25%	-1.64%	-1.55%	0.37%	-0.50%
2020	0.00%	0.00%	-1.00%	-1.53%	-1.71%	0.35%	-0.38%
2023	0.00%	0.00%	-1.02%	-1.61%	-1.69%	0.01%	-0.32%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-68. Impact on Sacramento Valley Air Basin Inventory of Change 12.12

Sacramento Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5022)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,362,128	51,431,120	216.2	2252.9	211.8	32,597	11.56
2000	1,634,783	63,336,324	90.2	903.2	174.6	37,528	7.40
2005	1,780,274	68,268,976	62.5	564.3	133.1	40,636	7.19
2007	1,860,962	70,353,144	56.2	500.1	120.8	42,420	6.97
2010	2,030,439	72,283,584	52.3	448.6	106.8	43,516	6.61
2014	2,285,447	78,601,864	47.1	387.2	88.9	47,749	6.44
2017	2,424,266	82,960,408	42.6	332.6	77.7	50,887	6.27
2020	2,522,620	87,144,888	38.4	285.0	69.2	53,854	6.26
2023	2,604,611	91,737,016	35.1	240.2	62.8	57,152	6.37

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.5023)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,373,306	50,465,080	217.3	2221.3	204.7	32,071	11.36
2000	1,628,305	62,080,196	90.9	907.3	167.8	37,499	7.27
2005	1,731,112	65,796,664	60.4	545.3	124.0	39,864	6.94
2007	1,823,069	68,580,760	54.5	485.5	114.7	42,217	6.79
2010	2,030,438	72,283,584	52.1	447.0	106.6	45,182	6.61
2014	2,285,447	78,601,864	47.0	385.8	88.7	49,473	6.44
2017	2,424,266	82,960,408	42.4	331.8	77.6	52,740	6.27
2020	2,522,620	87,144,880	38.2	285.1	69.1	55,776	6.26
2023	2,604,610	91,737,016	35.0	240.5	62.7	59,082	6.36

Difference (Ver. 2.5023 - Ver. 2.5022) in Sacramento Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	11178	-966040	1.1	-31.6	-7.1	-526	-0.20
2000	-6478	-1256128	0.7	4.1	-6.8	-29	-0.13
2005	-49162	-2472312	-2.1	-19.0	-9.1	-772	-0.25
2007	-37893	-1772384	-1.7	-14.6	-6.1	-203	-0.18
2010	-1	0	-0.2	-1.6	-0.2	1,666	0.00
2014	0	0	-0.1	-1.4	-0.2	1,724	0.00
2017	0	0	-0.2	-0.8	-0.1	1,853	0.00
2020	0	-8	-0.2	0.1	-0.1	1,922	0.00
2023	-1	0	-0.1	0.3	-0.1	1,930	-0.01

Percentage Change in Sacramento Emission Inventories (relative to Ver. 2.5022)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.82%	-1.88%	0.51%	-1.40%	-3.37%	-1.61%	-1.74%
2000	-0.40%	-1.98%	0.72%	0.46%	-3.88%	-0.08%	-1.74%
2005	-2.76%	-3.62%	-3.36%	-3.37%	-6.87%	-1.90%	-3.46%
2007	-2.04%	-2.52%	-2.99%	-2.92%	-5.04%	-0.48%	-2.57%
2010	0.00%	0.00%	-0.39%	-0.37%	-0.19%	3.83%	0.03%
2014	0.00%	0.00%	-0.29%	-0.37%	-0.21%	3.61%	0.00%
2017	0.00%	0.00%	-0.43%	-0.23%	-0.18%	3.64%	0.04%
2020	0.00%	0.00%	-0.44%	0.02%	-0.22%	3.57%	0.01%
2023	0.00%	0.00%	-0.26%	0.12%	-0.12%	3.38%	-0.12%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-69. Impact on San Diego Air Basin Inventory of Change 12.12

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5022)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,615,290	60,116,672	223.0	2306.0	205.0	37,786	9.61
2000	1,930,842	73,980,216	85.0	878.0	141.0	40,606	6.82
2005	2,066,461	79,199,328	54.0	536.0	102.0	44,278	6.56
2007	2,138,676	81,365,584	47.0	467.0	92.0	45,956	6.40
2010	2,277,702	82,533,536	42.0	404.0	81.0	47,090	6.16
2014	2,432,722	85,930,752	35.0	322.0	65.0	49,408	5.95
2017	2,480,927	88,470,176	30.0	261.0	54.0	51,238	5.80
2020	2,523,581	90,974,512	26.0	219.0	47.0	53,150	5.78
2023	2,599,894	94,694,160	24.0	193.0	42.0	56,274	5.91

San Diego Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.5023)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,609,040	59,230,324	222	2268	201	37,710	9.50
2000	1,925,116	73,764,616	83	860	138	41,257	6.77
2005	2,054,304	78,582,088	52	523	98	44,004	6.46
2007	2,129,484	80,890,632	46	458	90	45,845	6.33
2010	2,277,701	82,533,528	41	397	81	46,939	6.14
2014	2,432,723	85,930,784	35	317	64	49,290	5.93
2017	2,480,928	88,470,224	30	257	54	51,132	5.79
2020	2,523,582	90,974,536	26	216	46	53,051	5.76
2023	2,599,896	94,694,192	23	190	42	55,836	5.89

Difference (Ver. 2.5023 - Ver. 2.5022) in San Diego Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-6,250	-886,348	-1.4	-38.0	-4.4	-76	-0.11
2000	-5,726	-215,600	-2.3	-18.5	-2.9	651	-0.05
2005	-12,157	-617,240	-2.0	-13.2	-3.5	-274	-0.10
2007	-9,192	-474,952	-1.1	-9.1	-2.2	-111	-0.07
2010	-1	-8	-0.6	-6.9	-0.3	-151	-0.02
2014	1	32	-0.3	-5.3	-0.6	-118	-0.02
2017	1	48	-0.5	-4.0	-0.2	-106	-0.01
2020	1	24	-0.3	-3.4	-0.6	-99	-0.02
2023	2	32	-0.6	-2.9	-0.2	-438	-0.02

Percentage Change in San Diego Emission Inventories (relative to Ver. 2.5022)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-0.39%	-1.47%	-0.64%	-1.65%	-2.14%	-0.20%	-1.13%
2000	-0.30%	-0.29%	-2.68%	-2.11%	-2.02%	1.60%	-0.74%
2005	-0.59%	-0.78%	-3.70%	-2.46%	-3.46%	-0.62%	-1.54%
2007	-0.43%	-0.58%	-2.32%	-1.95%	-2.36%	-0.24%	-1.04%
2010	0.00%	0.00%	-1.46%	-1.71%	-0.40%	-0.32%	-0.35%
2014	0.00%	0.00%	-0.76%	-1.64%	-0.95%	-0.24%	-0.35%
2017	0.00%	0.00%	-1.58%	-1.55%	-0.29%	-0.21%	-0.18%
2020	0.00%	0.00%	-1.16%	-1.55%	-1.38%	-0.19%	-0.33%
2023	0.00%	0.00%	-2.38%	-1.49%	-0.46%	-0.78%	-0.41%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-70. Impact on San Francisco Bay Air Basin Inventory of Change 12.12

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5022)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,877,920	137,914,140	525.7	5054.4	498.4	80,677	24.46
2000	4,700,962	168,181,650	230.3	2155.2	353.3	95,617	17.05
2005	4,757,890	169,061,820	151.3	1307.5	257.5	96,667	15.47
2007	4,815,908	170,597,250	130.1	1103.8	227.6	98,725	14.79
2010	5,024,152	171,597,970	114.4	934.3	195.0	100,622	13.99
2014	5,426,317	181,193,380	96.9	745.4	154.0	106,678	13.44
2017	5,621,512	188,394,240	84.5	612.5	129.5	112,871	13.09
2020	5,754,138	195,584,700	74.7	510.7	111.9	118,124	13.01
2023	5,893,056	202,578,720	68.6	441.8	100.3	123,383	13.13

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.5023)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,932,100	138,236,160	531.2	4998.5	490.3	80,545	24.45
2000	4,709,472	166,475,900	234.1	2178.4	347.5	95,294	16.97
2005	4,663,679	164,225,200	149.6	1284.4	246.8	95,231	15.13
2007	4,742,242	167,109,980	128.6	1087.4	220.6	98,753	14.54
2010	5,024,152	171,597,970	114.4	934.3	195.0	103,886	13.99
2014	5,426,317	181,193,380	96.9	745.4	154.0	110,150	13.44
2017	5,621,512	188,394,240	84.5	612.5	129.5	116,571	13.09
2020	5,754,138	195,584,690	74.7	510.7	111.9	122,008	13.01
2023	5,893,057	202,578,720	68.6	441.8	100.3	127,438	13.13

Difference (Ver. 2.5023 - Ver. 2.5022) in San Francisco Bay Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	54,180	322,020	5.5	-55.9	-8.1	-132	-0.01
2000	8,510	-1,705,750	3.8	23.2	-5.8	-323	-0.08
2005	-94,211	-4,836,620	-1.7	-23.1	-10.7	-1,436	-0.34
2007	-73,666	-3,487,270	-1.5	-16.4	-7.0	28	-0.25
2010	0	0	0.0	0.0	0.0	3,264	0.00
2014	0	0	0.0	0.0	0.0	3,472	0.00
2017	0	0	0.0	0.0	0.0	3,700	0.00
2020	0	-10	0.0	0.0	0.0	3,884	0.00
2023	1	0	0.0	0.0	0.0	4,055	0.00

Percentage Change in San Francisco Bay Emission Inventories (relative to Ver. 2.5022)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1.40%	0.23%	1.04%	-1.11%	-1.62%	-0.16%	-0.04%
2000	0.18%	-1.01%	1.64%	1.08%	-1.64%	-0.34%	-0.46%
2005	-1.98%	-2.86%	-1.11%	-1.77%	-4.17%	-1.49%	-2.22%
2007	-1.53%	-2.04%	-1.13%	-1.49%	-3.09%	0.03%	-1.67%
2010	0.00%	0.00%	0.04%	0.00%	-0.01%	3.24%	0.03%
2014	0.00%	0.00%	-0.03%	0.00%	-0.02%	3.25%	-0.03%
2017	0.00%	0.00%	0.01%	0.00%	0.04%	3.28%	-0.01%
2020	0.00%	0.00%	0.01%	0.00%	-0.04%	3.29%	-0.01%
2023	0.00%	0.00%	0.05%	0.00%	-0.04%	3.29%	0.04%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-71. Impact on San Joaquin Valley Air Basin Inventory of Change 12.12

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5022)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,371,368	58,661,744	233.6	2481.1	336.5	43,742	23.49
2000	1,936,457	83,696,632	113.8	1148.0	351.3	57,276	13.86
2005	2,141,954	91,088,576	82.6	746.8	280.5	62,098	13.66
2007	2,254,768	94,929,168	74.8	666.7	254.6	65,069	13.13
2010	2,493,321	98,407,960	71.2	613.4	222.8	67,704	12.17
2014	2,852,481	107,711,930	66.3	547.7	178.4	75,116	11.53
2017	3,115,979	116,216,320	61.5	485.7	153.0	81,442	10.90
2020	3,309,582	124,193,760	56.4	424.9	132.9	87,246	10.65
2023	3,430,952	131,662,430	51.7	365.1	118.1	94,108	10.57

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.5023)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,378,730	58,052,672	229.7	2405.6	329.7	43,532	23.36
2000	1,925,682	82,513,360	112.3	1134.9	345.2	57,681	13.74
2005	2,101,642	88,853,616	80.5	728.9	273.4	62,164	13.43
2007	2,223,821	93,314,824	73.5	656.7	250.2	65,958	12.97
2010	2,493,321	98,407,960	71.1	612.7	223.0	70,222	12.16
2014	2,852,481	107,711,920	66.1	544.1	178.4	77,480	11.51
2017	3,115,978	116,216,310	61.4	482.0	153.0	84,089	10.88
2020	3,309,581	124,193,740	56.3	421.5	133.0	90,244	10.64
2023	3,430,952	131,662,410	51.4	355.9	117.9	95,735	10.54

Difference (Ver. 2.5023 - Ver. 2.5022) in San Joaquin Valley Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,362	-609,072	-3.9	-75.5	-6.8	-210	-0.13
2000	-10,775	-1,183,272	-1.5	-13.1	-6.1	405	-0.12
2005	-40,312	-2,234,960	-2.1	-17.9	-7.1	66	-0.23
2007	-30,947	-1,614,344	-1.3	-10.0	-4.4	889	-0.16
2010	0	0	-0.1	-0.7	0.2	2,518	-0.01
2014	0	-10	-0.2	-3.6	0.0	2,364	-0.02
2017	-1	-10	-0.1	-3.7	0.0	2,647	-0.02
2020	-1	-20	-0.1	-3.4	0.1	2,998	-0.01
2023	0	-20	-0.3	-9.2	-0.2	1,627	-0.03

Percentage Change in San Joaquin Valley Emission Inventories (relative to Ver. 2.5022)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.54%	-1.04%	-1.68%	-3.04%	-2.01%	-0.48%	-0.57%
2000	-0.56%	-1.41%	-1.35%	-1.15%	-1.74%	0.71%	-0.86%
2005	-1.88%	-2.45%	-2.50%	-2.40%	-2.54%	0.11%	-1.67%
2007	-1.37%	-1.70%	-1.69%	-1.50%	-1.71%	1.37%	-1.20%
2010	0.00%	0.00%	-0.12%	-0.11%	0.08%	3.72%	-0.11%
2014	0.00%	0.00%	-0.36%	-0.65%	0.03%	3.15%	-0.16%
2017	0.00%	0.00%	-0.17%	-0.76%	0.01%	3.25%	-0.15%
2020	0.00%	0.00%	-0.15%	-0.80%	0.05%	3.44%	-0.07%
2023	0.00%	0.00%	-0.51%	-2.51%	-0.20%	1.73%	-0.29%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-72. Impact on South Coast Air Basin Inventory of Change 12.12

South Coast Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5022)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,534,778	267,446,580	968.1	9412.1	917.6	162,586	46.35
2000	8,888,948	316,402,500	395.9	3894.1	661.0	177,774	31.97
2005	9,572,533	342,575,040	258.7	2438.3	499.3	198,998	31.73
2007	9,927,914	355,912,900	222.3	2082.0	448.0	207,685	30.88
2010	10,537,437	365,239,650	189.5	1733.7	391.8	213,617	29.59
2014	11,072,442	377,542,370	150.0	1321.4	312.0	225,484	28.09
2017	11,422,403	389,182,050	127.9	1080.8	267.2	236,789	27.34
2020	11,709,373	400,561,250	112.4	914.2	234.1	246,976	26.93
2023	11,886,469	407,786,110	102.0	797.8	212.7	256,602	26.84

South Coast Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.5023)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,537,252	264,378,460	958.8	9212.1	902.3	162,405	46.15
2000	8,885,995	315,646,460	390.5	3837.3	651.1	182,423	31.90
2005	9,547,117	340,782,370	249.1	2345.5	475.7	193,041	30.44
2007	9,907,570	354,557,890	215.1	2009.8	429.3	201,968	29.78
2010	10,537,439	365,239,680	185.0	1685.7	379.6	209,404	28.71
2014	11,072,440	377,542,340	146.4	1281.8	301.7	219,670	27.45
2017	11,422,400	389,182,020	125.2	1049.2	257.7	230,012	26.80
2020	11,709,370	400,561,150	110.1	888.9	225.5	239,553	26.52
2023	11,886,466	407,786,080	100.1	778.1	204.9	248,366	26.50

Difference (Ver. 2.5023 - Ver. 2.5022) in South Coast Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	2,474	-3,068,120	-9.3	-200.0	-15.3	-181	-0.20
2000	-2,953	-756,040	-5.4	-56.8	-9.9	4,649	-0.07
2005	-25,416	-1,792,670	-9.6	-92.8	-23.6	-5,957	-1.29
2007	-20,344	-1,355,010	-7.2	-72.2	-18.7	-5,717	-1.10
2010	2	30	-4.5	-48.0	-12.2	-4,213	-0.88
2014	-2	-30	-3.6	-39.6	-10.3	-5,814	-0.64
2017	-3	-30	-2.7	-31.6	-9.5	-6,777	-0.54
2020	-3	-100	-2.3	-25.3	-8.6	-7,423	-0.41
2023	-3	-30	-1.9	-19.7	-7.8	-8,236	-0.34

Percentage Change in South Coast Emission Inventories (relative to Ver. 2.5022)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.03%	-1.15%	-0.96%	-2.12%	-1.67%	-0.11%	-0.42%
2000	-0.03%	-0.24%	-1.37%	-1.46%	-1.49%	2.62%	-0.20%
2005	-0.27%	-0.52%	-3.70%	-3.80%	-4.73%	-2.99%	-4.08%
2007	-0.20%	-0.38%	-3.23%	-3.47%	-4.18%	-2.75%	-3.56%
2010	0.00%	0.00%	-2.39%	-2.77%	-3.11%	-1.97%	-2.96%
2014	0.00%	0.00%	-2.42%	-3.00%	-3.29%	-2.58%	-2.28%
2017	0.00%	0.00%	-2.14%	-2.92%	-3.57%	-2.86%	-1.99%
2020	0.00%	0.00%	-2.03%	-2.77%	-3.69%	-3.01%	-1.54%
2023	0.00%	0.00%	-1.82%	-2.47%	-3.65%	-3.21%	-1.28%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type Using Populations

12.13 REGIONAL VMT AND SPEED DISTRIBUTIONS (SECOND ROUND)

Please refer to Section 3.3.2. This change is complex and highly regional specific. In general, the future VMT projections are lower.

Table 12-73. Impact on Statewide Inventory of Change 12.13

Statewide Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5023)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,502,400	683,627,650	2,555	25,299	2,596	428,274	144.37
2000	22,167,354	832,353,470	1,094	10,806	2,060	494,731	93.59
2005	23,289,752	876,678,210	706	6,519	1,515	518,485	89.72
2007	24,181,280	910,324,160	621	5,688	1,379	544,418	87.50
2010	26,118,692	946,227,200	563	4,998	1,241	572,977	84.05
2014	28,247,532	999,628,290	478	4,069	996	612,245	80.43
2017	29,519,082	1,044,801,800	422	3,426	854	648,525	77.69
2020	30,517,098	1,089,757,600	377	2,932	749	682,840	76.97
2023	31,298,648	1,130,831,700	345	2,532	676	716,693	77.42

Statewide Summer Episodic On-Road Motor Vehicle Inventories Re VMT Matched FB LD HD
(Calculated Using EMFAC2010 ver 2.5041)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,391,380	686,190,590	2,568	25,774	2,554	427,867	133.40
2000	22,080,430	838,198,140	1,088	10,883	1,983	491,115	89.99
2005	23,867,536	916,943,680	719	6,696	1,584	546,922	90.61
2007	24,564,360	939,992,190	628	5,788	1,409	562,064	87.50
2010	26,094,882	954,860,220	554	4,942	1,177	564,727	81.02
2014	27,924,486	999,837,570	462	3,923	941	596,149	78.67
2017	28,952,354	1,039,317,600	400	3,212	796	624,114	76.80
2020	29,729,388	1,078,534,500	349	2,658	677	649,418	76.30
2023	30,293,924	1,113,356,000	310	2,192	586	673,595	76.58

Difference (Ver. 2.5041 - Ver. 2.5023) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-111,020	2,562,940	12.9	474.5	-41.6	-407	-10.97
2000	-86,924	5,844,670	-6.3	76.7	-77.1	-3,616	-3.60
2005	577,784	40,265,470	13.1	176.9	68.9	28,437	0.89
2007	383,080	29,668,030	7.2	100.1	30.0	17,646	0.00
2010	-23,810	8,633,020	-8.9	-55.9	-64.4	-8,250	-3.03
2014	-323,046	209,280	-15.9	-145.9	-55.0	-16,096	-1.76
2017	-566,728	-5,484,200	-22.4	-213.9	-58.4	-24,411	-0.89
2020	-787,710	-11,223,100	-27.9	-274.1	-71.9	-33,422	-0.67
2023	-1,004,724	-17,475,700	-34.6	-340.2	-90.2	-43,098	-0.84

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.5023)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-0.60%	0.37%	0.51%	1.88%	-1.60%	-0.10%	-7.60%
2000	-0.39%	0.70%	-0.58%	0.71%	-3.74%	-0.73%	-3.85%
2005	2.48%	4.59%	1.86%	2.71%	4.55%	5.48%	0.99%
2007	1.58%	3.26%	1.15%	1.76%	2.17%	3.24%	0.00%
2010	-0.09%	0.91%	-1.58%	-1.12%	-5.19%	-1.44%	-3.61%
2014	-1.14%	0.02%	-3.33%	-3.59%	-5.52%	-2.63%	-2.19%
2017	-1.92%	-0.52%	-5.31%	-6.24%	-6.84%	-3.76%	-1.14%
2020	-2.58%	-1.03%	-7.41%	-9.35%	-9.60%	-4.89%	-0.87%
2023	-3.21%	-1.55%	-10.02%	-13.44%	-13.35%	-6.01%	-1.08%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-74. Impact on Sacramento Valley Air Basin Inventory of Change 12.13

Sacramento Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5023)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,373,306	50,465,080	217.3	2221.3	204.7	32,071	11.36
2000	1,628,305	62,080,196	90.9	907.3	167.8	37,499	7.27
2005	1,731,112	65,796,664	60.4	545.3	124.0	39,864	6.94
2007	1,823,069	68,580,760	54.5	485.5	114.7	42,217	6.79
2010	2,030,438	72,283,584	52.1	447.0	106.6	45,182	6.61
2014	2,285,447	78,601,864	47.0	385.8	88.7	49,473	6.44
2017	2,424,266	82,960,408	42.4	331.8	77.6	52,740	6.27
2020	2,522,620	87,144,880	38.2	285.1	69.1	55,776	6.26
2023	2,604,610	91,737,016	35.0	240.5	62.7	59,082	6.36

Sacramento Summer Episodic On-Road Motor Vehicle Inventories Re VMT Matched FB LD HD
(Calculated Using EMFAC2010 ver 2.5041)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,343,634	51,658,632	219.5	2298.9	208.1	32,831	11.02
2000	1,600,770	64,021,716	90.8	928.9	172.4	38,760	7.44
2005	1,786,511	71,607,608	62.7	582.5	136.0	44,312	7.42
2007	1,863,163	73,436,584	56.2	513.3	123.2	45,662	7.21
2010	2,023,808	74,876,264	52.2	455.5	108.1	46,490	6.83
2014	2,241,985	79,746,664	45.9	379.1	85.7	49,472	6.52
2017	2,367,428	83,731,984	40.6	317.2	72.2	52,008	6.32
2020	2,446,532	87,438,952	35.6	262.5	61.8	54,193	6.29
2023	2,482,411	90,641,440	31.3	209.7	53.3	56,204	6.33

Difference (Ver. 2.5041 - Ver. 2.5023) in Sacramento Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-29672	1193552	2.2	77.6	3.4	760	-0.34
2000	-27535	1941520	-0.1	21.6	4.6	1,261	0.17
2005	55399	5810944	2.3	37.2	12.0	4,448	0.48
2007	40094	4855824	1.7	27.8	8.5	3,445	0.42
2010	-6630	2592680	0.1	8.5	1.5	1,308	0.22
2014	-43462	1144800	-1.1	-6.7	-3.0	-1	0.08
2017	-56838	771576	-1.8	-14.6	-5.4	-732	0.05
2020	-76088	294072	-2.6	-22.6	-7.3	-1,583	0.03
2023	-122199	-1095576	-3.7	-30.8	-9.4	-2,878	-0.03

Percentage Change in Sacramento Emission Inventories (relative to Ver. 2.5023)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-2.16%	2.37%	0.99%	3.50%	1.64%	2.37%	-2.96%
2000	-1.69%	3.13%	-0.09%	2.38%	2.76%	3.36%	2.28%
2005	3.20%	8.83%	3.84%	6.82%	9.68%	11.16%	6.93%
2007	2.20%	7.08%	3.19%	5.72%	7.38%	8.16%	6.14%
2010	-0.33%	3.59%	0.23%	1.90%	1.42%	2.90%	3.29%
2014	-1.90%	1.46%	-2.44%	-1.74%	-3.43%	0.00%	1.17%
2017	-2.34%	0.93%	-4.26%	-4.41%	-6.95%	-1.39%	0.75%
2020	-3.02%	0.34%	-6.72%	-7.92%	-10.56%	-2.84%	0.54%
2023	-4.69%	-1.19%	-10.51%	-12.80%	-14.91%	-4.87%	-0.49%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-75. Impact on San Diego Air Basin Inventory of Change 12.13

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5023)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,609,040	59,230,324	222.0	2268.0	201.0	37,710	9.50
2000	1,925,116	73,764,616	83.0	860.0	138.0	41,257	6.77
2005	2,054,304	78,582,088	52.0	523.0	98.0	44,004	6.46
2007	2,129,484	80,890,632	46.0	458.0	90.0	45,845	6.33
2010	2,277,701	82,533,528	41.0	397.0	81.0	46,939	6.14
2014	2,432,723	85,930,784	35.0	317.0	64.0	49,290	5.93
2017	2,480,928	88,470,224	30.0	257.0	54.0	51,132	5.79
2020	2,523,582	90,974,536	26.0	216.0	46.0	53,051	5.76
2023	2,599,896	94,694,192	23.0	190.0	42.0	55,836	5.89

San Diego Summer Episodic On-Road Motor Vehicle Inventories Re VMT Matched FB LD HD
(Calculated Using EMFAC2010 ver 2.5041)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,604,708	59,061,544	221	2266	200	37,630	9.42
2000	1,919,750	73,521,104	83	858	137	41,092	6.76
2005	2,061,644	79,028,376	52	522	101	44,606	6.59
2007	2,149,164	81,902,376	47	460	93	46,975	6.54
2010	2,278,918	82,599,080	41	390	79	46,826	6.11
2014	2,426,912	85,887,064	34	306	63	48,832	5.98
2017	2,470,420	88,353,024	29	243	52	50,247	5.88
2020	2,509,912	90,818,672	25	199	44	51,727	5.89
2023	2,586,244	94,608,376	22	168	38	54,041	6.03

Difference (Ver. 2.5041 - Ver. 2.5023) in San Diego Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-4,332	-168,780	-0.7	-1.7	-0.8	-80	-0.08
2000	-5,366	-243,512	-0.4	-1.6	-1.1	-165	-0.01
2005	7,340	446,288	0.4	-1.0	2.6	602	0.13
2007	19,680	1,011,744	0.6	1.7	3.5	1,130	0.21
2010	1,217	65,552	0.2	-7.0	-2.4	-113	-0.03
2014	-5,811	-43,720	-0.8	-11.0	-1.5	-458	0.05
2017	-10,508	-117,200	-1.3	-13.5	-2.2	-885	0.09
2020	-13,670	-155,864	-1.4	-17.4	-2.2	-1,324	0.13
2023	-13,652	-85,816	-1.1	-22.2	-3.8	-1,795	0.14

Percentage Change in San Diego Emission Inventories (relative to Ver. 2.5023)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-0.27%	-0.28%	-0.32%	-0.08%	-0.38%	-0.21%	-0.83%
2000	-0.28%	-0.33%	-0.47%	-0.18%	-0.82%	-0.40%	-0.19%
2005	0.36%	0.57%	0.72%	-0.20%	2.62%	1.37%	2.06%
2007	0.92%	1.25%	1.37%	0.37%	3.87%	2.47%	3.27%
2010	0.05%	0.08%	0.41%	-1.76%	-2.95%	-0.24%	-0.43%
2014	-0.24%	-0.05%	-2.35%	-3.48%	-2.34%	-0.93%	0.76%
2017	-0.42%	-0.13%	-4.33%	-5.27%	-4.05%	-1.73%	1.55%
2020	-0.54%	-0.17%	-5.49%	-8.04%	-4.76%	-2.50%	2.24%
2023	-0.53%	-0.09%	-4.87%	-11.68%	-9.07%	-3.22%	2.36%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-76. Impact on San Francisco Bay Air Basin Inventory of Change 12.13

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5023)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,932,100	138,236,160	531.2	4998.5	490.3	80,545	24.45
2000	4,709,472	166,475,900	234.1	2178.4	347.5	95,294	16.97
2005	4,663,679	164,225,200	149.6	1284.4	246.8	95,231	15.13
2007	4,742,242	167,109,980	128.6	1087.4	220.6	98,753	14.54
2010	5,024,152	171,597,970	114.4	934.3	195.0	103,886	13.99
2014	5,426,317	181,193,380	96.9	745.4	154.0	110,150	13.44
2017	5,621,512	188,394,240	84.5	612.5	129.5	116,571	13.09
2020	5,754,138	195,584,690	74.7	510.7	111.9	122,008	13.01
2023	5,893,057	202,578,720	68.6	441.8	100.3	127,438	13.13

San Francisco Summer Episodic On-Road Motor Vehicle Inventories Re VMT Matched FB LD HD
(Calculated Using EMFAC2010 ver 2.5041)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,926,764	141,436,530	538.5	5140.5	498.3	82,069	24.26
2000	4,702,158	170,357,330	230.5	2186.2	347.5	93,112	17.02
2005	4,740,305	174,199,680	147.2	1277.6	260.0	97,337	15.54
2007	4,816,329	175,699,760	127.7	1090.1	230.4	99,628	15.02
2010	4,992,611	175,105,090	110.8	905.8	195.3	98,995	14.21
2014	5,256,748	180,757,220	90.5	692.3	149.8	102,102	13.56
2017	5,345,382	184,993,810	76.2	542.9	121.9	104,552	13.05
2020	5,392,182	189,232,540	65.0	432.6	101.2	107,003	12.86
2023	5,463,724	193,470,030	57.7	355.3	86.9	109,632	12.86

Difference (Ver. 2.5041 - Ver. 2.5023) in San Francisco Bay Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-5,336	3,200,370	7.3	142.0	8.0	1,524	-0.19
2000	-7,314	3,881,430	-3.6	7.8	0.0	-2,182	0.05
2005	76,626	9,974,480	-2.4	-6.8	13.2	2,106	0.41
2007	74,087	8,589,780	-0.9	2.7	9.8	875	0.48
2010	-31,541	3,507,120	-3.6	-28.5	0.3	-4,891	0.22
2014	-169,569	-436,160	-6.4	-53.1	-4.2	-8,048	0.12
2017	-276,130	-3,400,430	-8.3	-69.6	-7.6	-12,019	-0.04
2020	-361,956	-6,352,150	-9.7	-78.1	-10.7	-15,006	-0.15
2023	-429,333	-9,108,690	-10.9	-86.5	-13.4	-17,806	-0.27

Percentage Change in San Francisco Bay Emission Inventories (relative to Ver. 2.5023)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-0.14%	2.32%	1.37%	2.84%	1.64%	1.89%	-0.77%
2000	-0.16%	2.33%	-1.53%	0.36%	-0.01%	-2.29%	0.32%
2005	1.64%	6.07%	-1.61%	-0.53%	5.33%	2.21%	2.71%
2007	1.56%	5.14%	-0.73%	0.25%	4.42%	0.89%	3.32%
2010	-0.63%	2.04%	-3.19%	-3.05%	0.13%	-4.71%	1.55%
2014	-3.12%	-0.24%	-6.57%	-7.12%	-2.71%	-7.31%	0.86%
2017	-4.91%	-1.80%	-9.88%	-11.36%	-5.87%	-10.31%	-0.28%
2020	-6.29%	-3.25%	-12.98%	-15.30%	-9.58%	-12.30%	-1.15%
2023	-7.29%	-4.50%	-15.94%	-19.57%	-13.39%	-13.97%	-2.08%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-77. Impact on San Joaquin Valley Air Basin Inventory of Change 12.13

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5023)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,378,730	58,052,672	229.7	2405.6	329.7	43,532	23.36
2000	1,925,682	82,513,360	112.3	1134.9	345.2	57,681	13.74
2005	2,101,642	88,853,616	80.5	728.9	273.4	62,164	13.43
2007	2,223,821	93,314,824	73.5	656.7	250.2	65,958	12.97
2010	2,493,321	98,407,960	71.1	612.7	223.0	70,222	12.16
2014	2,852,481	107,711,920	66.1	544.1	178.4	77,480	11.51
2017	3,115,978	116,216,310	61.4	482.0	153.0	84,089	10.88
2020	3,309,581	124,193,740	56.3	421.5	133.0	90,244	10.64
2023	3,430,952	131,662,410	51.4	355.9	117.9	95,735	10.54

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories Re VMT Matched FB LD HD
(Calculated Using EMFAC2010 ver 2.5041)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,360,512	57,189,940	230.2	2430.5	327.0	43,383	22.43
2000	1,904,122	81,665,680	111.7	1129.0	337.2	57,322	13.50
2005	2,133,798	91,497,808	82.1	743.5	289.0	65,930	13.88
2007	2,267,481	96,045,520	74.9	668.9	260.2	69,091	13.28
2010	2,493,775	98,289,208	70.3	605.1	211.8	69,123	11.71
2014	2,824,995	106,825,710	64.4	527.0	168.6	75,788	11.20
2017	3,054,319	114,866,860	59.2	456.1	145.7	82,593	10.88
2020	3,226,845	122,597,250	53.1	389.0	123.5	88,297	10.67
2023	3,337,928	130,114,810	47.7	318.0	106.3	93,507	10.61

Difference (Ver. 2.5041 - Ver. 2.5023) in San Joaquin Valley Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-18,218	-862,732	0.5	24.9	-2.7	-149	-0.93
2000	-21,560	-847,680	-0.6	-5.9	-8.0	-359	-0.24
2005	32,156	2,644,192	1.6	14.6	15.6	3,766	0.45
2007	43,660	2,730,696	1.4	12.2	10.0	3,133	0.31
2010	454	-118,752	-0.8	-7.6	-11.2	-1,099	-0.45
2014	-27,486	-886,210	-1.7	-17.1	-9.8	-1,692	-0.31
2017	-61,659	-1,349,450	-2.2	-25.9	-7.3	-1,496	0.00
2020	-82,736	-1,596,490	-3.2	-32.5	-9.5	-1,947	0.03
2023	-93,024	-1,547,600	-3.7	-37.9	-11.6	-2,228	0.07

Percentage Change in San Joaquin Valley Emission Inventories (relative to Ver. 2.5023)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-1.32%	-1.49%	0.24%	1.03%	-0.82%	-0.34%	-3.97%
2000	-1.12%	-1.03%	-0.52%	-0.52%	-2.32%	-0.62%	-1.74%
2005	1.53%	2.98%	2.01%	2.00%	5.71%	6.06%	3.37%
2007	1.96%	2.93%	1.97%	1.85%	3.98%	4.75%	2.37%
2010	0.02%	-0.12%	-1.15%	-1.24%	-5.03%	-1.56%	-3.69%
2014	-0.96%	-0.82%	-2.55%	-3.15%	-5.49%	-2.18%	-2.67%
2017	-1.98%	-1.16%	-3.59%	-5.37%	-4.76%	-1.78%	-0.03%
2020	-2.50%	-1.29%	-5.68%	-7.71%	-7.16%	-2.16%	0.24%
2023	-2.71%	-1.18%	-7.16%	-10.65%	-9.85%	-2.33%	0.66%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-78. Impact on South Coast Air Basin Inventory of Change 12.13

South Coast Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.5023)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,537,252	264,378,460	958.8	9212.1	902.3	162,405	46.15
2000	8,885,995	315,646,460	390.5	3837.3	651.1	182,423	31.90
2005	9,547,117	340,782,370	249.1	2345.5	475.7	193,041	30.44
2007	9,907,570	354,557,890	215.1	2009.8	429.3	201,968	29.78
2010	10,537,439	365,239,680	185.0	1685.7	379.6	209,404	28.71
2014	11,072,440	377,542,340	146.4	1281.8	301.7	219,670	27.45
2017	11,422,400	389,182,020	125.2	1049.2	257.7	230,012	26.80
2020	11,709,370	400,561,150	110.1	888.9	225.5	239,553	26.52
2023	11,886,466	407,786,080	100.1	778.1	204.9	248,366	26.50

South Coast Summer Episodic On-Road Motor Vehicle Inventories Re VMT Matched FB LD HD
(Calculated Using EMFAC2010 ver 2.5041)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,571,598	265,998,580	968.7	9386.1	888.2	162,224	42.97
2000	8,920,368	316,923,010	392.8	3886.7	624.0	181,241	30.54
2005	9,929,820	358,652,290	261.0	2460.2	514.8	207,806	31.67
2007	10,070,007	362,891,810	219.0	2042.4	442.1	209,078	30.06
2010	10,528,747	365,448,830	182.6	1655.3	355.6	207,479	27.64
2014	11,020,486	376,985,500	143.0	1234.5	287.9	216,555	27.21
2017	11,338,318	388,208,510	120.5	985.6	243.3	225,020	26.89
2020	11,605,638	399,393,310	104.0	806.1	206.4	232,307	26.81
2023	11,783,338	406,889,700	92.6	672.9	178.5	238,864	26.82

Difference (Ver. 2.5041 - Ver. 2.5023) in South Coast Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	34,346	1,620,120	9.9	174.0	-14.1	-181	-3.18
2000	34,373	1,276,550	2.3	49.4	-27.1	-1,182	-1.36
2005	382,703	17,869,920	11.9	114.7	39.1	14,765	1.23
2007	162,437	8,333,920	3.9	32.6	12.8	7,110	0.28
2010	-8,692	209,150	-2.4	-30.4	-24.0	-1,925	-1.07
2014	-51,954	-556,840	-3.4	-47.3	-13.8	-3,116	-0.24
2017	-84,082	-973,510	-4.7	-63.6	-14.4	-4,992	0.09
2020	-103,732	-1,167,840	-6.1	-82.8	-19.1	-7,246	0.29
2023	-103,128	-896,380	-7.5	-105.2	-26.4	-9,503	0.32

Percentage Change in South Coast Emission Inventories (relative to Ver. 2.5023)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.46%	0.61%	1.03%	1.89%	-1.56%	-0.11%	-6.89%
2000	0.39%	0.40%	0.59%	1.29%	-4.16%	-0.65%	-4.27%
2005	4.01%	5.24%	4.76%	4.89%	8.22%	7.65%	4.05%
2007	1.64%	2.35%	1.80%	1.62%	2.98%	3.52%	0.93%
2010	-0.08%	0.06%	-1.31%	-1.80%	-6.31%	-0.92%	-3.74%
2014	-0.47%	-0.15%	-2.31%	-3.69%	-4.58%	-1.42%	-0.87%
2017	-0.74%	-0.25%	-3.72%	-6.06%	-5.59%	-2.17%	0.35%
2020	-0.89%	-0.29%	-5.53%	-9.32%	-8.46%	-3.02%	1.08%
2023	-0.87%	-0.22%	-7.54%	-13.52%	-12.90%	-3.83%	1.21%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type Using Populations

12.14 MISCELLANEOUS SURVIVAL RATE AND NEW VEHICLE SALES ADJUSTMENT

Please refer to Section 3.3.2. In addition to the survival rate adjustments, a cap was removed limiting the rate of new vehicle sales. That is, new vehicle sales were limited to no more than a 10% increase from the previous year. Because the base year, 2009 was a very low sales year, this limit was causing anomalies in the age distributions. This generally reduces emissions by allowing more new vehicles to enter the fleet, which generally have lower emission rates.

Table 12-79. Impact on Statewide Inventory of Change 12.14

Statewide Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.50.41)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,391,380	686,190,590	2,568	25,774	2,554	427,867	133.40
2000	22,080,430	838,198,140	1,088	10,883	1,983	491,115	89.99
2005	23,867,536	916,943,680	719	6,696	1,584	546,922	90.61
2007	24,564,360	939,992,190	628	5,788	1,409	562,064	87.50
2010	26,094,882	954,860,220	554	4,942	1,177	564,727	81.02
2014	27,924,486	999,837,570	462	3,923	941	596,149	78.67
2017	28,952,354	1,039,317,600	400	3,212	796	624,114	76.80
2020	29,729,388	1,078,534,500	349	2,658	677	649,418	76.30
2023	30,293,924	1,113,356,000	310	2,192	586	673,595	76.58

Statewide Summer Episodic On-Road Motor Vehicle Inventories w Dynamic Population/07 Survivals exc PC/LT2
(Calculated Using EMFAC2011 ver 2.50.45)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	17,772,142	660,221,950	2,556	25,044	2,452	411,831	127.17
2000	21,310,336	812,222,140	1,069	10,437	1,879	475,745	86.41
2005	23,126,388	889,263,170	699	6,458	1,522	530,563	87.46
2007	24,037,784	920,125,310	615	5,639	1,373	550,409	85.48
2010	25,632,786	954,863,490	527	4,698	1,147	563,878	80.53
2014	26,602,556	1,000,107,900	390	3,311	861	595,399	77.66
2017	27,483,390	1,039,511,200	321	2,604	702	624,383	75.82
2020	28,419,452	1,078,516,100	277	2,146	581	650,674	75.42
2023	29,314,482	1,113,351,200	253	1,879	501	675,619	75.85

Difference (Ver. 2.5044 - Ver. 2.5041) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-619,238	-25,968,640	-12.1	-729.7	-102.0	-16,036	-6.23
2000	-770,094	-25,976,000	-18.4	-446.0	-103.6	-15,370	-3.58
2005	-741,148	-27,680,510	-19.8	-238.1	-61.6	-16,359	-3.15
2007	-526,576	-19,866,880	-13.5	-149.0	-36.0	-11,655	-2.02
2010	-462,096	3,270	-27.1	-244.3	-29.1	-848	-0.49
2014	-1,321,930	270,330	-72.5	-611.8	-80.3	-750	-1.00
2017	-1,468,964	193,600	-78.5	-607.7	-93.6	268	-0.98
2020	-1,309,936	-18,400	-71.9	-511.6	-95.7	1,256	-0.88
2023	-979,442	-4,800	-57.8	-313.1	-84.7	2,025	-0.73

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.5041)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-3.37%	-3.78%	-0.47%	-2.83%	-3.99%	-3.75%	-4.67%
2000	-3.49%	-3.10%	-1.70%	-4.10%	-5.22%	-3.13%	-3.97%
2005	-3.11%	-3.02%	-2.75%	-3.56%	-3.89%	-2.99%	-3.48%
2007	-2.14%	-2.11%	-2.16%	-2.57%	-2.55%	-2.07%	-2.31%
2010	-1.77%	0.00%	-4.89%	-4.94%	-2.47%	-0.15%	-0.60%
2014	-4.73%	0.03%	-15.70%	-15.60%	-8.53%	-0.13%	-1.28%
2017	-5.07%	0.02%	-19.65%	-18.92%	-11.76%	0.04%	-1.28%
2020	-4.41%	0.00%	-20.61%	-19.25%	-14.13%	0.19%	-1.16%
2023	-3.23%	0.00%	-18.62%	-14.29%	-14.47%	0.30%	-0.96%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-80. Impact on Sacramento Valley Air Basin Inventory of Change12.14

Sacramento Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.50.41)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,343,634	51,658,632	219.5	2298.9	208.1	32,831	11.02
2000	1,600,770	64,021,716	90.8	928.9	172.4	38,760	7.44
2005	1,786,511	71,607,608	62.7	582.5	136.0	44,312	7.42
2007	1,863,163	73,436,584	56.2	513.3	123.2	45,662	7.21
2010	2,023,808	74,876,264	52.2	455.5	108.1	46,490	6.83
2014	2,241,985	79,746,664	45.9	379.1	85.7	49,472	6.52
2017	2,367,428	83,731,984	40.6	317.2	72.2	52,008	6.32
2020	2,446,532	87,438,952	35.6	262.5	61.8	54,193	6.29
2023	2,482,411	90,641,440	31.3	209.7	53.3	56,204	6.33

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2011 ver 2.50.45)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,274,816	48,658,028	215.4	2204.0	197.0	31,033	10.42
2000	1,518,151	60,879,456	89.7	892.2	163.1	37,013	7.07
2005	1,698,989	68,124,624	60.4	555.6	129.9	42,295	7.08
2007	1,817,064	71,630,616	55.0	499.7	120.2	44,610	7.03
2010	1,969,133	74,875,336	48.8	425.4	104.7	46,392	6.77
2014	2,065,937	80,023,600	35.6	295.2	75.7	49,471	6.40
2017	2,154,850	83,938,640	28.9	230.0	60.5	52,067	6.20
2020	2,246,959	87,433,544	24.8	188.7	50.1	54,284	6.18
2023	2,339,770	90,662,608	22.6	165.1	43.4	56,460	6.24

Difference (Ver. 2.5044 - Ver. 2.5041) in Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-68818	-3000604	-4.1	-95.0	-11.0	-1,798	-0.61
2000	-82619	-3142260	-1.1	-36.7	-9.3	-1,748	-0.37
2005	-87522	-3482984	-2.3	-26.9	-6.1	-2,017	-0.34
2007	-46099	-1805968	-1.2	-13.5	-3.0	-1,053	-0.17
2010	-54675	-928	-3.4	-30.1	-3.4	-98	-0.06
2014	-176048	276936	-10.3	-83.8	-9.9	-1	-0.12
2017	-212578	206656	-11.7	-87.2	-11.7	59	-0.12
2020	-199573	-5408	-10.9	-73.8	-11.7	91	-0.11
2023	-142641	21168	-8.7	-44.6	-10.0	257	-0.09

Percentage Change in Sacramento Emission Inventories (relative to Ver. 2.5041)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-5.12%	-5.81%	-1.86%	-4.13%	-5.30%	-5.48%	-5.51%
2000	-5.16%	-4.91%	-1.19%	-3.95%	-5.39%	-4.51%	-4.92%
2005	-4.90%	-4.86%	-3.73%	-4.63%	-4.51%	-4.55%	-4.56%
2007	-2.47%	-2.46%	-2.17%	-2.64%	-2.41%	-2.31%	-2.41%
2010	-2.70%	0.00%	-6.56%	-6.61%	-3.11%	-0.21%	-0.88%
2014	-7.85%	0.35%	-22.44%	-22.12%	-11.60%	0.00%	-1.77%
2017	-8.98%	0.25%	-28.73%	-27.49%	-16.18%	0.11%	-1.87%
2020	-8.16%	-0.01%	-30.46%	-28.12%	-18.96%	0.17%	-1.81%
2023	-5.75%	0.02%	-27.77%	-21.29%	-18.66%	0.46%	-1.42%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-81. Impact on San Diego Air Basin Inventory of Change 12.14

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.50.41)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,604,708	59,061,544	221.3	2266.3	200.2	37,630	9.42
2000	1,919,750	73,521,104	82.6	858.4	136.9	41,092	6.76
2005	2,061,644	79,028,376	52.4	522.0	100.6	44,606	6.59
2007	2,149,164	81,902,376	46.6	459.7	93.5	46,975	6.54
2010	2,278,918	82,599,080	41.2	390.0	78.6	46,826	6.11
2014	2,426,912	85,887,064	34.2	306.0	62.5	48,832	5.98
2017	2,470,420	88,353,024	28.7	243.5	51.8	50,247	5.88
2020	2,509,912	90,818,672	24.6	198.6	43.8	51,727	5.89
2023	2,586,244	94,608,376	21.9	167.8	38.2	54,041	6.03

San Diego Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2011 ver 2.50.45)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,567,046	57,477,284	221	2217	195	36,660	9.16
2000	1,874,501	72,232,144	81	829	132	40,390	6.59
2005	2,013,087	77,339,664	51	507	98	43,693	6.44
2007	2,098,513	80,059,032	45	447	91	45,950	6.38
2010	2,240,420	82,599,296	39	373	77	46,753	6.08
2014	2,327,605	85,886,136	30	266	58	48,809	5.91
2017	2,391,866	88,352,776	25	211	47	50,393	5.83
2020	2,457,305	90,816,720	22	175	39	51,933	5.84
2023	2,551,118	94,602,256	20	156	34	54,250	5.99

Difference (Ver. 2.5044 - Ver. 2.5041) in Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-37,662	-1,584,260	0.2	-49.0	-5.4	-969	-0.27
2000	-45,249	-1,288,960	-1.4	-29.3	-5.3	-702	-0.16
2005	-48,557	-1,688,712	-1.2	-15.1	-2.9	-913	-0.16
2007	-50,651	-1,843,344	-1.2	-13.0	-2.5	-1,025	-0.15
2010	-38,498	216	-1.8	-17.0	-1.9	-73	-0.03
2014	-99,307	-928	-4.3	-39.5	-5.0	-23	-0.06
2017	-78,554	-248	-3.6	-32.2	-4.9	145	-0.05
2020	-52,607	-1,952	-2.6	-23.4	-4.6	206	-0.04
2023	-35,126	-6,120	-1.7	-11.6	-4.0	209	-0.04

Percentage Change in San Diego Emission Inventories (relative to Ver. 2.5041)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-2.35%	-2.68%	0.08%	-2.16%	-2.70%	-2.58%	-2.82%
2000	-2.36%	-1.75%	-1.74%	-3.42%	-3.88%	-1.71%	-2.44%
2005	-2.36%	-2.14%	-2.29%	-2.89%	-2.88%	-2.05%	-2.36%
2007	-2.36%	-2.25%	-2.59%	-2.82%	-2.63%	-2.18%	-2.33%
2010	-1.69%	0.00%	-4.34%	-4.37%	-2.44%	-0.16%	-0.53%
2014	-4.09%	0.00%	-12.45%	-12.91%	-8.00%	-0.05%	-1.06%
2017	-3.18%	0.00%	-12.51%	-13.22%	-9.50%	0.29%	-0.89%
2020	-2.10%	0.00%	-10.67%	-11.79%	-10.42%	0.40%	-0.75%
2023	-1.36%	-0.01%	-7.64%	-6.93%	-10.38%	0.39%	-0.64%

ROG_Tot[1] - This includes running, starting, idling and evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-82. Impact on San Francisco Bay Air Basin Inventory of Change 12.14

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.50.41)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,926,764	141,436,530	538.5	5140.5	498.3	82,069	24.26
2000	4,702,158	170,357,330	230.5	2186.2	347.5	93,112	17.02
2005	4,740,305	174,199,680	147.2	1277.6	260.0	97,337	15.54
2007	4,816,329	175,699,760	127.7	1090.1	230.4	99,628	15.02
2010	4,992,611	175,105,090	110.8	905.8	195.3	98,995	14.21
2014	5,256,748	180,757,220	90.5	692.3	149.8	102,102	13.56
2017	5,345,382	184,993,810	76.2	542.9	121.9	104,552	13.05
2020	5,392,182	189,232,540	65.0	432.6	101.2	107,003	12.86
2023	5,463,724	193,470,030	57.7	355.3	86.9	109,632	12.86

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2011 ver 2.50.45)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,791,482	136,096,320	544.2	5014.7	478.6	79,054	23.12
2000	4,539,164	165,382,590	230.0	2094.3	327.7	90,395	16.35
2005	4,573,979	168,301,140	143.7	1224.3	247.8	94,019	14.91
2007	4,731,008	172,683,570	125.9	1065.4	224.5	97,907	14.71
2010	4,915,308	175,104,750	105.6	867.8	191.0	98,854	14.11
2014	5,039,932	180,753,710	77.1	602.0	138.6	101,887	13.37
2017	5,147,419	184,990,540	63.1	466.6	110.5	104,573	12.90
2020	5,264,958	189,228,260	54.4	379.9	90.9	107,236	12.73
2023	5,390,386	193,460,990	49.6	330.4	78.4	109,886	12.75

Difference (Ver. 2.5044 - Ver. 2.5041) in Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-135,282	-5,340,210	5.7	-125.8	-19.8	-3,016	-1.14
2000	-162,994	-4,974,740	-0.5	-91.8	-19.8	-2,717	-0.67
2005	-166,326	-5,898,540	-3.5	-53.3	-12.1	-3,318	-0.63
2007	-85,321	-3,016,190	-1.8	-24.8	-5.8	-1,722	-0.32
2010	-77,303	-340	-5.1	-38.0	-4.3	-142	-0.09
2014	-216,816	-3,510	-13.5	-90.3	-11.2	-215	-0.18
2017	-197,963	-3,270	-13.0	-76.4	-11.4	21	-0.16
2020	-127,224	-4,280	-10.6	-52.7	-10.2	233	-0.13
2023	-73,338	-9,040	-8.1	-24.9	-8.5	253	-0.11

Percentage Change in San Francisco Bay Emission Inventories (relative to Ver. 2.5041)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-3.45%	-3.78%	1.05%	-2.45%	-3.96%	-3.67%	-4.69%
2000	-3.47%	-2.92%	-0.24%	-4.20%	-5.70%	-2.92%	-3.95%
2005	-3.51%	-3.39%	-2.38%	-4.17%	-4.67%	-3.41%	-4.02%
2007	-1.77%	-1.72%	-1.39%	-2.27%	-2.52%	-1.73%	-2.11%
2010	-1.55%	0.00%	-4.62%	-4.20%	-2.20%	-0.14%	-0.66%
2014	-4.12%	0.00%	-14.88%	-13.05%	-7.47%	-0.21%	-1.34%
2017	-3.70%	0.00%	-17.08%	-14.06%	-9.32%	0.02%	-1.21%
2020	-2.36%	0.00%	-16.27%	-12.18%	-10.12%	0.22%	-1.00%
2023	-1.34%	0.00%	-14.02%	-7.01%	-9.76%	0.23%	-0.82%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear

Fuel[3] - VMT Matching by Fuel Type

Table 12-83. Impact on San Joaquin Valley Air Basin Inventory of Change 12.14

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.50.41)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,360,512	57,189,940	230.2	2430.5	327.0	43,383	22.43
2000	1,904,122	81,665,680	111.7	1129.0	337.2	57,322	13.50
2005	2,133,798	91,497,808	82.1	743.5	289.0	65,930	13.88
2007	2,267,481	96,045,520	74.9	668.9	260.2	69,091	13.28
2010	2,493,775	98,289,208	70.3	605.1	211.8	69,123	11.71
2014	2,824,995	106,825,710	64.4	527.0	168.6	75,788	11.20
2017	3,054,319	114,866,860	59.2	456.1	145.7	82,593	10.88
2020	3,226,845	122,597,250	53.1	389.0	123.5	88,297	10.67
2023	3,337,928	130,114,810	47.7	318.0	106.3	93,507	10.61

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2011 ver 2.50.45)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,279,267	53,535,128	222.6	2304.9	306.8	40,717	21.02
2000	1,789,931	77,188,680	106.5	1056.8	315.0	54,226	12.70
2005	2,026,420	87,160,304	78.2	705.6	274.8	62,912	13.22
2007	2,197,510	93,262,648	72.5	647.0	252.3	67,147	12.88
2010	2,412,169	98,288,880	65.3	559.8	206.7	68,940	11.63
2014	2,552,338	106,823,070	49.1	395.7	153.4	75,435	11.00
2017	2,704,630	114,862,440	41.0	314.0	127.4	82,350	10.66
2020	2,872,522	122,591,290	35.6	262.4	104.7	88,293	10.47
2023	3,047,654	130,107,720	32.6	233.6	89.7	93,786	10.45

Difference (Ver. 2.5044 - Ver. 2.5041) in Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-81,245	-3,654,812	-7.6	-125.6	-20.2	-2,665	-1.41
2000	-114,191	-4,477,000	-5.2	-72.2	-22.2	-3,096	-0.81
2005	-107,378	-4,337,504	-3.9	-37.8	-14.2	-3,018	-0.67
2007	-69,971	-2,782,872	-2.4	-21.9	-7.9	-1,944	-0.39
2010	-81,606	-328	-5.0	-45.3	-5.1	-183	-0.08
2014	-272,657	-2,640	-15.3	-131.3	-15.2	-353	-0.20
2017	-349,689	-4,420	-18.2	-142.1	-18.3	-244	-0.21
2020	-354,323	-5,960	-17.5	-126.7	-18.8	-5	-0.19
2023	-290,274	-7,090	-15.1	-84.4	-16.6	279	-0.16

Percentage Change in San Joaquin Valley Emission Inventories (relative to Ver. 2.5041)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-5.97%	-6.39%	-3.32%	-5.17%	-6.17%	-6.14%	-6.30%
2000	-6.00%	-5.48%	-4.64%	-6.39%	-6.59%	-5.40%	-5.97%
2005	-5.03%	-4.74%	-4.77%	-5.09%	-4.91%	-4.58%	-4.80%
2007	-3.09%	-2.90%	-3.20%	-3.27%	-3.03%	-2.81%	-2.96%
2010	-3.27%	0.00%	-7.12%	-7.49%	-2.39%	-0.27%	-0.71%
2014	-9.65%	0.00%	-23.79%	-24.91%	-9.00%	-0.47%	-1.80%
2017	-11.45%	0.00%	-30.76%	-31.16%	-12.56%	-0.30%	-1.97%
2020	-10.98%	0.00%	-32.92%	-32.56%	-15.23%	-0.01%	-1.83%
2023	-8.70%	-0.01%	-31.74%	-26.54%	-15.61%	0.30%	-1.54%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-84. Impact on South Coast Air Basin Inventory of Change 12.14

South Coast Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.50.41)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,571,598	265,998,580	968.7	9386.1	888.2	162,224	42.97
2000	8,920,368	316,923,010	392.8	3886.7	624.0	181,241	30.54
2005	9,929,820	358,652,290	261.0	2460.2	514.8	207,806	31.67
2007	10,070,007	362,891,810	219.0	2042.4	442.1	209,078	30.06
2010	10,528,747	365,448,830	182.6	1655.3	355.6	207,479	27.64
2014	11,020,486	376,985,500	143.0	1234.5	287.9	216,555	27.21
2017	11,338,318	388,208,510	120.5	985.6	243.3	225,020	26.89
2020	11,605,638	399,393,310	104.0	806.1	206.4	232,307	26.81
2023	11,783,338	406,889,700	92.6	672.9	178.5	238,864	26.82

South Coast Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2011 ver 2.50.45)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,369,264	258,397,090	964.2	9205.9	865.1	157,885	41.65
2000	8,667,431	309,433,410	383.4	3740.7	601.1	177,195	29.73
2005	9,686,220	350,403,970	254.2	2385.4	501.1	203,355	30.93
2007	9,860,916	355,615,360	213.9	1989.7	432.7	205,147	29.48
2010	10,426,589	365,454,110	177.3	1606.0	349.2	207,360	27.54
2014	10,797,710	376,983,170	132.5	1143.0	272.8	216,712	27.06
2017	11,105,086	388,201,180	109.9	902.5	225.1	225,360	26.75
2020	11,412,823	399,391,550	94.9	740.7	186.7	232,701	26.67
2023	11,644,727	406,887,300	85.9	641.8	160.3	239,156	26.70

Difference (Ver. 2.5044 - Ver. 2.5041) in Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-202,334	-7,601,490	-4.6	-180.2	-23.1	-4,339	-1.32
2000	-252,937	-7,489,600	-9.5	-146.0	-22.9	-4,046	-0.81
2005	-243,600	-8,248,320	-6.8	-74.9	-13.7	-4,450	-0.74
2007	-209,091	-7,276,450	-5.1	-52.6	-9.4	-3,931	-0.58
2010	-102,158	5,280	-5.3	-49.4	-6.4	-119	-0.10
2014	-222,776	-2,330	-10.5	-91.5	-15.0	158	-0.15
2017	-233,232	-7,330	-10.6	-83.1	-18.2	340	-0.15
2020	-192,815	-1,760	-9.2	-65.3	-19.7	394	-0.14
2023	-138,611	-2,400	-6.7	-31.1	-18.2	292	-0.12

Percentage Change in South Coast Emission Inventories (relative to Ver. 2.5041)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-2.67%	-2.86%	-0.47%	-1.92%	-2.60%	-2.67%	-3.08%
2000	-2.84%	-2.36%	-2.41%	-3.76%	-3.67%	-2.23%	-2.66%
2005	-2.45%	-2.30%	-2.59%	-3.04%	-2.67%	-2.14%	-2.33%
2007	-2.08%	-2.01%	-2.32%	-2.58%	-2.12%	-1.88%	-1.93%
2010	-0.97%	0.00%	-2.90%	-2.98%	-1.81%	-0.06%	-0.36%
2014	-2.02%	0.00%	-7.34%	-7.41%	-5.23%	0.07%	-0.57%
2017	-2.06%	0.00%	-8.82%	-8.43%	-7.49%	0.15%	-0.54%
2020	-1.66%	0.00%	-8.80%	-8.10%	-9.55%	0.17%	-0.51%
2023	-1.18%	0.00%	-7.22%	-4.62%	-10.19%	0.12%	-0.45%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear

Fuel[3] - VMT Matching by Fuel Type Using Populations

12.15 REMOVAL OF HEAVY DUTY TRUCKS

Please refer to Section 4. These incremental emissions document how the EMFAC model responds as the heavy duty fleet is removed from EMFAC to the truck model. As expected, this significantly reduces the NOx and PM inventories. Areas with higher truck VMT are disproportionately affected.

Table 12-85. Impact on Statewide Inventory of Change 12.15

Statewide Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2011 ver 2.50.45)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	17,772,142	660,221,950	2,556	25,044	2,452	411,831	127.17
2000	21,310,336	812,222,140	1,069	10,437	1,879	475,745	86.41
2005	23,126,388	889,263,170	699	6,458	1,522	530,563	87.46
2007	24,037,784	920,125,310	615	5,639	1,373	550,409	85.48
2010	25,632,786	954,863,490	527	4,698	1,147	563,878	80.53
2014	26,602,556	1,000,107,900	390	3,311	861	595,399	77.66
2017	27,483,390	1,039,511,200	321	2,604	702	624,383	75.82
2020	28,419,452	1,078,516,100	277	2,146	581	650,674	75.42
2023	29,314,482	1,113,351,200	253	1,879	501	675,619	75.85
Statewide Summer Episodic On-Road Motor Vehicle Inventories Remove HD Diesel Populations (Calculated Using EMFAC2011 ver 2.50.50)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	17,402,036	627,215,300	2,432	24,325	1,788	349,011	62.53
2000	20,918,632	772,769,920	1,031	10,380	1,061	403,712	54.83
2005	22,628,922	844,379,140	653	6,267	753	450,852	53.63
2007	23,529,334	874,683,840	573	5,475	679	469,678	53.71
2010	25,124,892	911,216,640	493	4,573	598	486,812	54.08
2014	26,007,884	949,234,750	361	3,199	450	505,994	54.14
2017	26,820,658	982,844,990	295	2,499	370	524,749	55.42
2020	27,702,826	1,017,386,400	254	2,049	312	543,466	57.12
2023	28,553,862	1,048,442,400	231	1,786	273	561,739	58.83
Difference (Ver. 2.5050 - Ver. 2.5045) in Statewide Emission Inventories (tons per day)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	-370,106	-33,006,650	-124.2	-718.5	-664.5	-62,820	-64.64
2000	-391,704	-39,452,220	-38.2	-56.2	-818.3	-72,033	-31.59
2005	-497,466	-44,884,030	-46.7	-191.0	-769.4	-79,711	-33.83
2007	-508,450	-45,441,470	-41.9	-163.6	-694.1	-80,732	-31.76
2010	-507,894	-43,646,850	-34.1	-124.6	-549.7	-77,067	-26.45
2014	-594,672	-50,873,150	-28.7	-112.3	-410.9	-89,405	-23.53
2017	-662,732	-56,666,210	-25.9	-104.9	-332.1	-99,634	-20.40
2020	-716,626	-61,129,700	-23.6	-97.6	-269.3	-107,208	-18.30
2023	-760,620	-64,908,800	-21.9	-92.6	-227.6	-113,881	-17.02
Percentage Change in Statewide Emission Inventories (relative to Ver. 2.5045)							
Cal. Year	**Population**	**VMT**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	-2.08%	-5.00%	-4.86%	-2.87%	-27.10%	-15.25%	-50.83%
2000	-1.84%	-4.86%	-3.58%	-0.54%	-43.54%	-15.14%	-36.55%
2005	-2.15%	-5.05%	-6.68%	-2.96%	-50.54%	-15.02%	-38.68%
2007	-2.12%	-4.94%	-6.81%	-2.90%	-50.55%	-14.67%	-37.16%
2010	-1.98%	-4.57%	-6.46%	-2.65%	-47.90%	-13.67%	-32.85%
2014	-2.24%	-5.09%	-7.38%	-3.39%	-47.74%	-15.02%	-30.29%
2017	-2.41%	-5.45%	-8.08%	-4.03%	-47.31%	-15.96%	-26.91%
2020	-2.52%	-5.67%	-8.51%	-4.55%	-46.31%	-16.48%	-24.27%
2023	-2.59%	-5.83%	-8.68%	-4.93%	-45.42%	-16.86%	-22.44%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from evaporative processes.
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.
Fuel[3] - VMT Matching by Fuel Type

Table 12-86. Impact on Sacramento Valley Air Basin Inventory of Change 12.15

Sacramento Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.50.45)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,274,816	48,658,028	215.4	2204.0	197.0	31,033	10.42
2000	1,518,151	60,879,456	89.7	892.2	163.1	37,013	7.07
2005	1,698,989	68,124,624	60.4	555.6	129.9	42,295	7.08
2007	1,817,064	71,630,616	55.0	499.7	120.2	44,610	7.03
2010	1,969,133	74,875,336	48.8	425.4	104.7	46,392	6.77
2014	2,065,937	80,023,600	35.6	295.2	75.7	49,471	6.40
2017	2,154,850	83,938,640	28.9	230.0	60.5	52,067	6.20
2020	2,246,959	87,433,544	24.8	188.7	50.1	54,284	6.18
2023	2,339,770	90,662,608	22.6	165.1	43.4	56,460	6.24

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2011 ver 2.50.50)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,237,256	45,631,808	201.9	2095.9	137.2	25,413	4.49
2000	1,479,047	56,912,088	85.6	879.2	82.0	29,786	3.93
2005	1,656,074	64,188,484	56.3	537.5	63.2	35,259	4.11
2007	1,772,208	67,571,552	51.4	485.1	59.1	37,373	4.20
2010	1,921,162	70,735,288	45.6	413.2	53.6	39,064	4.28
2014	2,013,171	75,488,296	33.0	285.1	40.1	41,476	4.36
2017	2,098,532	79,107,024	26.7	221.1	32.9	43,552	4.51
2020	2,186,689	82,271,032	22.8	180.5	27.6	45,201	4.66
2023	2,275,619	85,172,008	20.8	157.4	24.0	46,802	4.81

Difference (Ver. 2.5050 - Ver. 2.5045) in Sacramento Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-37560	-3026220	-13.5	-108.1	-59.9	-5,620	-5.93
2000	-39104	-3967368	-4.2	-13.0	-81.1	-7,226	-3.14
2005	-42915	-3936140	-4.1	-18.1	-66.7	-7,035	-2.97
2007	-44856	-4059064	-3.7	-14.6	-61.1	-7,237	-2.83
2010	-47971	-4140048	-3.2	-12.2	-51.2	-7,329	-2.49
2014	-52766	-4535304	-2.6	-10.1	-35.6	-7,996	-2.04
2017	-56318	-4831616	-2.2	-8.9	-27.7	-8,516	-1.69
2020	-60270	-5162512	-2.0	-8.1	-22.5	-9,084	-1.52
2023	-64151	-5490600	-1.9	-7.7	-19.4	-9,658	-1.43

Percentage Change in Sacramento Emission Inventories (relative to Ver. 2.5045)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-2.95%	-6.22%	-6.25%	-4.90%	-30.39%	-18.11%	-56.90%
2000	-2.58%	-6.52%	-4.62%	-1.45%	-49.73%	-19.52%	-44.36%
2005	-2.53%	-5.78%	-6.83%	-3.25%	-51.33%	-16.63%	-41.97%
2007	-2.47%	-5.67%	-6.66%	-2.93%	-50.85%	-16.22%	-40.24%
2010	-2.44%	-5.53%	-6.55%	-2.86%	-48.87%	-15.80%	-36.79%
2014	-2.55%	-5.67%	-7.20%	-3.42%	-47.05%	-16.16%	-31.86%
2017	-2.61%	-5.76%	-7.65%	-3.87%	-45.71%	-16.35%	-27.33%
2020	-2.68%	-5.90%	-8.03%	-4.31%	-44.87%	-16.73%	-24.67%
2023	-2.74%	-6.06%	-8.21%	-4.67%	-44.81%	-17.11%	-22.94%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from evaporative processes

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear

Fuel[3] - VMT Matching by Fuel Type

Table 12-87. Impact on San Diego Air Basin Inventory of Change 12.15

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.50.45)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,567,046	57,477,284	221.5	2217.3	194.8	36,660	9.16
2000	1,874,501	72,232,144	81.2	829.1	131.6	40,390	6.59
2005	2,013,087	77,339,664	51.2	506.9	97.7	43,693	6.44
2007	2,098,513	80,059,032	45.4	446.7	91.0	45,950	6.38
2010	2,240,420	82,599,296	39.4	373.0	76.7	46,753	6.08
2014	2,327,605	85,886,136	29.9	266.5	57.5	48,809	5.91
2017	2,391,866	88,352,776	25.1	211.3	46.9	50,393	5.83
2020	2,457,305	90,816,720	21.9	175.2	39.2	51,933	5.84
2023	2,551,118	94,602,256	20.2	156.2	34.2	54,250	5.99

San Diego Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2011 ver 2.50.50)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,545,039	55,695,720	215	2179	160	33,411	5.85
2000	1,849,785	70,049,760	79	827	88	36,489	4.79
2005	1,984,103	74,943,112	49	499	58	39,523	4.65
2007	2,067,644	77,550,736	43	439	53	41,609	4.68
2010	2,210,591	80,286,288	38	367	48	42,784	4.70
2014	2,293,489	83,253,688	29	261	36	44,319	4.70
2017	2,354,498	85,480,472	24	206	30	45,502	4.78
2020	2,416,712	87,704,976	21	171	25	46,648	4.89
2023	2,507,908	91,308,168	19	152	23	48,674	5.09

Difference (Ver. 2.5050 - Ver. 2.5045) in San Diego Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-22,007	-1,781,564	-6.6	-38.6	-34.6	-3,250	-3.31
2000	-24,716	-2,182,384	-2.0	-2.5	-43.4	-3,901	-1.80
2005	-28,984	-2,396,552	-2.1	-7.4	-40.1	-4,170	-1.78
2007	-30,869	-2,508,296	-2.1	-7.9	-37.5	-4,341	-1.70
2010	-29,829	-2,313,008	-1.7	-6.2	-29.0	-3,969	-1.38
2014	-34,116	-2,632,448	-1.4	-5.4	-21.3	-4,490	-1.21
2017	-37,368	-2,872,304	-1.2	-5.0	-16.9	-4,891	-1.04
2020	-40,593	-3,111,744	-1.1	-4.6	-13.8	-5,285	-0.95
2023	-43,210	-3,294,088	-1.0	-4.4	-11.7	-5,576	-0.90

Percentage Change in San Diego Emission Inventories (relative to Ver. 2.5045)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-1.40%	-3.10%	-2.97%	-1.74%	-17.75%	-8.86%	-36.15%
2000	-1.32%	-3.02%	-2.41%	-0.30%	-33.01%	-9.66%	-27.28%
2005	-1.44%	-3.10%	-4.13%	-1.46%	-41.11%	-9.54%	-27.71%
2007	-1.47%	-3.13%	-4.57%	-1.78%	-41.23%	-9.45%	-26.67%
2010	-1.33%	-2.80%	-4.22%	-1.66%	-37.76%	-8.49%	-22.72%
2014	-1.47%	-3.07%	-4.67%	-2.04%	-37.06%	-9.20%	-20.45%
2017	-1.56%	-3.25%	-4.95%	-2.35%	-36.09%	-9.71%	-17.92%
2020	-1.65%	-3.43%	-5.15%	-2.61%	-35.21%	-10.18%	-16.31%
2023	-1.69%	-3.48%	-5.19%	-2.80%	-34.11%	-10.28%	-15.01%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-88. Impact on San Francisco Bay Air Basin Inventory of Change 12.15

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.50.45)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,791,482	136,096,320	544.2	5014.7	478.6	79,054	23.12
2000	4,539,164	165,382,590	230.0	2094.3	327.7	90,395	16.35
2005	4,573,979	168,301,140	143.7	1224.3	247.8	94,019	14.91
2007	4,731,008	172,683,570	125.9	1065.4	224.5	97,907	14.71
2010	4,915,308	175,104,750	105.6	867.8	191.0	98,854	14.11
2014	5,039,932	180,753,710	77.1	602.0	138.6	101,887	13.37
2017	5,147,419	184,990,540	63.1	466.6	110.5	104,573	12.90
2020	5,264,958	189,228,260	54.4	379.9	90.9	107,236	12.73
2023	5,390,386	193,460,990	49.6	330.4	78.4	109,886	12.75

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2011 ver 2.50.50)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,736,332	131,079,910	527.4	4949.8	375.7	69,459	12.99
2000	4,482,899	159,858,610	225.6	2101.8	212.8	80,240	11.50
2005	4,508,814	162,538,700	137.6	1200.9	146.2	83,877	10.50
2007	4,661,293	166,557,410	120.1	1044.1	127.7	87,125	10.43
2010	4,838,772	168,633,490	100.4	849.0	107.5	87,619	10.20
2014	4,955,524	173,712,480	72.8	586.1	78.9	89,754	10.08
2017	5,057,204	177,521,460	59.4	452.3	64.0	91,712	10.17
2020	5,169,034	181,332,000	51.1	366.8	53.6	93,674	10.34
2023	5,288,756	185,137,150	46.5	318.1	47.0	95,625	10.54

Difference (Ver. 2.5050 - Ver. 2.5045) in San Francisco Bay Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-55,150	-5,016,410	-16.7	-64.9	-102.9	-9,595	-10.14
2000	-56,265	-5,523,980	-4.4	7.4	-114.9	-10,155	-4.85
2005	-65,165	-5,762,440	-6.1	-23.3	-101.6	-10,142	-4.42
2007	-69,715	-6,126,160	-5.8	-21.3	-96.8	-10,782	-4.27
2010	-76,536	-6,471,260	-5.2	-18.7	-83.5	-11,235	-3.91
2014	-84,408	-7,041,230	-4.3	-15.9	-59.7	-12,133	-3.30
2017	-90,215	-7,469,080	-3.7	-14.2	-46.6	-12,861	-2.73
2020	-95,924	-7,896,260	-3.4	-13.1	-37.3	-13,562	-2.40
2023	-101,630	-8,323,840	-3.1	-12.3	-31.4	-14,261	-2.21

Percentage Change in San Francisco Bay Emission Inventories (relative to Ver. 2.5045)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-1.45%	-3.69%	-3.07%	-1.29%	-21.51%	-12.14%	-43.83%
2000	-1.24%	-3.34%	-1.91%	0.35%	-35.05%	-11.23%	-29.64%
2005	-1.42%	-3.42%	-4.24%	-1.91%	-40.99%	-10.79%	-29.61%
2007	-1.47%	-3.55%	-4.59%	-2.00%	-43.11%	-11.01%	-29.06%
2010	-1.56%	-3.70%	-4.96%	-2.16%	-43.73%	-11.37%	-27.74%
2014	-1.67%	-3.90%	-5.56%	-2.64%	-43.06%	-11.91%	-24.66%
2017	-1.75%	-4.04%	-5.90%	-3.05%	-42.12%	-12.30%	-21.15%
2020	-1.82%	-4.17%	-6.17%	-3.45%	-41.03%	-12.65%	-18.83%
2023	-1.89%	-4.30%	-6.21%	-3.72%	-40.02%	-12.98%	-17.37%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-89. Impact on San Joaquin Valley Air Basin Inventory of Change 12.15

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.50.45)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,279,267	53,535,128	222.6	2304.9	306.8	40,717	21.02
2000	1,789,931	77,188,680	106.5	1056.8	315.0	54,226	12.70
2005	2,026,420	87,160,304	78.2	705.6	274.8	62,912	13.22
2007	2,197,510	93,262,648	72.5	647.0	252.3	67,147	12.88
2010	2,412,169	98,288,880	65.3	559.8	206.7	68,940	11.63
2014	2,552,338	106,823,070	49.1	395.7	153.4	75,435	11.00
2017	2,704,630	114,862,440	41.0	314.0	127.4	82,350	10.66
2020	2,872,522	122,591,290	35.6	262.4	104.7	88,293	10.47
2023	3,047,654	130,107,720	32.6	233.6	89.7	93,786	10.45

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2011 ver 2.50.50)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,216,824	45,962,660	197.2	2146.8	145.9	25,728	4.49
2000	1,718,132	67,534,608	96.5	1024.9	102.4	35,812	4.67
2005	1,939,609	76,538,128	66.8	657.3	79.3	42,956	4.90
2007	2,107,607	82,480,304	62.1	603.8	76.0	46,899	5.12
2010	2,322,059	87,957,792	56.6	526.0	68.3	49,650	5.29
2014	2,447,596	94,888,144	41.7	365.9	51.4	53,258	5.46
2017	2,583,723	101,152,060	34.1	285.7	42.5	56,891	5.73
2020	2,741,452	107,784,100	29.4	236.4	36.2	60,850	6.07
2023	2,907,917	114,356,040	26.8	209.3	32.0	64,612	6.43

Difference (Ver. 2.5050 - Ver. 2.5045) in San Joaquin Valley Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-62,443	-7,572,468	-25.4	-158.1	-161.0	-14,989	-16.53
2000	-71,799	-9,654,072	-10.0	-31.9	-212.6	-18,414	-8.02
2005	-86,811	-10,622,176	-11.4	-48.4	-195.5	-19,956	-8.32
2007	-89,903	-10,782,344	-10.5	-43.2	-176.3	-20,248	-7.76
2010	-90,110	-10,331,088	-8.7	-33.8	-138.5	-19,290	-6.34
2014	-104,742	-11,934,926	-7.4	-29.8	-102.0	-22,177	-5.55
2017	-120,907	-13,710,380	-6.9	-28.3	-84.9	-25,459	-4.93
2020	-131,070	-14,807,190	-6.2	-26.0	-68.5	-27,443	-4.40
2023	-139,737	-15,751,680	-5.7	-24.3	-57.7	-29,174	-4.02

Percentage Change in San Joaquin Valley Emission Inventories (relative to Ver. 2.5045)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-4.88%	-14.14%	-11.42%	-6.86%	-52.46%	-36.81%	-78.66%
2000	-4.01%	-12.51%	-9.42%	-3.02%	-67.50%	-33.96%	-63.18%
2005	-4.28%	-12.19%	-14.55%	-6.85%	-71.14%	-31.72%	-62.95%
2007	-4.09%	-11.56%	-14.45%	-6.68%	-69.86%	-30.15%	-60.23%
2010	-3.74%	-10.51%	-13.26%	-6.03%	-66.98%	-27.98%	-54.52%
2014	-4.10%	-11.17%	-15.11%	-7.54%	-66.48%	-29.40%	-50.41%
2017	-4.47%	-11.94%	-16.82%	-9.01%	-66.61%	-30.92%	-46.22%
2020	-4.56%	-12.08%	-17.48%	-9.91%	-65.40%	-31.08%	-41.99%
2023	-4.59%	-12.11%	-17.61%	-10.41%	-64.38%	-31.11%	-38.46%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-90. Impact on South Coast Air Basin Inventory of Change 12.15

South Coast Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.50.45)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,369,264	258,397,090	964.2	9205.9	865.1	157,885	41.65
2000	8,667,431	309,433,410	383.4	3740.7	601.1	177,195	29.73
2005	9,686,220	350,403,970	254.2	2385.4	501.1	203,355	30.93
2007	9,860,916	355,615,360	213.9	1989.7	432.7	205,147	29.48
2010	10,426,589	365,454,110	177.3	1606.0	349.2	207,360	27.54
2014	10,797,710	376,983,170	132.5	1143.0	272.8	216,712	27.06
2017	11,105,086	388,201,180	109.9	902.5	225.1	225,360	26.75
2020	11,412,823	399,391,550	94.9	740.7	186.7	232,701	26.67
2023	11,644,727	406,887,300	85.9	641.8	160.3	239,156	26.70

South Coast Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2011 ver 2.50.50)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,232,260	248,651,890	926.6	8963.6	678.7	140,024	25.09
2000	8,526,977	298,739,360	376.0	3739.5	394.8	158,722	21.53
2005	9,485,378	336,339,490	241.8	2323.9	275.8	179,695	21.23
2007	9,664,210	341,888,290	203.7	1943.6	236.6	182,018	20.73
2010	10,242,853	353,053,950	170.0	1577.3	201.1	186,573	20.61
2014	10,573,581	361,797,660	125.7	1115.0	152.9	191,281	20.40
2017	10,852,563	371,091,390	103.5	875.4	126.6	196,648	20.75
2020	11,138,933	380,855,680	88.9	715.0	106.9	201,716	21.24
2023	11,354,450	387,191,140	80.3	616.9	94.0	206,143	21.64

Difference (Ver. 2.5050 - Ver. 2.5045) in South Coast Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-137,004	-9,745,200	-37.6	-242.3	-186.4	-17,861	-16.56
2000	-140,454	-10,694,050	-7.3	-1.2	-206.3	-18,473	-8.20
2005	-200,842	-14,064,480	-12.4	-61.4	-225.3	-23,660	-9.71
2007	-196,706	-13,727,070	-10.2	-46.1	-196.1	-23,130	-8.74
2010	-183,736	-12,400,160	-7.3	-28.7	-148.1	-20,787	-6.93
2014	-224,129	-15,185,510	-6.8	-28.0	-119.9	-25,431	-6.65
2017	-252,523	-17,109,790	-6.4	-27.1	-98.5	-28,712	-6.00
2020	-273,890	-18,535,870	-5.9	-25.8	-79.8	-30,985	-5.43
2023	-290,277	-19,696,160	-5.6	-24.9	-66.2	-33,013	-5.07

Percentage Change in South Coast Emission Inventories (relative to Ver. 2.5045)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	-1.86%	-3.77%	-3.90%	-2.63%	-21.55%	-11.31%	-39.77%
2000	-1.62%	-3.46%	-1.91%	-0.03%	-34.31%	-10.43%	-27.58%
2005	-2.07%	-4.01%	-4.86%	-2.58%	-44.97%	-11.63%	-31.38%
2007	-1.99%	-3.86%	-4.76%	-2.32%	-45.32%	-11.27%	-29.66%
2010	-1.76%	-3.39%	-4.13%	-1.78%	-42.42%	-10.02%	-25.16%
2014	-2.08%	-4.03%	-5.16%	-2.45%	-43.95%	-11.73%	-24.60%
2017	-2.27%	-4.41%	-5.83%	-3.00%	-43.76%	-12.74%	-22.43%
2020	-2.40%	-4.64%	-6.25%	-3.48%	-42.72%	-13.32%	-20.36%
2023	-2.49%	-4.84%	-6.51%	-3.87%	-41.33%	-13.80%	-18.97%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type Using Populations

12.16 LIFETIME MILEAGE CALCULATIONS AND EVAPORATIVE I/M

Please refer to Section 3.3.4.3. Staff inadvertently left out the adjustment for evaporative I/M. This had the effect of overestimating the benefit for smog check areas. In general this change increases ROG emissions on the order of a couple percent.

Table 12-91. Impact on Statewide Inventory of Change 12.16

Statewide Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2011 ver 2.50.50)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	17,402,036	627,215,300	2,432	24,325	1,788	349,011	62.53
2000	20,918,632	772,769,920	1,031	10,380	1,061	403,712	54.83
2005	22,628,922	844,379,140	653	6,267	753	450,852	53.63
2007	23,529,334	874,683,840	573	5,475	679	469,678	53.71
2010	25,124,892	911,216,640	493	4,573	598	486,812	54.08
2014	26,007,884	949,234,750	361	3,199	450	505,994	54.14
2017	26,820,658	982,844,990	295	2,499	370	524,749	55.42
2020	27,702,826	1,017,386,400	254	2,049	312	543,466	57.12
2023	28,553,862	1,048,442,400	231	1,786	273	561,739	58.83

Statewide Summer Episodic On-Road LD Motor Vehicle Inventories with revised ODO/Fuel
(Calculated Using EMFAC2011 ver 2.50.51)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	17,402,036	627,215,300	2,432	24,325	1,788	349,011	62.53
2000	20,918,632	772,769,920	1,052	10,380	1,061	403,712	54.83
2005	22,628,922	844,379,140	669	6,267	753	450,852	53.63
2007	23,529,334	874,683,840	585	5,475	679	469,678	53.71
2010	25,124,892	911,216,640	503	4,573	598	486,812	54.08
2014	26,007,884	949,234,750	368	3,199	450	505,994	54.14
2017	26,820,658	982,844,990	301	2,499	370	524,749	55.42
2020	27,702,826	1,017,386,400	259	2,049	312	543,466	57.12
2023	28,553,862	1,048,442,400	235	1,786	273	561,739	58.83

Difference (Ver. 2.5051 - Ver. 2.5050) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	20.9	0.0	0.0	0	0.00
2005	0	0	16.1	0.0	0.0	0	0.00
2007	0	0	12.8	0.0	0.0	0	0.00
2010	0	0	10.2	0.0	0.0	0	0.00
2014	0	0	7.1	0.0	0.0	0	0.00
2017	0	0	6.2	0.0	0.0	0	0.00
2020	0	0	5.1	0.0	0.0	0	0.00
2023	0	0	4.2	0.0	0.0	0	0.00

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.5050)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	2.02%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	2.47%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	2.23%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	2.07%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	1.96%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	2.09%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	2.00%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	1.82%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-92. Impact on Sacramento Valley Air Basin Inventory of Change 12.16

Sacramento Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2010 ver 2.50.50)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	1,237,256	45,631,808	201.9	2095.9	137.2	25,413	4.49
2000	1,479,047	56,912,088	85.6	879.2	82.0	29,786	3.93
2005	1,656,074	64,188,484	56.3	537.5	63.2	35,259	4.11
2007	1,772,208	67,571,552	51.4	485.1	59.1	37,373	4.20
2010	1,921,162	70,735,288	45.6	413.2	53.6	39,064	4.28
2014	2,013,171	75,488,296	33.0	285.1	40.1	41,476	4.36
2017	2,098,532	79,107,024	26.7	221.1	32.9	43,552	4.51
2020	2,186,689	82,271,032	22.8	180.5	27.6	45,201	4.66
2023	2,275,619	85,172,008	20.8	157.4	24.0	46,802	4.81

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs (Calculated Using EMFAC2010 ver 2.50.51)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	1,237,256	45,631,808	201.9	2095.9	137.2	25,413	4.49
2000	1,479,047	56,912,088	87.0	879.2	82.0	29,786	3.93
2005	1,656,074	64,188,484	57.3	537.5	63.2	35,259	4.11
2007	1,772,208	67,571,552	52.2	485.1	59.1	37,373	4.20
2010	1,921,162	70,735,288	46.3	413.2	53.6	39,064	4.28
2014	2,013,171	75,488,296	33.5	285.1	40.1	41,476	4.36
2017	2,098,532	79,107,024	27.1	221.1	32.9	43,552	4.51
2020	2,186,689	82,271,032	23.1	180.5	27.6	45,201	4.66
2023	2,275,619	85,172,008	21.1	157.4	24.0	46,802	4.81

Difference (Ver. 2.5051 - Ver. 2.5050) in Emission Inventories (tons per day)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	1.4	0.0	0.0	0	0.00
2005	0	0	1.1	0.0	0.0	0	0.00
2007	0	0	0.9	0.0	0.0	0	0.00
2010	0	0	0.7	0.0	0.0	0	0.00
2014	0	0	0.5	0.0	0.0	0	0.00
2017	0	0	0.4	0.0	0.0	0	0.00
2020	0	0	0.3	0.0	0.0	0	0.00
2023	0	0	0.3	0.0	0.0	0	0.00

Percentage Change in Emission Inventories (relative to Ver. 2.5050)							
Cal. Year	**Population**	**VMT**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	1.65%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	1.89%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	1.70%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	1.50%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	1.43%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	1.50%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	1.53%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	1.44%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-93. Impact on San Diego Air Basin Inventory of Change 12.16

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.50.50)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,545,039	55,695,720	214.9	2178.7	160.3	33,411	5.85
2000	1,849,785	70,049,760	79.2	826.7	88.1	36,489	4.79
2005	1,984,103	74,943,112	49.1	499.5	57.5	39,523	4.65
2007	2,067,644	77,550,736	43.3	438.8	53.5	41,609	4.68
2010	2,210,591	80,286,288	37.7	366.8	47.7	42,784	4.70
2014	2,293,489	83,253,688	28.5	261.0	36.2	44,319	4.70
2017	2,354,498	85,480,472	23.9	206.3	30.0	45,502	4.78
2020	2,416,712	87,704,976	20.8	170.6	25.4	46,648	4.89
2023	2,507,908	91,308,168	19.2	151.8	22.6	48,674	5.09

San Diego Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.50.51)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,545,039	55,695,720	215	2179	160	33,411	5.85
2000	1,849,785	70,049,760	81	827	88	36,489	4.79
2005	1,984,103	74,943,112	50	499	58	39,523	4.65
2007	2,067,644	77,550,736	44	439	53	41,609	4.68
2010	2,210,591	80,286,288	38	367	48	42,784	4.70
2014	2,293,489	83,253,688	29	261	36	44,319	4.70
2017	2,354,498	85,480,472	24	206	30	45,502	4.78
2020	2,416,712	87,704,976	21	171	25	46,648	4.89
2023	2,507,908	91,308,168	19	152	23	48,674	5.09

Difference (Ver. 2.5051 - Ver. 2.5050) in Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	1.6	0.0	0.0	0	0.00
2005	0	0	1.1	0.0	0.0	0	0.00
2007	0	0	0.9	0.0	0.0	0	0.00
2010	0	0	0.7	0.0	0.0	0	0.00
2014	0	0	0.5	0.0	0.0	0	0.00
2017	0	0	0.4	0.0	0.0	0	0.00
2020	0	0	0.4	0.0	0.0	0	0.00
2023	0	0	0.3	0.0	0.0	0	0.00

Percentage Change in Emission Inventories (relative to Ver. 2.5050)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	1.98%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	2.29%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	2.01%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	1.80%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	1.73%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	1.81%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	1.73%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	1.56%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-94. Impact on San Francisco Bay Air Basin Inventory of Change 12.16

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.50.50)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,736,332	131,079,910	527.4	4949.8	375.7	69,459	12.99
2000	4,482,899	159,858,610	225.6	2101.8	212.8	80,240	11.50
2005	4,508,814	162,538,700	137.6	1200.9	146.2	83,877	10.50
2007	4,661,293	166,557,410	120.1	1044.1	127.7	87,125	10.43
2010	4,838,772	168,633,490	100.4	849.0	107.5	87,619	10.20
2014	4,955,524	173,712,480	72.8	586.1	78.9	89,754	10.08
2017	5,057,204	177,521,460	59.4	452.3	64.0	91,712	10.17
2020	5,169,034	181,332,000	51.1	366.8	53.6	93,674	10.34
2023	5,288,756	185,137,150	46.5	318.1	47.0	95,625	10.54

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.50.51)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,736,332	131,079,910	527.4	4949.8	375.7	69,459	12.99
2000	4,482,899	159,858,610	230.0	2101.8	212.8	80,240	11.50
2005	4,508,814	162,538,700	140.8	1200.9	146.2	83,877	10.50
2007	4,661,293	166,557,410	122.8	1044.1	127.7	87,125	10.43
2010	4,838,772	168,633,490	102.5	849.0	107.5	87,619	10.20
2014	4,955,524	173,712,480	74.4	586.1	78.9	89,754	10.08
2017	5,057,204	177,521,460	60.9	452.3	64.0	91,712	10.17
2020	5,169,034	181,332,000	52.3	366.8	53.6	93,674	10.34
2023	5,288,756	185,137,150	47.4	318.1	47.0	95,625	10.54

Difference (Ver. 2.5051 - Ver. 2.5050) in Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	4.4	0.0	0.0	0	0.00
2005	0	0	3.2	0.0	0.0	0	0.00
2007	0	0	2.7	0.0	0.0	0	0.00
2010	0	0	2.1	0.0	0.0	0	0.00
2014	0	0	1.6	0.0	0.0	0	0.00
2017	0	0	1.4	0.0	0.0	0	0.00
2020	0	0	1.2	0.0	0.0	0	0.00
2023	0	0	0.9	0.0	0.0	0	0.00

Percentage Change in Emission Inventories (relative to Ver. 2.5050)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	1.96%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	2.35%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	2.26%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	2.13%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	2.22%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	2.43%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	2.35%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	1.91%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-95. Impact on San Joaquin Valley Air Basin Inventory of Change 12.16

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2010 ver 2.50.50)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	1,216,824	45,962,660	197.2	2146.8	145.9	25,728	4.49
2000	1,718,132	67,534,608	96.5	1024.9	102.4	35,812	4.67
2005	1,939,609	76,538,128	66.8	657.3	79.3	42,956	4.90
2007	2,107,607	82,480,304	62.1	603.8	76.0	46,899	5.12
2010	2,322,059	87,957,792	56.6	526.0	68.3	49,650	5.29
2014	2,447,596	94,888,144	41.7	365.9	51.4	53,258	5.46
2017	2,583,723	101,152,060	34.1	285.7	42.5	56,891	5.73
2020	2,741,452	107,784,100	29.4	236.4	36.2	60,850	6.07
2023	2,907,917	114,356,040	26.8	209.3	32.0	64,612	6.43

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs (Calculated Using EMFAC2010 ver 2.50.51)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	1,216,824	45,962,660	197.2	2146.8	145.9	25,728	4.49
2000	1,718,132	67,534,608	98.1	1024.9	102.4	35,812	4.67
2005	1,939,609	76,538,128	68.0	657.3	79.3	42,956	4.90
2007	2,107,607	82,480,304	63.0	603.8	76.0	46,899	5.12
2010	2,322,059	87,957,792	57.4	526.0	68.3	49,650	5.29
2014	2,447,596	94,888,144	42.2	365.9	51.4	53,258	5.46
2017	2,583,723	101,152,060	34.6	285.7	42.5	56,891	5.73
2020	2,741,452	107,784,100	29.9	236.4	36.2	60,850	6.07
2023	2,907,917	114,356,040	27.5	209.3	32.0	64,612	6.43

Difference (Ver. 2.5051 - Ver. 2.5050) in Emission Inventories (tons per day)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	1.6	0.0	0.0	0	0.00
2005	0	0	1.2	0.0	0.0	0	0.00
2007	0	0	0.9	0.0	0.0	0	0.00
2010	0	0	0.8	0.0	0.0	0	0.00
2014	0	0	0.6	0.0	0.0	0	0.00
2017	0	0	0.5	0.0	0.0	0	0.00
2020	0	0	0.5	0.0	0.0	0	0.00
2023	0	0	0.7	0.0	0.0	0	0.00

Percentage Change in Emission Inventories (relative to Ver. 2.5050)							
Cal. Year	**Population**	**VMT**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	1.64%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	1.81%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	1.51%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	1.35%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	1.36%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	1.48%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	1.68%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	2.45%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-96. Impact on South Coast Air Basin Inventory of Change 12.16

South Coast Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2010 ver 2.50.50)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	7,232,260	248,651,890	926.6	8963.6	678.7	140,024	25.09
2000	8,526,977	298,739,360	376.0	3739.5	394.8	158,722	21.53
2005	9,485,378	336,339,490	241.8	2323.9	275.8	179,695	21.23
2007	9,664,210	341,888,290	203.7	1943.6	236.6	182,018	20.73
2010	10,242,853	353,053,950	170.0	1577.3	201.1	186,573	20.61
2014	10,573,581	361,797,660	125.7	1115.0	152.9	191,281	20.40
2017	10,852,563	371,091,390	103.5	875.4	126.6	196,648	20.75
2020	11,138,933	380,855,680	88.9	715.0	106.9	201,716	21.24
2023	11,354,450	387,191,140	80.3	616.9	94.0	206,143	21.64

South Coast Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs (Calculated Using EMFAC2010 ver 2.50.51)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	7,232,260	248,651,890	926.6	8963.6	678.7	140,024	25.09
2000	8,526,977	298,739,360	384.2	3739.5	394.8	158,722	21.53
2005	9,485,378	336,339,490	248.5	2323.9	275.8	179,695	21.23
2007	9,664,210	341,888,290	209.1	1943.6	236.6	182,018	20.73
2010	10,242,853	353,053,950	174.2	1577.3	201.1	186,573	20.61
2014	10,573,581	361,797,660	129.0	1115.0	152.9	191,281	20.40
2017	10,852,563	371,091,390	106.4	875.4	126.6	196,648	20.75
2020	11,138,933	380,855,680	91.3	715.0	106.9	201,716	21.24
2023	11,354,450	387,191,140	82.0	616.9	94.0	206,143	21.64

Difference (Ver. 2.5051 - Ver. 2.5050) in Emission Inventories (tons per day)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	8.2	0.0	0.0	0	0.00
2005	0	0	6.7	0.0	0.0	0	0.00
2007	0	0	5.4	0.0	0.0	0	0.00
2010	0	0	4.3	0.0	0.0	0	0.00
2014	0	0	3.3	0.0	0.0	0	0.00
2017	0	0	2.9	0.0	0.0	0	0.00
2020	0	0	2.4	0.0	0.0	0	0.00
2023	0	0	1.7	0.0	0.0	0	0.00

Percentage Change in Emission Inventories (relative to Ver. 2.5050)							
Cal. Year	**Population**	**VMT**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	2.19%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	2.75%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	2.63%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	2.50%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	2.65%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	2.84%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	2.65%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	2.10%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type Using Populations

12.17 REDUCTION IN LIGHT-HEAVY TRUCK STARTS

Please refer to Section 3.3.4.5. Reducing the number of starts reduces ROG and NOx, especially in the future. This effect is more pronounced in future years because of the large contribution of light heavy trucks to the hot soak and starts inventory in future calendar years.

Table 12-97. Impact on Statewide Inventory of Change 12.17

Statewide Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2010 ver 2.50.51)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	17,402,036	627,215,300	2,432	24,325	1,788	349,011	62.53
2000	20,918,632	772,769,920	1,052	10,380	1,061	403,712	54.83
2005	22,628,922	844,379,140	669	6,267	753	450,852	53.63
2007	23,529,334	874,683,840	585	5,475	679	469,678	53.71
2010	25,124,892	911,216,640	503	4,573	598	486,812	54.08
2014	26,007,884	949,234,750	368	3,199	450	505,994	54.14
2017	26,820,658	982,844,990	301	2,499	370	524,749	55.42
2020	27,702,826	1,017,386,400	259	2,049	312	543,466	57.12
2023	28,553,862	1,048,442,400	235	1,786	273	561,739	58.83

Statewide Summer Episodic On-Road LD Motor Vehicle Inventories with reduced LHD1 Starts (Calculated Using EMFAC2010 ver 2.50.52)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	17,402,036	627,215,300	2,380	23,929	1,768	348,170	62.33
2000	20,918,632	772,769,920	1,006	10,192	1,047	403,240	54.73
2005	22,628,922	844,379,140	630	6,135	733	450,340	53.57
2007	23,529,334	874,683,840	552	5,358	656	469,129	53.66
2010	25,124,892	911,216,640	472	4,469	572	486,216	54.04
2014	26,007,884	949,234,750	343	3,123	423	505,382	54.11
2017	26,820,658	982,844,990	278	2,437	344	524,108	55.40
2020	27,702,826	1,017,386,400	238	1,997	286	542,793	57.11
2023	28,553,862	1,048,442,400	216	1,741	249	561,027	58.82

Difference (Ver. 2.5052 - Ver. 2.5051) in Emission Inventories (tons per day)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0	0	-51.6	-396.7	-19.6	-841	-0.20
2000	0	0	-45.6	-188.3	-13.9	-472	-0.09
2005	0	0	-38.3	-131.9	-19.9	-512	-0.06
2007	0	0	-33.5	-117.3	-22.5	-549	-0.05
2010	0	0	-31.1	-104.7	-25.8	-596	-0.04
2014	0	0	-25.3	-76.4	-26.5	-612	-0.03
2017	0	0	-22.9	-61.9	-26.3	-641	-0.02
2020	0	0	-20.5	-51.7	-25.8	-673	-0.01
2023	0	0	-18.7	-45.1	-24.8	-712	-0.01

Percentage Change in Emission Inventories (relative to Ver. 2.5051)							
Cal. Year	**Population**	**VMT**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0.00%	0.00%	-2.12%	-1.63%	-1.10%	-0.24%	-0.32%
2000	0.00%	0.00%	-4.33%	-1.81%	-1.31%	-0.12%	-0.17%
2005	0.00%	0.00%	-5.73%	-2.10%	-2.64%	-0.11%	-0.11%
2007	0.00%	0.00%	-5.73%	-2.14%	-3.32%	-0.12%	-0.09%
2010	0.00%	0.00%	-6.18%	-2.29%	-4.32%	-0.12%	-0.08%
2014	0.00%	0.00%	-6.88%	-2.39%	-5.89%	-0.12%	-0.05%
2017	0.00%	0.00%	-7.59%	-2.48%	-7.11%	-0.12%	-0.03%
2020	0.00%	0.00%	-7.94%	-2.52%	-8.25%	-0.12%	-0.02%
2023	0.00%	0.00%	-7.97%	-2.53%	-9.08%	-0.13%	-0.01%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-98. Impact on Sacramento Valley Air Basin Inventory of Change 12.17

Sacramento Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2010 ver 2.50.51)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	1,237,256	45,631,808	201.9	2095.9	137.2	25,413	4.49
2000	1,479,047	56,912,088	87.0	879.2	82.0	29,786	3.93
2005	1,656,074	64,188,484	57.3	537.5	63.2	35,259	4.11
2007	1,772,208	67,571,552	52.2	485.1	59.1	37,373	4.20
2010	1,921,162	70,735,288	46.3	413.2	53.6	39,064	4.28
2014	2,013,171	75,488,296	33.5	285.1	40.1	41,476	4.36
2017	2,098,532	79,107,024	27.1	221.1	32.9	43,552	4.51
2020	2,186,689	82,271,032	23.1	180.5	27.6	45,201	4.66
2023	2,275,619	85,172,008	21.1	157.4	24.0	46,802	4.81

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs (Calculated Using EMFAC2010 ver 2.50.52)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	1,237,256	45,631,808	196.2	2052.9	135.6	25,321	4.47
2000	1,479,047	56,912,088	82.9	857.8	80.9	29,735	3.92
2005	1,656,074	64,188,484	54.1	524.2	61.6	35,212	4.10
2007	1,772,208	67,571,552	49.2	472.8	57.2	37,322	4.20
2010	1,921,162	70,735,288	43.4	402.2	51.4	39,009	4.27
2014	2,013,171	75,488,296	31.1	277.5	37.9	41,421	4.36
2017	2,098,532	79,107,024	25.0	215.2	30.7	43,495	4.50
2020	2,186,689	82,271,032	21.2	176.0	25.5	45,142	4.65
2023	2,275,619	85,172,008	19.3	153.4	21.9	46,740	4.81

Difference (Ver. 2.5052 - Ver. 2.5051) in Emission Inventories (tons per day)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0	0	-5.7	-43.0	-1.6	-92	-0.02
2000	0	0	-4.1	-21.4	-1.1	-51	-0.01
2005	0	0	-3.2	-13.3	-1.6	-47	-0.01
2007	0	0	-3.0	-12.3	-1.9	-50	-0.01
2010	0	0	-2.9	-11.1	-2.2	-55	0.00
2014	0	0	-2.4	-7.7	-2.2	-55	0.00
2017	0	0	-2.1	-5.9	-2.2	-56	0.00
2020	0	0	-1.9	-4.6	-2.1	-58	0.00
2023	0	0	-1.8	-4.0	-2.1	-62	0.00

Percentage Change in Emission Inventories (relative to Ver. 2.5051)							
Cal. Year	**Population**	**VMT**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0.00%	0.00%	-2.81%	-2.05%	-1.16%	-0.36%	-0.50%
2000	0.00%	0.00%	-4.71%	-2.43%	-1.36%	-0.17%	-0.28%
2005	0.00%	0.00%	-5.63%	-2.47%	-2.56%	-0.13%	-0.15%
2007	0.00%	0.00%	-5.76%	-2.54%	-3.16%	-0.13%	-0.13%
2010	0.00%	0.00%	-6.30%	-2.67%	-4.10%	-0.14%	-0.11%
2014	0.00%	0.00%	-7.14%	-2.69%	-5.54%	-0.13%	-0.06%
2017	0.00%	0.00%	-7.87%	-2.65%	-6.67%	-0.13%	-0.04%
2020	0.00%	0.00%	-8.34%	-2.54%	-7.76%	-0.13%	-0.02%
2023	0.00%	0.00%	-8.45%	-2.52%	-8.63%	-0.13%	-0.02%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-99. Impact on San Diego Air Basin Inventory of Change 12.17

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.50.51)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,545,039	55,695,720	214.9	2178.7	160.3	33,411	5.85
2000	1,849,785	70,049,760	80.8	826.7	88.1	36,489	4.79
2005	1,984,103	74,943,112	50.2	499.5	57.5	39,523	4.65
2007	2,067,644	77,550,736	44.2	438.8	53.5	41,609	4.68
2010	2,210,591	80,286,288	38.4	366.8	47.7	42,784	4.70
2014	2,293,489	83,253,688	29.0	261.0	36.2	44,319	4.70
2017	2,354,498	85,480,472	24.3	206.3	30.0	45,502	4.78
2020	2,416,712	87,704,976	21.2	170.6	25.4	46,648	4.89
2023	2,507,908	91,308,168	19.5	151.8	22.6	48,674	5.09

San Diego Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.50.52)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,545,039	55,695,720	212	2157	159	33,364	5.83
2000	1,849,785	70,049,760	78	817	87	36,463	4.79
2005	1,984,103	74,943,112	48	492	56	39,496	4.65
2007	2,067,644	77,550,736	42	432	52	41,574	4.68
2010	2,210,591	80,286,288	36	360	46	42,742	4.70
2014	2,293,489	83,253,688	27	256	34	44,276	4.70
2017	2,354,498	85,480,472	23	202	28	45,456	4.78
2020	2,416,712	87,704,976	20	167	24	46,601	4.89
2023	2,507,908	91,308,168	18	149	21	48,624	5.09

Difference (Ver. 2.5052 - Ver. 2.5051) in Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	-2.8	-21.3	-1.1	-47	-0.01
2000	0	0	-2.9	-10.0	-0.8	-26	0.00
2005	0	0	-2.3	-7.1	-1.0	-27	0.00
2007	0	0	-2.2	-7.0	-1.4	-35	0.00
2010	0	0	-2.1	-6.6	-1.8	-42	0.00
2014	0	0	-1.8	-5.0	-1.9	-44	0.00
2017	0	0	-1.7	-4.2	-1.9	-45	0.00
2020	0	0	-1.6	-3.5	-1.8	-47	0.00
2023	0	0	-1.4	-3.1	-1.7	-49	0.00

Percentage Change in Emission Inventories (relative to Ver. 2.5051)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	-1.32%	-0.98%	-0.67%	-0.14%	-0.19%
2000	0.00%	0.00%	-3.60%	-1.22%	-0.91%	-0.07%	-0.10%
2005	0.00%	0.00%	-4.56%	-1.43%	-1.81%	-0.07%	-0.07%
2007	0.00%	0.00%	-4.89%	-1.59%	-2.70%	-0.08%	-0.06%
2010	0.00%	0.00%	-5.57%	-1.81%	-3.87%	-0.10%	-0.05%
2014	0.00%	0.00%	-6.32%	-1.93%	-5.23%	-0.10%	-0.03%
2017	0.00%	0.00%	-6.98%	-2.02%	-6.21%	-0.10%	-0.02%
2020	0.00%	0.00%	-7.32%	-2.08%	-7.09%	-0.10%	-0.02%
2023	0.00%	0.00%	-7.27%	-2.05%	-7.71%	-0.10%	-0.01%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-100. Impact on San Francisco Bay Air Basin Inventory of Change 12.17

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.50.51)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,736,332	131,079,910	527.4	4949.8	375.7	69,459	12.99
2000	4,482,899	159,858,610	230.0	2101.8	212.8	80,240	11.50
2005	4,508,814	162,538,700	140.8	1200.9	146.2	83,877	10.50
2007	4,661,293	166,557,410	122.8	1044.1	127.7	87,125	10.43
2010	4,838,772	168,633,490	102.5	849.0	107.5	87,619	10.20
2014	4,955,524	173,712,480	74.4	586.1	78.9	89,754	10.08
2017	5,057,204	177,521,460	60.9	452.3	64.0	91,712	10.17
2020	5,169,034	181,332,000	52.3	366.8	53.6	93,674	10.34
2023	5,288,756	185,137,150	47.4	318.1	47.0	95,625	10.54

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.50.52)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,736,332	131,079,910	519.3	4888.3	373.1	69,325	12.95
2000	4,482,899	159,858,610	221.7	2071.9	210.9	80,166	11.49
2005	4,508,814	162,538,700	133.4	1180.1	142.9	83,789	10.49
2007	4,661,293	166,557,410	116.1	1025.5	124.0	87,032	10.42
2010	4,838,772	168,633,490	96.5	832.8	103.4	87,523	10.19
2014	4,955,524	173,712,480	69.4	574.2	74.9	89,660	10.07
2017	5,057,204	177,521,460	56.4	442.8	60.0	91,615	10.17
2020	5,169,034	181,332,000	48.2	358.7	49.8	93,575	10.33
2023	5,288,756	185,137,150	43.8	311.2	43.4	95,521	10.54

Difference (Ver. 2.5052 - Ver. 2.5051) in Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	-8.1	-61.5	-2.5	-134	-0.03
2000	0	0	-8.3	-29.8	-1.9	-74	-0.01
2005	0	0	-7.4	-20.8	-3.4	-88	-0.01
2007	0	0	-6.7	-18.6	-3.7	-92	-0.01
2010	0	0	-6.1	-16.2	-4.0	-95	-0.01
2014	0	0	-5.0	-11.9	-4.1	-94	0.00
2017	0	0	-4.5	-9.6	-4.0	-97	0.00
2020	0	0	-4.1	-8.1	-3.8	-99	0.00
2023	0	0	-3.6	-6.9	-3.6	-103	0.00

Percentage Change in Emission Inventories (relative to Ver. 2.5051)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	-1.54%	-1.24%	-0.67%	-0.19%	-0.25%
2000	0.00%	0.00%	-3.60%	-1.42%	-0.91%	-0.09%	-0.13%
2005	0.00%	0.00%	-5.26%	-1.73%	-2.31%	-0.10%	-0.10%
2007	0.00%	0.00%	-5.44%	-1.78%	-2.91%	-0.11%	-0.08%
2010	0.00%	0.00%	-5.91%	-1.91%	-3.74%	-0.11%	-0.07%
2014	0.00%	0.00%	-6.69%	-2.04%	-5.15%	-0.11%	-0.04%
2017	0.00%	0.00%	-7.38%	-2.12%	-6.21%	-0.11%	-0.03%
2020	0.00%	0.00%	-7.77%	-2.20%	-7.17%	-0.11%	-0.02%
2023	0.00%	0.00%	-7.50%	-2.16%	-7.76%	-0.11%	-0.01%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-101. Impact on San Joaquin Valley Air Basin Inventory of Change 12.17

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.50.51)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,216,824	45,962,660	197.2	2146.8	145.9	25,728	4.49
2000	1,718,132	67,534,608	98.1	1024.9	102.4	35,812	4.67
2005	1,939,609	76,538,128	68.0	657.3	79.3	42,956	4.90
2007	2,107,607	82,480,304	63.0	603.8	76.0	46,899	5.12
2010	2,322,059	87,957,792	57.4	526.0	68.3	49,650	5.29
2014	2,447,596	94,888,144	42.2	365.9	51.4	53,258	5.46
2017	2,583,723	101,152,060	34.6	285.7	42.5	56,891	5.73
2020	2,741,452	107,784,100	29.9	236.4	36.2	60,850	6.07
2023	2,907,917	114,356,040	27.5	209.3	32.0	64,612	6.43

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.50.52)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,216,824	45,962,660	191.4	2103.3	144.0	25,635	4.46
2000	1,718,132	67,534,608	93.6	1002.9	101.0	35,758	4.66
2005	1,939,609	76,538,128	64.3	642.8	77.4	42,902	4.89
2007	2,107,607	82,480,304	59.5	590.4	73.6	46,836	5.12
2010	2,322,059	87,957,792	54.1	514.1	65.5	49,582	5.28
2014	2,447,596	94,888,144	39.5	357.3	48.6	53,188	5.45
2017	2,583,723	101,152,060	32.1	278.9	39.7	56,818	5.73
2020	2,741,452	107,784,100	27.5	230.9	33.3	60,773	6.07
2023	2,907,917	114,356,040	25.2	204.4	29.1	64,529	6.43

Difference (Ver. 2.5052 - Ver. 2.5051) in Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	-5.8	-43.6	-1.9	-93	-0.02
2000	0	0	-4.5	-22.0	-1.4	-54	-0.01
2005	0	0	-3.7	-14.5	-1.9	-54	-0.01
2007	0	0	-3.5	-13.4	-2.4	-63	-0.01
2010	0	0	-3.3	-11.9	-2.8	-68	-0.01
2014	0	0	-2.8	-8.6	-2.9	-69	0.00
2017	0	0	-2.5	-6.7	-2.9	-73	0.00
2020	0	0	-2.3	-5.5	-2.9	-77	0.00
2023	0	0	-2.3	-4.8	-2.8	-83	0.00

Percentage Change in Emission Inventories (relative to Ver. 2.5051)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	-2.96%	-2.03%	-1.29%	-0.36%	-0.50%
2000	0.00%	0.00%	-4.59%	-2.15%	-1.36%	-0.15%	-0.24%
2005	0.00%	0.00%	-5.51%	-2.21%	-2.45%	-0.13%	-0.15%
2007	0.00%	0.00%	-5.53%	-2.22%	-3.19%	-0.13%	-0.12%
2010	0.00%	0.00%	-5.76%	-2.27%	-4.07%	-0.14%	-0.10%
2014	0.00%	0.00%	-6.56%	-2.34%	-5.59%	-0.13%	-0.06%
2017	0.00%	0.00%	-7.29%	-2.36%	-6.79%	-0.13%	-0.04%
2020	0.00%	0.00%	-7.83%	-2.31%	-7.96%	-0.13%	-0.02%
2023	0.00%	0.00%	-8.25%	-2.31%	-8.86%	-0.13%	-0.01%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-102. Impact on South Coast Air Basin Inventory of Change 12.17

South Coast Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2010 ver 2.50.51)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	7,232,260	248,651,890	926.6	8963.6	678.7	140,024	25.09
2000	8,526,977	298,739,360	384.2	3739.5	394.8	158,722	21.53
2005	9,485,378	336,339,490	248.5	2323.9	275.8	179,695	21.23
2007	9,664,210	341,888,290	209.1	1943.6	236.6	182,018	20.73
2010	10,242,853	353,053,950	174.2	1577.3	201.1	186,573	20.61
2014	10,573,581	361,797,660	129.0	1115.0	152.9	191,281	20.40
2017	10,852,563	371,091,390	106.4	875.4	126.6	196,648	20.75
2020	11,138,933	380,855,680	91.3	715.0	106.9	201,716	21.24
2023	11,354,450	387,191,140	82.0	616.9	94.0	206,143	21.64

South Coast Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs (Calculated Using EMFAC2010 ver 2.50.52)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	7,232,260	248,651,890	906.4	8803.5	669.6	139,697	25.01
2000	8,526,977	298,739,360	366.5	3666.8	388.6	158,538	21.49
2005	9,485,378	336,339,490	233.1	2271.2	267.1	179,481	21.20
2007	9,664,210	341,888,290	196.2	1899.3	227.4	181,800	20.72
2010	10,242,853	353,053,950	162.7	1539.1	190.9	186,342	20.60
2014	10,573,581	361,797,660	119.1	1086.4	142.3	191,037	20.39
2017	10,852,563	371,091,390	97.4	851.5	116.0	196,390	20.74
2020	11,138,933	380,855,680	83.2	694.5	96.5	201,442	21.24
2023	11,354,450	387,191,140	74.9	598.7	84.0	205,853	21.63

Difference (Ver. 2.5052 - Ver. 2.5051) in Emission Inventories (tons per day)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0	0	-20.2	-160.1	-9.2	-327	-0.08
2000	0	0	-17.8	-72.7	-6.2	-184	-0.03
2005	0	0	-15.4	-52.8	-8.6	-214	-0.02
2007	0	0	-12.9	-44.3	-9.2	-218	-0.02
2010	0	0	-11.5	-38.2	-10.2	-231	-0.01
2014	0	0	-9.9	-28.6	-10.6	-244	-0.01
2017	0	0	-9.1	-23.9	-10.6	-259	-0.01
2020	0	0	-8.1	-20.5	-10.4	-274	0.00
2023	0	0	-7.1	-18.2	-10.0	-290	0.00

Percentage Change in Emission Inventories (relative to Ver. 2.5051)							
Cal. Year	**Population**	**VMT**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0.00%	0.00%	-2.18%	-1.79%	-1.35%	-0.23%	-0.31%
2000	0.00%	0.00%	-4.62%	-1.94%	-1.57%	-0.12%	-0.15%
2005	0.00%	0.00%	-6.18%	-2.27%	-3.14%	-0.12%	-0.11%
2007	0.00%	0.00%	-6.18%	-2.28%	-3.89%	-0.12%	-0.09%
2010	0.00%	0.00%	-6.62%	-2.42%	-5.07%	-0.12%	-0.07%
2014	0.00%	0.00%	-7.66%	-2.56%	-6.93%	-0.13%	-0.04%
2017	0.00%	0.00%	-8.52%	-2.73%	-8.36%	-0.13%	-0.03%
2020	0.00%	0.00%	-8.87%	-2.87%	-9.72%	-0.14%	-0.02%
2023	0.00%	0.00%	-8.67%	-2.95%	-10.68%	-0.14%	-0.02%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type Using Populations

12.18 DEFAULT ZEV IMPLEMENTATION ASSUMPTIONS

Please refer to Section 3.3.4.6. The change in the number of ZEVs had no measurable impact on the emissions inventory. EMFAC2011-LDV was finalized based on the working inventory *EMFAC2010-2.50.53*.

Table 12-103. Impact on Statewide Inventory of Change 12.18

Statewide Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2010 ver 2.50.52)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	17,402,036	627,215,300	2,380	23,929	1,768	348,170	62.33
2000	20,918,632	772,769,920	1,006	10,192	1,047	403,240	54.73
2005	22,628,922	844,379,140	630	6,135	733	450,340	53.57
2007	23,529,334	874,683,840	552	5,358	656	469,129	53.66
2010	25,124,892	911,216,640	472	4,469	572	486,216	54.04
2014	26,007,884	949,234,750	343	3,123	423	505,382	54.11
2017	26,820,658	982,844,990	278	2,437	344	524,108	55.40
2020	27,702,826	1,017,386,400	238	1,997	286	542,793	57.11
2023	28,553,862	1,048,442,400	216	1,741	249	561,027	58.82
Statewide Summer Episodic On-Road LD Motor Vehicle Inventories with increased ZEV implementation (Calculated Using EMFAC2010 ver 2.50.53)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	17,402,036	627,215,300	2,380	23,929	1,768	348,170	62.33
2000	20,918,632	772,769,920	1,006	10,192	1,047	403,240	54.73
2005	22,628,922	844,379,140	630	6,135	733	450,340	53.57
2007	23,529,334	874,683,840	552	5,358	656	469,129	53.66
2010	25,124,892	911,216,640	472	4,469	572	486,216	54.04
2014	26,007,884	949,234,750	343	3,123	423	505,382	54.11
2017	26,820,658	982,844,990	278	2,438	344	524,108	55.40
2020	27,702,826	1,017,386,400	238	1,997	286	542,793	57.11
2023	28,553,862	1,048,442,400	216	1,741	249	561,027	58.82
Difference (Ver. 2.5053 - Ver. 2.5052) in Emission Inventories (tons per day)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	0	0	0.0	0.0	0.0	0	0.00
2010	0	0	0.0	0.0	0.0	0	0.00
2014	0	0	0.0	0.0	0.0	0	0.00
2017	0	0	0.0	0.0	0.0	0	0.00
2020	0	0	0.0	0.1	0.0	0	0.00
2023	0	0	0.0	0.1	0.0	0	0.00
Percentage Change in Emission Inventories (relative to Ver. 2.5052)							
Cal. Year	**Population**	**VMT**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-104. Impact on Sacramento Valley Air Basin Inventory of Change 12.18

Sacramento Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2010 ver 2.50.52)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	1,237,256	45,631,808	196.2	2052.9	135.6	25,321	4.47
2000	1,479,047	56,912,088	82.9	857.8	80.9	29,735	3.92
2005	1,656,074	64,188,484	54.1	524.2	61.6	35,212	4.10
2007	1,772,208	67,571,552	49.2	472.8	57.2	37,322	4.20
2010	1,921,162	70,735,288	43.4	402.2	51.4	39,009	4.27
2014	2,013,171	75,488,296	31.1	277.5	37.9	41,421	4.36
2017	2,098,532	79,107,024	25.0	215.2	30.7	43,495	4.50
2020	2,186,689	82,271,032	21.2	176.0	25.5	45,142	4.65
2023	2,275,619	85,172,008	19.3	153.4	21.9	46,740	4.81

Sacramento Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs (Calculated Using EMFAC2010 ver 2.50.53)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	1,237,256	45,631,808	196.2	2052.9	135.6	25,321	4.47
2000	1,479,047	56,912,088	82.9	857.8	80.9	29,735	3.92
2005	1,656,074	64,188,484	54.1	524.2	61.6	35,212	4.10
2007	1,772,208	67,571,552	49.2	472.8	57.2	37,322	4.20
2010	1,921,162	70,735,288	43.4	402.2	51.4	39,009	4.27
2014	2,013,171	75,488,296	31.1	277.5	37.9	41,421	4.36
2017	2,098,532	79,107,024	25.0	215.2	30.7	43,495	4.50
2020	2,186,689	82,271,032	21.2	176.0	25.5	45,142	4.65
2023	2,275,619	85,172,008	19.3	153.4	21.9	46,740	4.81

Difference (Ver. 2.5053 - Ver. 2.5052) in Emission Inventories (tons per day)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	0	0	0.0	0.0	0.0	0	0.00
2010	0	0	0.0	0.0	0.0	0	0.00
2014	0	0	0.0	0.0	0.0	0	0.00
2017	0	0	0.0	0.0	0.0	0	0.00
2020	0	0	0.0	0.0	0.0	0	0.00
2023	0	0	0.0	0.0	0.0	0	0.00

Percentage Change in Emission Inventories (relative to Ver. 2.5052)							
Cal. Year	**Population**	**VMT**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-105. Impact on San Diego Air Basin Inventory of Change 12.18

San Diego Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.50.52)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,545,039	55,695,720	212.1	2157.4	159.2	33,364	5.83
2000	1,849,785	70,049,760	77.9	816.6	87.3	36,463	4.79
2005	1,984,103	74,943,112	47.9	492.3	56.5	39,496	4.65
2007	2,067,644	77,550,736	42.1	431.8	52.0	41,574	4.68
2010	2,210,591	80,286,288	36.3	360.1	45.9	42,742	4.70
2014	2,293,489	83,253,688	27.2	256.0	34.3	44,276	4.70
2017	2,354,498	85,480,472	22.6	202.1	28.1	45,456	4.78
2020	2,416,712	87,704,976	19.6	167.1	23.6	46,601	4.89
2023	2,507,908	91,308,168	18.0	148.7	20.8	48,624	5.09

San Diego Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.50.53)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,545,039	55,695,720	212	2157	159	33,364	5.83
2000	1,849,785	70,049,760	78	817	87	36,463	4.79
2005	1,984,103	74,943,112	48	492	56	39,496	4.65
2007	2,067,644	77,550,736	42	432	52	41,574	4.68
2010	2,210,591	80,286,288	36	360	46	42,742	4.70
2014	2,293,489	83,253,688	27	256	34	44,276	4.70
2017	2,354,498	85,480,472	23	202	28	45,456	4.78
2020	2,416,712	87,704,976	20	167	24	46,601	4.89
2023	2,507,908	91,308,160	18	149	21	48,624	5.09

Difference (Ver. 2.5053 - Ver. 2.5052) in Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	0	0	0.0	0.0	0.0	0	0.00
2010	0	0	0.0	0.0	0.0	0	0.00
2014	0	0	0.0	0.0	0.0	0	0.00
2017	0	0	0.0	0.0	0.0	0	0.00
2020	0	0	0.0	0.0	0.0	0	0.00
2023	0	-8	0.0	0.0	0.0	0	0.00

Percentage Change in Emission Inventories (relative to Ver. 2.5052)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	0.00%	0.01%	0.01%	0.00%	0.00%
2023	0.00%	0.00%	0.01%	0.01%	0.01%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-106. Impact on San Francisco Bay Air Basin Inventory of Change 12.18

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.50.52)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,736,332	131,079,910	519.3	4888.3	373.1	69,325	12.95
2000	4,482,899	159,858,610	221.7	2071.9	210.9	80,166	11.49
2005	4,508,814	162,538,700	133.4	1180.1	142.9	83,789	10.49
2007	4,661,293	166,557,410	116.1	1025.5	124.0	87,032	10.42
2010	4,838,772	168,633,490	96.5	832.8	103.4	87,523	10.19
2014	4,955,524	173,712,480	69.4	574.2	74.9	89,660	10.07
2017	5,057,204	177,521,460	56.4	442.8	60.0	91,615	10.17
2020	5,169,034	181,332,000	48.2	358.7	49.8	93,575	10.33
2023	5,288,756	185,137,150	43.8	311.2	43.4	95,521	10.54

San Francisco Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs
(Calculated Using EMFAC2010 ver 2.50.53)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,736,332	131,079,910	519.3	4888.3	373.1	69,325	12.95
2000	4,482,899	159,858,610	221.7	2071.9	210.9	80,166	11.49
2005	4,508,814	162,538,700	133.4	1180.1	142.9	83,789	10.49
2007	4,661,293	166,557,410	116.1	1025.5	124.0	87,032	10.42
2010	4,838,772	168,633,490	96.5	832.8	103.4	87,523	10.19
2014	4,955,524	173,712,480	69.4	574.2	74.9	89,660	10.07
2017	5,057,204	177,521,460	56.4	442.8	60.0	91,615	10.17
2020	5,169,034	181,332,000	48.2	358.7	49.8	93,575	10.33
2023	5,288,756	185,137,170	43.8	311.2	43.4	95,521	10.54

Difference (Ver. 2.5053 - Ver. 2.5052) in Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	0	0	0.0	0.0	0.0	0	0.00
2010	0	0	0.0	0.0	0.0	0	0.00
2014	0	0	0.0	0.0	0.0	0	0.00
2017	0	0	0.0	0.0	0.0	0	0.00
2020	0	0	0.0	0.0	0.0	0	0.00
2023	0	20	0.0	0.0	0.0	0	0.00

Percentage Change in Emission Inventories (relative to Ver. 2.5052)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-107. Impact on San Joaquin Valley Air Basin Inventory of Change 12.18

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2010 ver 2.50.52)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	1,216,824	45,962,660	191.4	2103.3	144.0	25,635	4.46
2000	1,718,132	67,534,608	93.6	1002.9	101.0	35,758	4.66
2005	1,939,609	76,538,128	64.3	642.8	77.4	42,902	4.89
2007	2,107,607	82,480,304	59.5	590.4	73.6	46,836	5.12
2010	2,322,059	87,957,792	54.1	514.1	65.5	49,582	5.28
2014	2,447,596	94,888,144	39.5	357.3	48.6	53,188	5.45
2017	2,583,723	101,152,060	32.1	278.9	39.7	56,818	5.73
2020	2,741,452	107,784,100	27.5	230.9	33.3	60,773	6.07
2023	2,907,917	114,356,040	25.2	204.4	29.1	64,529	6.43

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs (Calculated Using EMFAC2010 ver 2.50.53)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	1,216,824	45,962,660	191.4	2103.3	144.0	25,635	4.46
2000	1,718,132	67,534,608	93.6	1002.9	101.0	35,758	4.66
2005	1,939,609	76,538,128	64.3	642.8	77.4	42,902	4.89
2007	2,107,607	82,480,304	59.5	590.4	73.6	46,836	5.12
2010	2,322,059	87,957,792	54.1	514.1	65.5	49,582	5.28
2014	2,447,596	94,888,152	39.5	357.3	48.6	53,188	5.45
2017	2,583,723	101,152,060	32.1	278.9	39.7	56,818	5.73
2020	2,741,452	107,784,100	27.5	230.9	33.3	60,773	6.07
2023	2,907,917	114,356,050	25.2	204.4	29.1	64,529	6.43

Difference (Ver. 2.5053 - Ver. 2.5052) in Emission Inventories (tons per day)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	0	0	0.0	0.0	0.0	0	0.00
2010	0	0	0.0	0.0	0.0	0	0.00
2014	0	8	0.0	0.0	0.0	0	0.00
2017	0	0	0.0	0.0	0.0	0	0.00
2020	0	0	0.0	0.0	0.0	0	0.00
2023	0	10	0.0	0.0	0.0	0	0.00

Percentage Change in Emission Inventories (relative to Ver. 2.5052)							
Cal. Year	**Population**	**VMT**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-108. Impact on South Coast Air Basin Inventory of Change 12.18

South Coast Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2010 ver 2.50.52)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	7,232,260	248,651,890	906.4	8803.5	669.6	139,697	25.01
2000	8,526,977	298,739,360	366.5	3666.8	388.6	158,538	21.49
2005	9,485,378	336,339,490	233.1	2271.2	267.1	179,481	21.20
2007	9,664,210	341,888,290	196.2	1899.3	227.4	181,800	20.72
2010	10,242,853	353,053,950	162.7	1539.1	190.9	186,342	20.60
2014	10,573,581	361,797,660	119.1	1086.4	142.3	191,037	20.39
2017	10,852,563	371,091,390	97.4	851.5	116.0	196,390	20.74
2020	11,138,933	380,855,680	83.2	694.5	96.5	201,442	21.24
2023	11,354,450	387,191,140	74.9	598.7	84.0	205,853	21.63

South Coast Summer Episodic On-Road Motor Vehicle Inventories With Updated CO2 BERs (Calculated Using EMFAC2010 ver 2.50.53)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	7,232,260	248,651,890	906.4	8803.5	669.6	139,697	25.01
2000	8,526,977	298,739,360	366.5	3666.8	388.6	158,538	21.49
2005	9,485,378	336,339,490	233.1	2271.2	267.1	179,481	21.20
2007	9,664,210	341,888,290	196.2	1899.3	227.4	181,800	20.72
2010	10,242,853	353,053,950	162.7	1539.1	190.9	186,342	20.60
2014	10,573,581	361,797,660	119.1	1086.4	142.3	191,037	20.39
2017	10,852,563	371,091,390	97.4	851.5	116.0	196,390	20.74
2020	11,138,933	380,855,680	83.2	694.5	96.5	201,442	21.24
2023	11,354,451	387,191,140	74.9	598.8	84.0	205,853	21.63

Difference (Ver. 2.5053 - Ver. 2.5052) in Emission Inventories (tons per day)							
Cal. Year	**Population**	**VMT (mi/d)**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0	0	0.0	0.0	0.0	0	0.00
2000	0	0	0.0	0.0	0.0	0	0.00
2005	0	0	0.0	0.0	0.0	0	0.00
2007	0	0	0.0	0.0	0.0	0	0.00
2010	0	0	0.0	0.0	0.0	0	0.00
2014	0	0	0.0	0.0	0.0	0	0.00
2017	0	0	0.0	0.0	0.0	0	0.00
2020	0	0	0.0	0.0	0.0	0	0.00
2023	1	0	0.0	0.0	0.0	0	0.00

Percentage Change in Emission Inventories (relative to Ver. 2.5052)							
Cal. Year	**Population**	**VMT**	**ROG_Tot[1]**	**CO_Tot**	**NOx_Tot**	**CO2_Tot**	**PM10_Tot[2]**
1990	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2005	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2014	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2017	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2020	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2023	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type Using Populations

12.19 FINAL EMFAC2011

The final change to the EMFAC2011 emissions inventory is the addition of the diesel fueled truck and bus categories calculated using EMFAC2011-HD to the emissions inventory generated using EMFAC2011-LDV. The combined total from the LDV and HD modules is used as input to EMFAC2011-SG. The impact on emissions is shown below.

Table 12-109. Impact on Statewide Inventory of Change 12.19

Statewide Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2010 ver 2.50.53							
Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	17,402,036	627,215,300	2,380	23,929	1,768	348,170	62.33
2000	20,918,632	772,769,920	1,006	10,192	1,047	403,240	54.73
2005	22,628,922	844,379,140	630	6,135	733	450,340	53.57
2007	23,529,334	874,683,840	552	5,358	656	469,129	53.66
2010	25,124,892	911,216,640	472	4,469	572	486,216	54.04
2014	26,007,884	949,234,750	343	3,123	423	505,382	54.11
2017	26,820,658	982,844,990	278	2,438	344	524,108	55.40
2020	27,702,826	1,017,386,400	238	1,997	286	542,793	57.11
2023	28,553,862	1,048,442,400	216	1,741	249	561,027	58.82

Statewide Summer Episodic On-Road Motor Vehicle Inventories with EMFAC-HD (Calculated Using EMFAC2011 SG)							
Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	17,696,484	655,347,606	2,510	24,857	2,405	402,387	127.06
2000	21,316,586	813,291,572	1,069	10,580	1,930	475,088	92.00
2005	23,099,492	892,024,442	698	6,574	1,647	534,252	92.33
2007	23,992,395	923,818,396	613	5,747	1,492	555,905	89.04
2010	25,524,283	953,028,822	516	4,767	1,115	558,459	80.17
2014	26,496,651	1,000,024,272	372	3,322	861	594,951	69.90
2017	27,359,099	1,040,528,213	304	2,602	675	626,221	68.42
2020	28,261,858	1,079,010,873	263	2,149	543	651,853	70.11
2023	29,134,444	1,113,870,536	240	1,883	422	676,661	72.08

Difference (SG - Ver. 2.5053) in Statewide Emission Inventories (tons per day)							
Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	294,448	28,132,306	130.4	928.0	636.2	54,216	64.74
2000	397,954	40,521,652	62.9	388.0	882.7	71,848	37.27
2005	470,570	47,645,302	67.9	438.7	914.4	83,912	38.76
2007	463,061	49,134,556	60.6	388.5	835.4	86,776	35.37
2010	399,391	41,812,182	43.9	298.5	543.5	72,243	26.13
2014	488,767	50,789,522	29.6	199.1	438.2	89,569	15.79
2017	538,441	57,683,223	25.3	164.4	331.7	102,113	13.01
2020	559,032	61,624,473	24.4	151.7	256.6	109,060	13.01
2023	580,582	65,428,136	23.6	141.7	173.7	115,633	13.26

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.5053)							
Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1.69%	4.49%	5.48%	3.88%	35.98%	15.57%	103.87%
2000	1.90%	5.24%	6.25%	3.81%	84.30%	17.82%	68.08%
2005	2.08%	5.64%	10.78%	7.15%	124.75%	18.63%	72.37%
2007	1.97%	5.62%	10.98%	7.25%	127.28%	18.50%	65.91%
2010	1.59%	4.59%	9.31%	6.68%	95.02%	14.86%	48.35%
2014	1.88%	5.35%	8.65%	6.37%	103.52%	17.72%	29.17%
2017	2.01%	5.87%	9.10%	6.75%	96.54%	19.48%	23.49%
2020	2.02%	6.06%	10.26%	7.59%	89.61%	20.09%	22.78%
2023	2.03%	6.24%	10.92%	8.14%	69.86%	20.61%	22.55%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-110. Impact on Sacramento Valley Air Basin Inventory of Change 12.19

Sacramento Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2010 ver 2.50.53							
Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,237,256	45,631,808	196.2	2,052.9	135.6	25,321	4.47
2000	1,479,047	56,912,088	82.9	857.8	80.9	29,735	3.92
2005	1,656,074	64,188,484	54.1	524.2	61.6	35,212	4.10
2007	1,772,208	67,571,552	49.2	472.8	57.2	37,322	4.20
2010	1,921,162	70,735,288	43.4	402.2	51.4	39,009	4.27
2014	2,013,171	75,488,296	31.1	277.5	37.9	41,421	4.36
2017	2,098,532	79,107,024	25.0	215.2	30.7	43,495	4.50
2020	2,186,689	82,271,032	21.2	176.0	25.5	45,142	4.65
2023	2,275,619	85,172,008	19.3	153.4	21.9	46,740	4.81
Sacramento Summer Episodic On-Road Motor Vehicle Inventories with EMFAC-HD (Calculated Using EMFAC2011 SG)							
Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,266,806	48,108,360	207.7	2,112.8	189.3	30,144	10.11
2000	1,517,285	60,388,742	87.8	874.5	154.9	36,091	6.96
2005	1,702,055	68,337,230	60.0	558.3	139.3	42,720	7.28
2007	1,818,000	71,857,110	54.5	504.2	127.7	45,073	7.06
2010	1,960,623	74,371,974	47.3	426.4	98.3	45,466	6.45
2014	2,061,356	79,886,220	33.6	293.0	75.3	49,355	5.67
2017	2,151,771	84,095,784	27.0	227.9	58.3	52,508	5.60
2020	2,242,308	87,602,648	23.1	187.6	46.3	54,771	5.74
2023	2,333,593	90,811,038	21.2	164.1	36.8	56,920	5.89
Difference (SG - Ver. 2.5053) in Statewide Emission Inventories (tons per day)							
Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	29,550	2,476,552	11.5	59.9	53.7	4,824	5.64
2000	38,238	3,476,654	4.9	16.7	74.0	6,356	3.04
2005	45,981	4,148,746	5.9	34.1	77.7	7,508	3.18
2007	45,792	4,285,558	5.3	31.5	70.5	7,751	2.86
2010	39,461	3,636,686	3.9	24.2	46.9	6,458	2.18
2014	48,185	4,397,924	2.5	15.5	37.4	7,934	1.32
2017	53,239	4,988,760	2.0	12.7	27.7	9,013	1.09
2020	55,619	5,331,616	1.9	11.6	20.9	9,629	1.08
2023	57,974	5,639,030	1.9	10.7	14.9	10,179	1.09
Percentage Change in Statewide Emission Inventories (relative to Ver. 2.5053)							
Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	2.39%	5.43%	5.86%	2.92%	39.64%	19.05%	126.25%
2000	2.59%	6.11%	5.87%	1.95%	91.45%	21.38%	77.43%
2005	2.78%	6.46%	10.98%	6.51%	126.16%	21.32%	77.42%
2007	2.58%	6.34%	10.78%	6.66%	123.25%	20.77%	68.20%
2010	2.05%	5.14%	9.07%	6.02%	91.36%	16.55%	50.91%
2014	2.39%	5.83%	7.96%	5.59%	98.87%	19.15%	30.21%
2017	2.54%	6.31%	8.18%	5.90%	90.25%	20.72%	24.27%
2020	2.54%	6.48%	9.10%	6.60%	81.96%	21.33%	23.22%
2023	2.55%	6.62%	9.78%	6.96%	67.96%	21.78%	22.60%
ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.							
PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.							
Fuel[3] - VMT Matching by Fuel Type							

Table 12-111. Impact on San Diego Air Basin Inventory of Change 12.19

San Diego Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2010 ver 2.50.53							
Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,545,039	55,695,720	212.1	2,157.4	159.2	33,364	5.83
2000	1,849,785	70,049,760	77.9	816.6	87.3	36,463	4.79
2005	1,984,103	74,943,112	47.9	492.3	56.5	39,496	4.65
2007	2,067,644	77,550,736	42.1	431.8	52.0	41,574	4.68
2010	2,210,591	80,286,288	36.3	360.1	45.9	42,742	4.70
2014	2,293,489	83,253,688	27.2	256.0	34.3	44,276	4.70
2017	2,354,498	85,480,472	22.6	202.1	28.1	45,456	4.78
2020	2,416,712	87,704,976	19.6	167.1	23.6	46,601	4.89
2023	2,507,908	91,308,160	18.0	148.7	20.8	48,624	5.09

San Diego Summer Episodic On-Road Motor Vehicle Inventories with EMFAC-HD (Calculated Using EMFAC2011 SG)							
Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,563,181	57,264,281	216.1	2,169.3	192.0	36,353	9.34
2000	1,874,347	72,291,135	80.4	826.3	133.3	40,476	6.82
2005	2,012,525	77,498,458	50.4	502.0	102.0	44,007	6.64
2007	2,098,404	80,362,284	44.4	441.1	96.0	46,504	6.57
2010	2,236,543	82,630,299	37.9	366.5	75.2	46,833	6.08
2014	2,324,015	85,995,798	28.2	260.3	57.4	49,143	5.55
2017	2,387,137	88,513,963	23.5	205.8	45.0	50,859	5.45
2020	2,449,655	90,863,164	20.5	170.8	35.9	52,239	5.54
2023	2,542,202	94,653,759	18.9	152.6	28.8	54,588	5.75

Difference (SG - Ver. 2.5053) in Statewide Emission Inventories (tons per day)							
Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	18,142	1,568,561	4.0	11.9	32.8	2,989	3.51
2000	24,562	2,241,375	2.5	9.7	46.0	4,013	2.03
2005	28,422	2,555,346	2.5	9.7	45.5	4,511	1.99
2007	30,760	2,811,548	2.4	9.3	43.9	4,930	1.89
2010	25,952	2,344,011	1.6	6.4	29.3	4,091	1.38
2014	30,526	2,742,110	1.1	4.3	23.1	4,868	0.85
2017	32,639	3,033,491	0.9	3.6	16.9	5,403	0.67
2020	32,943	3,158,188	0.9	3.7	12.3	5,638	0.65
2023	34,294	3,345,599	0.9	3.9	8.0	5,963	0.66

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.5053)							
Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1.17%	2.82%	1.88%	0.55%	20.61%	8.96%	60.10%
2000	1.33%	3.20%	3.27%	1.19%	52.67%	11.01%	42.43%
2005	1.43%	3.41%	5.18%	1.96%	80.50%	11.42%	42.69%
2007	1.49%	3.63%	5.62%	2.15%	84.43%	11.86%	40.47%
2010	1.17%	2.92%	4.50%	1.78%	63.81%	9.57%	29.41%
2014	1.33%	3.29%	3.90%	1.69%	67.42%	10.99%	18.14%
2017	1.39%	3.55%	3.82%	1.80%	60.14%	11.89%	14.06%
2020	1.36%	3.60%	4.39%	2.23%	52.16%	12.10%	13.24%
2023	1.37%	3.66%	4.92%	2.59%	38.30%	12.26%	12.93%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-112. Impact on San Francisco Bay Air Basin Inventory of Change 12.19

San Francisco Summer Episodic On-Road Motor Vehicle Inventories
(Calculated Using EMFAC2010 ver 2.50.53

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,736,332	131,079,910	519.3	4,888.3	373.1	69,325	12.95
2000	4,482,899	159,858,610	221.7	2,071.9	210.9	80,166	11.49
2005	4,508,814	162,538,700	133.4	1,180.1	142.9	83,789	10.49
2007	4,661,293	166,557,410	116.1	1,025.5	124.0	87,032	10.42
2010	4,838,772	168,633,490	96.5	832.8	103.4	87,523	10.19
2014	4,955,524	173,712,480	69.4	574.2	74.9	89,660	10.07
2017	5,057,204	177,521,460	56.4	442.8	60.0	91,615	10.17
2020	5,169,034	181,332,000	48.2	358.7	49.8	93,575	10.33
2023	5,288,756	185,137,170	43.8	311.2	43.4	95,521	10.54

San Francisco Summer Episodic On-Road Motor Vehicle Inventories with EMFAC-HD
(Calculated Using EMFAC2011 SG)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	3,783,955	134,996,518	530.1	4,929.7	454.4	76,595	21.49
2000	4,547,994	165,491,199	228.3	2,100.5	323.7	89,996	16.60
2005	4,575,209	168,375,048	139.4	1,205.5	248.0	94,043	15.08
2007	4,736,313	173,274,236	122.0	1,050.5	229.5	98,711	14.96
2010	4,901,995	174,234,952	100.6	850.1	175.2	97,218	13.49
2014	5,030,221	180,290,209	72.1	586.2	131.0	101,222	12.17
2017	5,136,821	184,790,054	58.5	452.6	101.2	104,433	11.81
2020	5,249,149	188,906,075	50.3	368.4	80.1	106,962	11.91
2023	5,372,322	193,202,834	46.0	321.0	62.5	109,744	12.14

Difference (SG - Ver. 2.5053) in Statewide Emission Inventories (tons per day)

Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	47,623	3,916,608	10.8	41.4	81.2	7,270	8.53
2000	65,095	5,632,589	6.6	28.6	112.8	9,830	5.11
2005	66,395	5,836,348	6.0	25.4	105.1	10,254	4.59
2007	75,020	6,716,826	5.9	24.9	105.4	11,679	4.54
2010	63,223	5,601,462	4.1	17.3	71.8	9,695	3.30
2014	74,697	6,577,729	2.7	12.0	56.1	11,563	2.09
2017	79,617	7,268,594	2.2	9.8	41.2	12,817	1.64
2020	80,115	7,574,075	2.1	9.7	30.3	13,387	1.57
2023	83,566	8,065,664	2.2	9.8	19.1	14,223	1.60

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.5053)

Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1.27%	2.99%	2.07%	0.85%	21.77%	10.49%	65.86%
2000	1.45%	3.52%	2.96%	1.38%	53.47%	12.26%	44.50%
2005	1.47%	3.59%	4.47%	2.15%	73.60%	12.24%	43.76%
2007	1.61%	4.03%	5.04%	2.43%	85.00%	13.42%	43.51%
2010	1.31%	3.32%	4.23%	2.08%	69.37%	11.08%	32.35%
2014	1.51%	3.79%	3.88%	2.09%	74.99%	12.90%	20.79%
2017	1.57%	4.09%	3.83%	2.22%	68.68%	13.99%	16.15%
2020	1.55%	4.18%	4.42%	2.71%	60.85%	14.31%	15.24%
2023	1.58%	4.36%	4.95%	3.14%	44.00%	14.89%	15.23%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-113. Impact on San Joaquin Valley Air Basin Inventory of Change 12.19

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2010 ver 2.50.53							
Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,216,824	45,962,660	191.4	2,103.3	144.0	25,635	4.46
2000	1,718,132	67,534,608	93.6	1,002.9	101.0	35,758	4.66
2005	1,939,609	76,538,128	64.3	642.8	77.4	42,902	4.89
2007	2,107,607	82,480,304	59.5	590.4	73.6	46,836	5.12
2010	2,322,059	87,957,792	54.1	514.1	65.5	49,582	5.28
2014	2,447,596	94,888,152	39.5	357.3	48.6	53,188	5.45
2017	2,583,723	101,152,060	32.1	278.9	39.7	56,818	5.73
2020	2,741,452	107,784,100	27.5	230.9	33.3	60,773	6.07
2023	2,907,917	114,356,050	25.2	204.4	29.1	64,529	6.43

San Joaquin Summer Episodic On-Road Motor Vehicle Inventories with EMFAC-HD (Calculated Using EMFAC2011 SG)							
Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1,269,165	52,198,974	214.1	2,204.0	285.3	38,521	20.07
2000	1,786,636	76,444,639	105.4	1,052.8	305.6	53,043	12.95
2005	2,026,950	87,485,059	76.8	697.9	293.5	63,828	13.65
2007	2,193,674	93,877,396	70.8	640.8	272.9	68,665	13.14
2010	2,396,408	97,700,102	62.0	549.5	194.8	67,933	11.39
2014	2,541,218	106,873,471	44.6	381.6	152.7	76,061	9.05
2017	2,689,189	114,919,482	36.7	300.9	116.4	83,058	8.67
2020	2,853,066	122,652,744	32.4	253.6	91.9	89,052	9.06
2023	3,024,536	130,172,967	30.3	227.8	69.6	94,551	9.47

Difference (SG - Ver. 2.5053) in Statewide Emission Inventories (tons per day)							
Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	52,341	6,236,314	22.7	100.7	141.3	12,886	15.61
2000	68,504	8,910,031	11.8	49.9	204.7	17,286	8.29
2005	87,341	10,946,931	12.5	55.1	216.1	20,926	8.76
2007	86,067	11,397,092	11.3	50.4	199.3	21,829	8.03
2010	74,349	9,742,310	7.9	35.4	129.3	18,351	6.11
2014	93,622	11,985,319	5.2	24.3	104.2	22,873	3.60
2017	105,466	13,767,422	4.6	22.0	76.8	26,240	2.93
2020	111,614	14,868,644	4.8	22.7	58.6	28,279	2.99
2023	116,619	15,816,917	5.1	23.4	40.4	30,022	3.05

Percentage Change in Statewide Emission Inventories (relative to Ver. 2.5053)							
Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	4.30%	13.57%	11.87%	4.79%	98.12%	50.27%	349.78%
2000	3.99%	13.19%	12.60%	4.98%	202.70%	48.34%	177.69%
2005	4.50%	14.30%	19.41%	8.58%	279.33%	48.78%	179.11%
2007	4.08%	13.82%	19.01%	8.53%	270.72%	46.61%	156.83%
2010	3.20%	11.08%	14.56%	6.89%	197.46%	37.01%	115.63%
2014	3.83%	12.63%	13.08%	6.79%	214.55%	43.00%	66.00%
2017	4.08%	13.61%	14.44%	7.89%	193.67%	46.18%	51.18%
2020	4.07%	13.79%	17.57%	9.84%	175.80%	46.53%	49.22%
2023	4.01%	13.83%	20.11%	11.43%	138.85%	46.52%	47.39%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type

Table 12-114 . Impact on South Coast Air Basin Inventory of Change 12.19

South Coast Summer Episodic On-Road Motor Vehicle Inventories (Calculated Using EMFAC2010 ver 2.50.53							
Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,232,260	248,651,890	906.4	8,803.5	669.6	139,697	25.01
2000	8,526,977	298,739,360	366.5	3,666.8	388.6	158,538	21.49
2005	9,485,378	336,339,490	233.1	2,271.2	267.1	179,481	21.20
2007	9,664,210	341,888,290	196.2	1,899.3	227.4	181,800	20.72
2010	10,242,853	353,053,950	162.7	1,539.1	190.9	186,342	20.60
2014	10,573,581	361,797,660	119.1	1,086.4	142.3	191,037	20.39
2017	10,852,563	371,091,390	97.4	851.5	116.0	196,390	20.74
2020	11,138,933	380,855,680	83.2	694.5	96.5	201,442	21.24
2023	11,354,451	387,191,140	74.9	598.8	84.0	205,853	21.63
South Coast Summer Episodic On-Road Motor Vehicle Inventories with EMFAC-HD (Calculated Using EMFAC2011 SG)							
Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	7,334,677	257,490,447	933.1	8,922.0	853.6	156,396	44.03
2000	8,669,709	311,684,446	381.7	3,739.3	645.9	180,639	33.60
2005	9,655,054	351,679,769	248.8	2,342.8	535.9	205,753	33.67
2007	9,817,110	356,588,945	209.6	1,961.8	461.5	207,271	31.38
2010	10,375,851	365,619,731	171.4	1,581.1	337.4	207,790	28.03
2014	10,736,194	377,184,908	125.3	1,117.1	267.1	217,827	25.08
2017	11,031,711	388,633,894	103.0	879.7	216.2	227,094	24.74
2020	11,324,682	399,639,267	88.9	723.3	177.1	234,309	25.28
2023	11,545,941	407,150,864	80.4	626.8	134.8	240,730	25.79
Difference (SG - Ver. 2.5053) in Statewide Emission Inventories (tons per day)							
Cal. Year	Population	VMT (mi/d)	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	102,417	8,838,557	26.7	118.5	184.0	16,699	19.02
2000	142,732	12,945,086	15.2	72.5	257.3	22,101	12.10
2005	169,676	15,340,279	15.6	71.7	268.8	26,271	12.47
2007	152,900	14,700,655	13.5	62.5	234.1	25,471	10.66
2010	132,998	12,565,781	8.7	41.9	146.6	21,448	7.43
2014	162,613	15,387,248	6.2	30.7	124.8	26,790	4.69
2017	179,148	17,542,504	5.6	28.2	100.2	30,705	4.00
2020	185,749	18,783,587	5.7	28.9	80.6	32,867	4.04
2023	191,490	19,959,724	5.5	28.0	50.8	34,877	4.15
Percentage Change in Statewide Emission Inventories (relative to Ver. 2.5053)							
Cal. Year	Population	VMT	ROG_Tot[1]	CO_Tot	NOx_Tot	CO2_Tot	PM10_Tot[2]
1990	1.42%	3.55%	2.94%	1.35%	27.48%	11.95%	76.07%
2000	1.67%	4.33%	4.16%	1.98%	66.20%	13.94%	56.32%
2005	1.79%	4.56%	6.70%	3.16%	100.65%	14.64%	58.79%
2007	1.58%	4.30%	6.87%	3.29%	102.96%	14.01%	51.48%
2010	1.30%	3.56%	5.38%	2.72%	76.78%	11.51%	36.07%
2014	1.54%	4.25%	5.21%	2.83%	87.69%	14.02%	22.97%
2017	1.65%	4.73%	5.75%	3.31%	86.38%	15.63%	19.29%
2020	1.67%	4.93%	6.85%	4.16%	83.49%	16.32%	19.02%
2023	1.69%	5.16%	7.40%	4.68%	60.53%	16.94%	19.20%

ROG_Tot[1] - This includes running, starting, idle exhaust emissions and emissions from all evaporative processes.

PM10_Tot[2] - Total emissions from running, starting, idle processes, and from tire wear and brake wear.

Fuel[3] - VMT Matching by Fuel Type