



On-Road Motor Vehicle Emissions Inventory Workshop



Agenda

- ◆ Welcome / Introductions
- ◆ Need for an Updated On-Road Vehicle Emissions Inventory
- ◆ Summary of the Most Current On-Road Motor Vehicle Emissions Inventory (EMFAC2001 v2.08)
- ◆ Possible Modifications to the Emissions Inventory
- ◆ Lunch
- ◆ Possible Modification Discussions (continued)
- ◆ EMFAC2001 v2.08
 - ▢ Overview of Features
 - ▢ Discussion of the What If? Scenario Generator
- ◆ Overview of QA Plan and Documentation/Website Development
- ◆ END

Welcome and Introductions

- ◆ Bob Fletcher, Chief, Planning and Technical Support Division
- ◆ Mark Carlock, Chief, Mobile Source Analysis Branch
(mcarlock@arb.ca.gov)
- ◆ Jeff Long, Manager, Analysis Section (jlong@arb.ca.gov)
- ◆ Archana Agrawal, Manager, Off-Road Modeling and Assessment Section (aagrwal@arb.ca.gov)
- ◆ Dilip Patel, Programming Coordinator, Analysis Section (dpatel@arb.ca.gov)
- ◆ Tess Sicut, Documentation Coordinator, Transportation Activity Section (msicut@arb.ca.gov)

- ◆ Website: <http://www.arb.ca.gov/msei/msei.htm>

Modeling History

- ◆ **EMFAC7F**
 - Υ Basis of most regional SIPs (September, 1993)
- ◆ **MVEI7G1.0c**
 - Υ Basis of the South Coast SIP (July, 1997)
- ◆ **Version 2.02**
 - Υ Official EMFAC2000 (November, 2000)
- ◆ **Version 2.06**
 - Υ Used for Santa Barbara SIP (July, 2001)
- ◆ **Version 2.07**
 - Υ Used in Benefits Analysis for ZEV Amendments (Oct., 2001)
- ◆ **Version 2.08**
 - Υ Latest Working Version



- ◆ Modeled Evaporative Emissions by Time of Day
- ◆ Updated Basic Emission Rates / Speed Correction and Temperature Correction Factors
- ◆ Updated Cumulative Mileage Curves and Travel Activity
- ◆ Added Phase II Gasoline and Oxygenate Benefits

- ◆ Added Cycle Correction Factors
- ◆ Added CO2 to the model
- ◆ Improved Starts Methodology - Start Activity
- ◆ Added Clean Diesel Fuel Benefits
- ◆ Added GUI Interface

- ◆ County Specific Fleet Characterization
- ◆ Expanded Age Distribution
- ◆ Addition of School Bus and Motor Home Classes
- ◆ Twenty Four Hourly Periods of Analysis
- ◆ Monthly Inventory Estimation
- ◆ Addition of Idle Emission Rates
- ◆ Addition of Evaporative “Liquid Leakers”
- ◆ Added “smoking” vehicles to PM inventory
- ◆ Switch to cycle based (UDDS) Heavy-duty Vehicle Inventory
- ◆ Updated I/M Benefit Estimates

- ◆ Presented to the Board in July, 2001, during SB 2174 Hearing
- ◆ Used by Santa Barbara in their SIP Submittal
- ◆ Inadvertently Added Diesel Start Emissions
- ◆ Corrected Diurnal Emissions Equation
- ◆ Corrected Hot Soak Normalization Issue
- ◆ Corrected Non-Catalyst Equipped/Catalyst Equipped Fleet Split
- ◆ Added Additional Chassis Dynamometer Data for Heavy-Duty Gasoline Powered Trucks
- ◆ Included LEVII and TIERII Programs

EMFAC2001 v2.06 (continued)

- ◆ Added Evaporative Emissions for ZEVs
- ◆ Added New Standards for Urban Buses
- ◆ Modified the Air Conditioning Correction Factors based on Public Comment
- ◆ Updated Idle Emission Rates
- ◆ Corrected Gasoline and Diesel Tech Fraction Problem
- ◆ Updated School Bus Activity Estimates
- ◆ Updated Unregistered Vehicle Estimates
- ◆ Revised Activity for Santa Barbara/North Central Coast/MTC/ San Diego/ and portions of San Joaquin Valley

- ◆ Used in the LEVII/TIERII Analysis
- ◆ Corrected Anomaly in the I/M Benefits Calculation
- ◆ Adjusted the Fuel Correction Factors for Low Sulfur Diesel
- ◆ Corrected the Benefit Estimate for USEPA's 2007+ Heavy Duty Standards
- ◆ Modified the Benefit Estimate for LEVII/TIERII
- ◆ Included SCAG Activity Information

- ◆ Eliminated Diesel Start Emissions
- ◆ Removed SCAG Activity Information



EMFAC V2.08 FEATURES

- ◆ Inventories for 1970 to 2040
- ◆ 13 Vehicle Classes
- ◆ 45 Model Years within a Calendar Year
- ◆ 69 Geographic Areas
- ◆ 24 Hourly Periods
- ◆ 12 Months
- ◆ 3 Seasons
- ◆ 7 Pollutants
- ◆ 7 Processes
- ◆ 3 Fuel Types

POLLUTANTS and PROCESSES



◆ POLLUTANTS

- Υ HC / CO / NO_x / PM / CO₂ / LEAD / SO_x
- Υ HC = ROG / TOG / CH₄
- Υ PM = TOTAL / PM₁₀ / PM_{2.5}

◆ PROCESSES (EXHAUST)

- Υ RUNNING EXHAUST
- Υ START EMISSIONS
- Υ IDLE EMISSIONS

◆ PROCESSES (EVAPORATIVE)

- Υ RUNNING LOSSES
- Υ HOT SOAK
- Υ DIURNAL
- Υ RESTING LOSSES

Vehicle Classes

Code	Description	Weight Class	Abbreviation
PC	Passenger Car	All	LDA
T1	Light-Duty Truck	0-3,750	LDT1
T2	Light-Duty Truck	3,751-5,750	LDT2
T3	Medium-Duty Truck	5,751-8,500	MDV
T4	Light-Heavy-Truck	8,501-10,000	LHDT1
T5	Light-Heavy-Truck	10,001-14,000	LHDT2
T6	Medium-Heavy-Truck	14,001-33,000	MHDT
T7	Heavy-Heavy-Truck	33,001-60,000	HHDT
T8	Line-Haul Vehicle	60,000+	LHV
UB	Urban Bus	All	UB
MC	Motorcycle	All	MCY
SB	School Bus	All	SBUS
MH	Motor Home	All	MH

EMISSION FACTORS (Exhaust)



Most Data From
Surveillance

Over 5,000 gasoline
powered vehicles

FTP and UC Test

I/M / Speed / Temp



EMISSION FACTORS (Evaporative)



About 1,800 Vehicles
Tested

(ARB/EPA/CRC/Auto Oil)

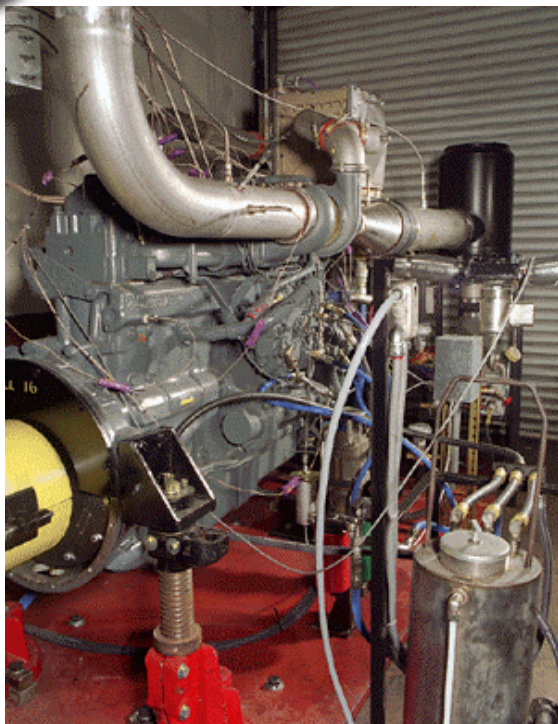
Different Temperatures

Different Fuels

Different Durations



EMISSION FACTORS (Heavy-Duty)



Previous estimates based on engine dynamometer results (30+ Engines)

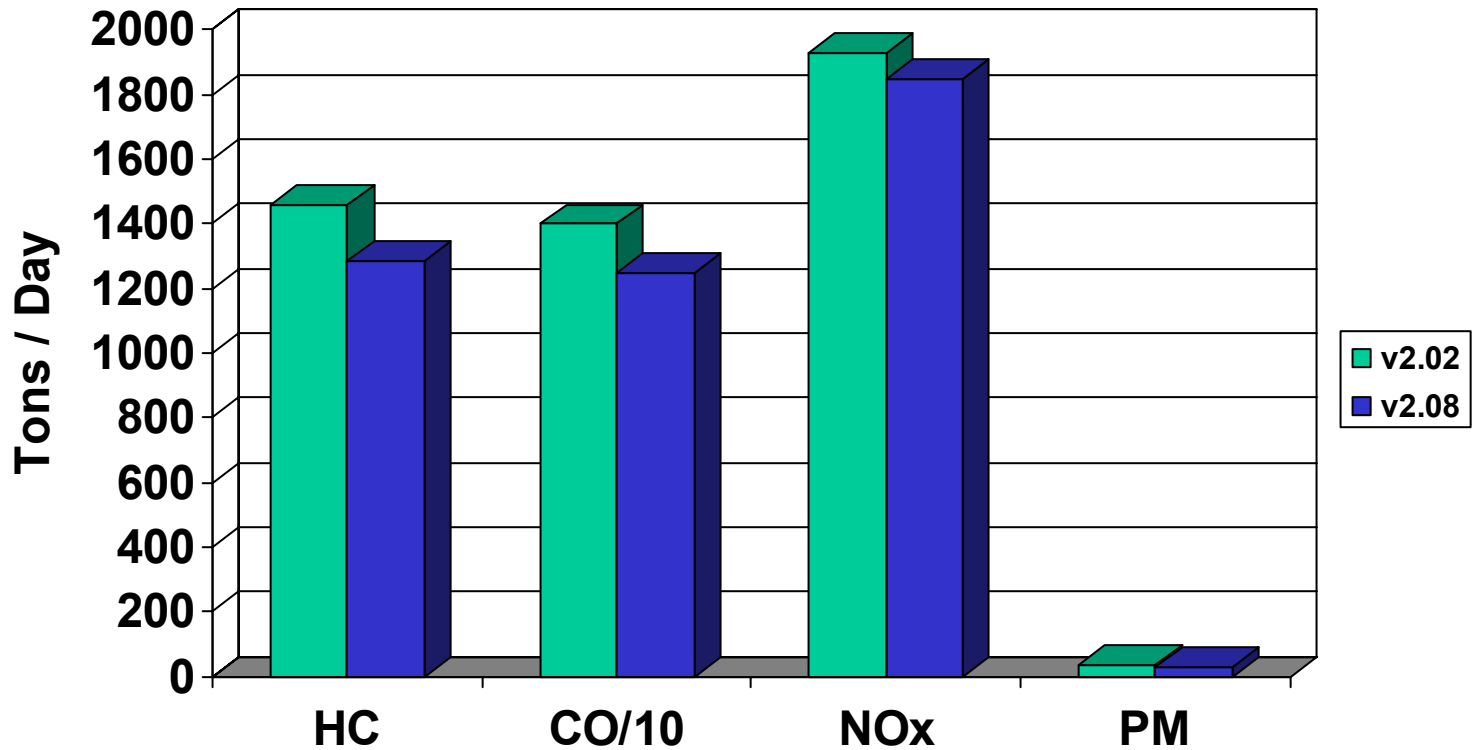
Current Inventory based upon chassis dynamometer Tests UDDS (75 Vehicles)



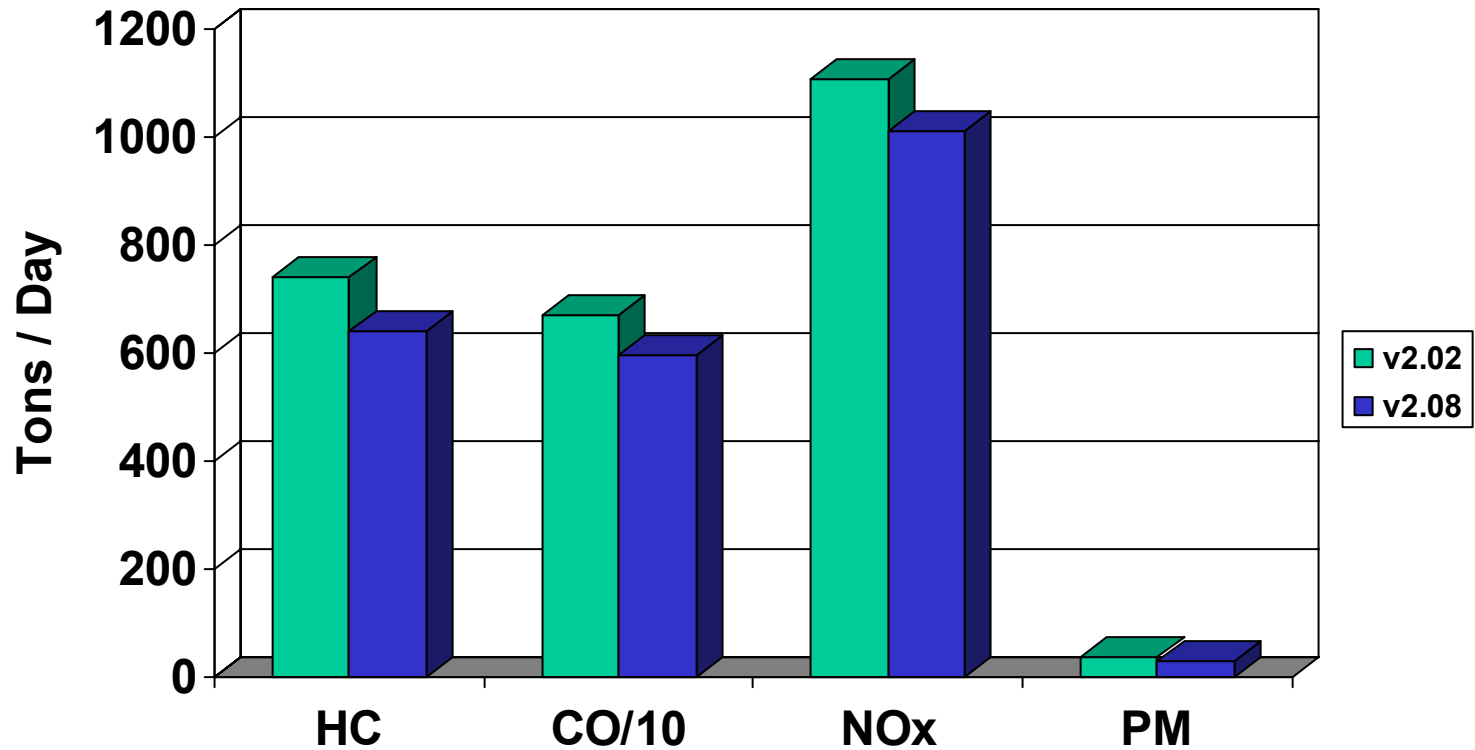
50 Vehicle Test Program on New Cycle - CRC



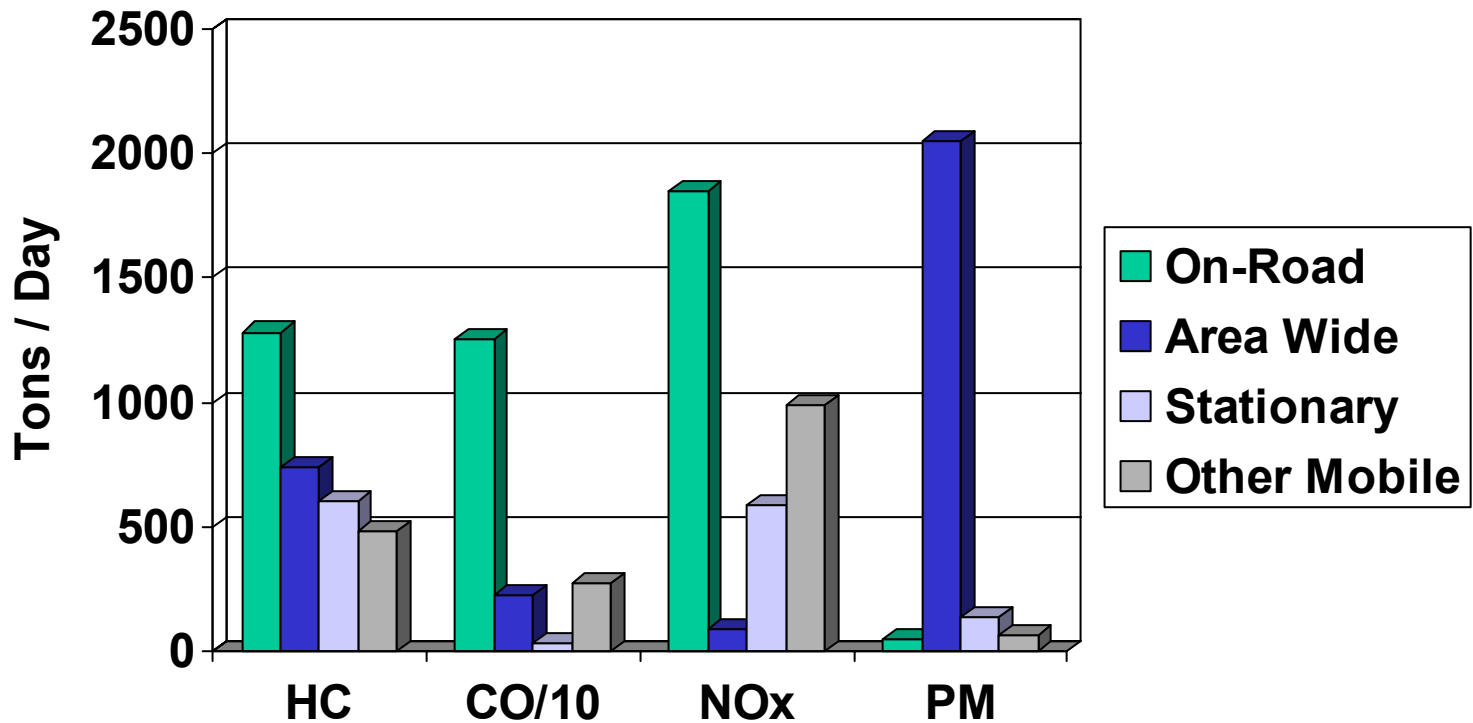
EMISSIONS INVENTORY – STATEWIDE 2000



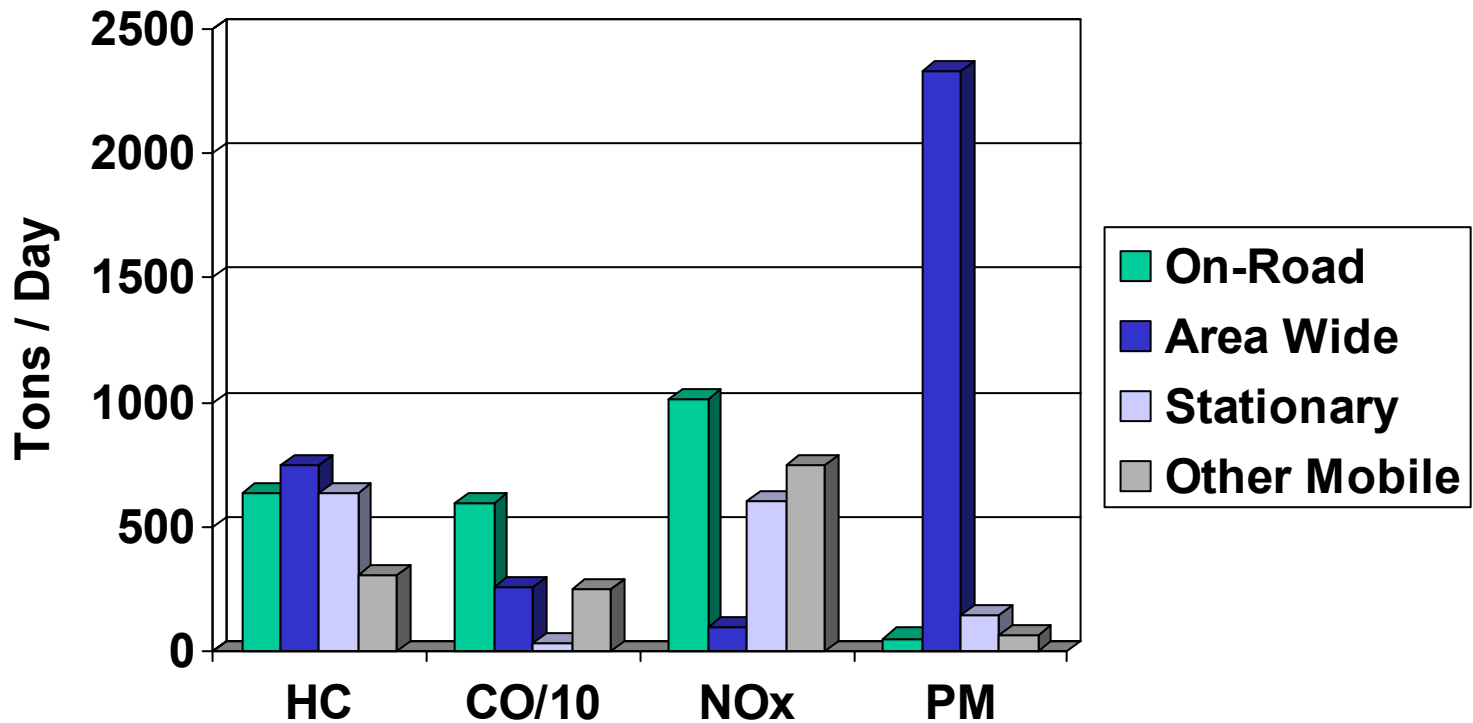
EMISSIONS INVENTORY – STATEWIDE 2010



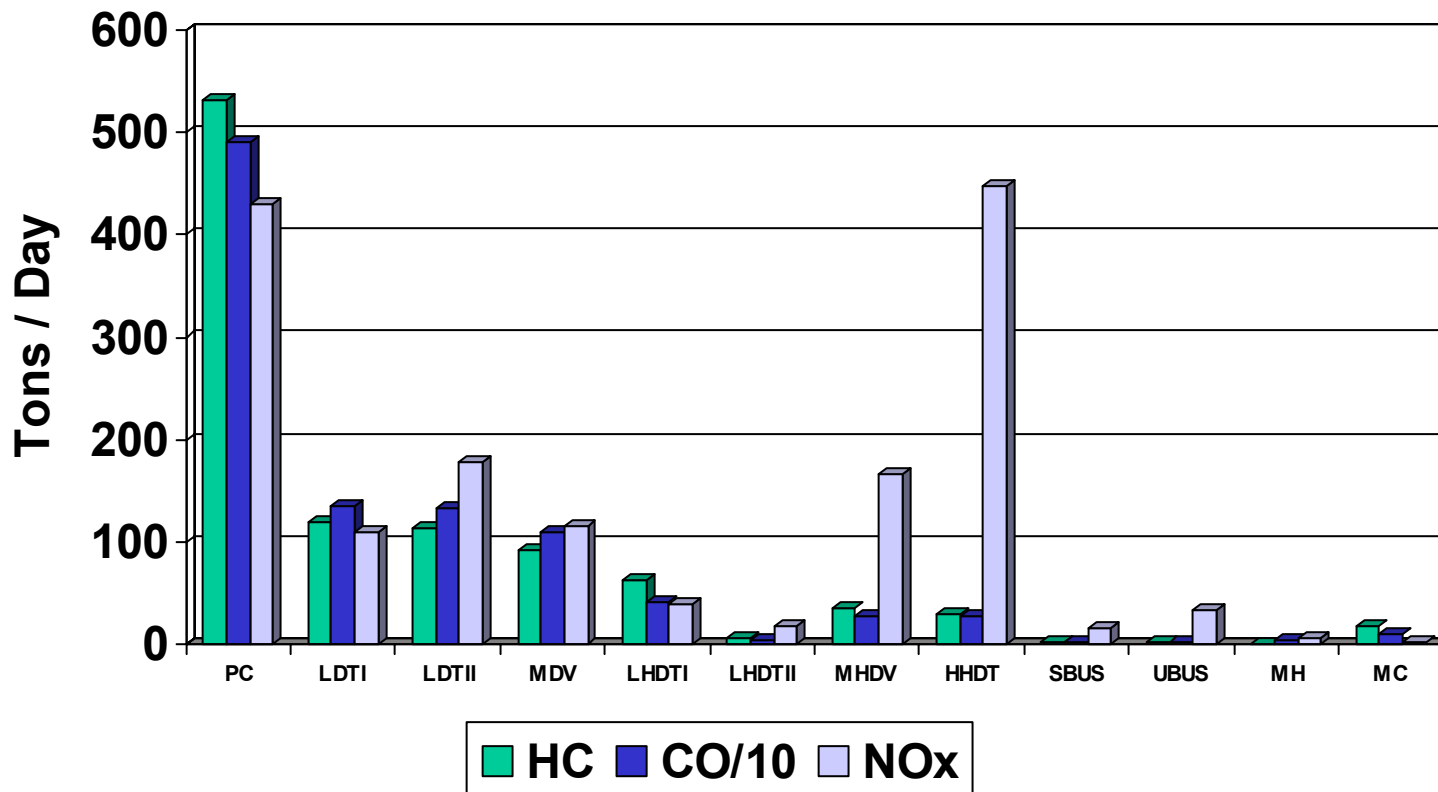
EMISSIONS INVENTORY – STATEWIDE 2000



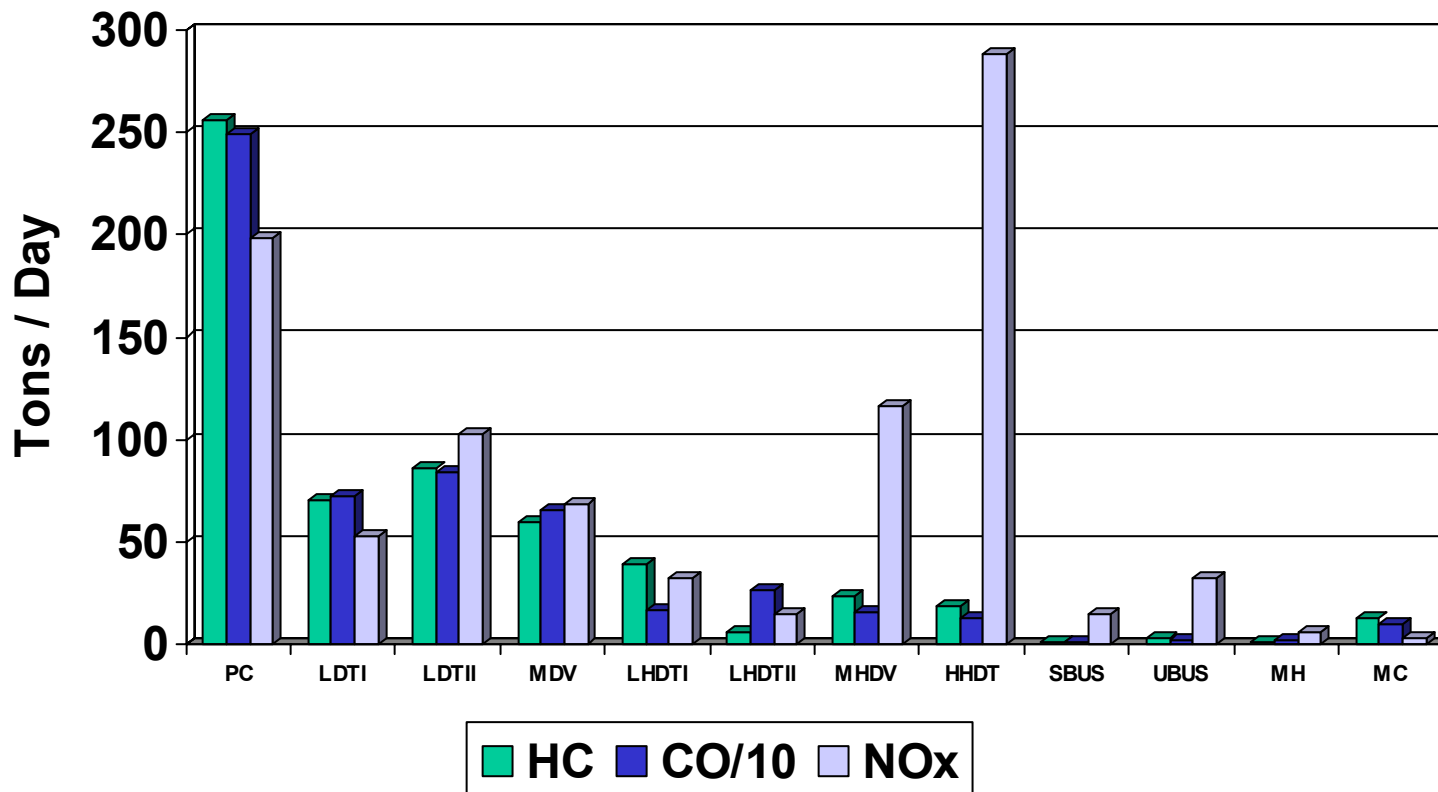
EMISSIONS INVENTORY – STATEWIDE 2010



INVENTORY BY CLASS – STATEWIDE 2000 (v2.08)

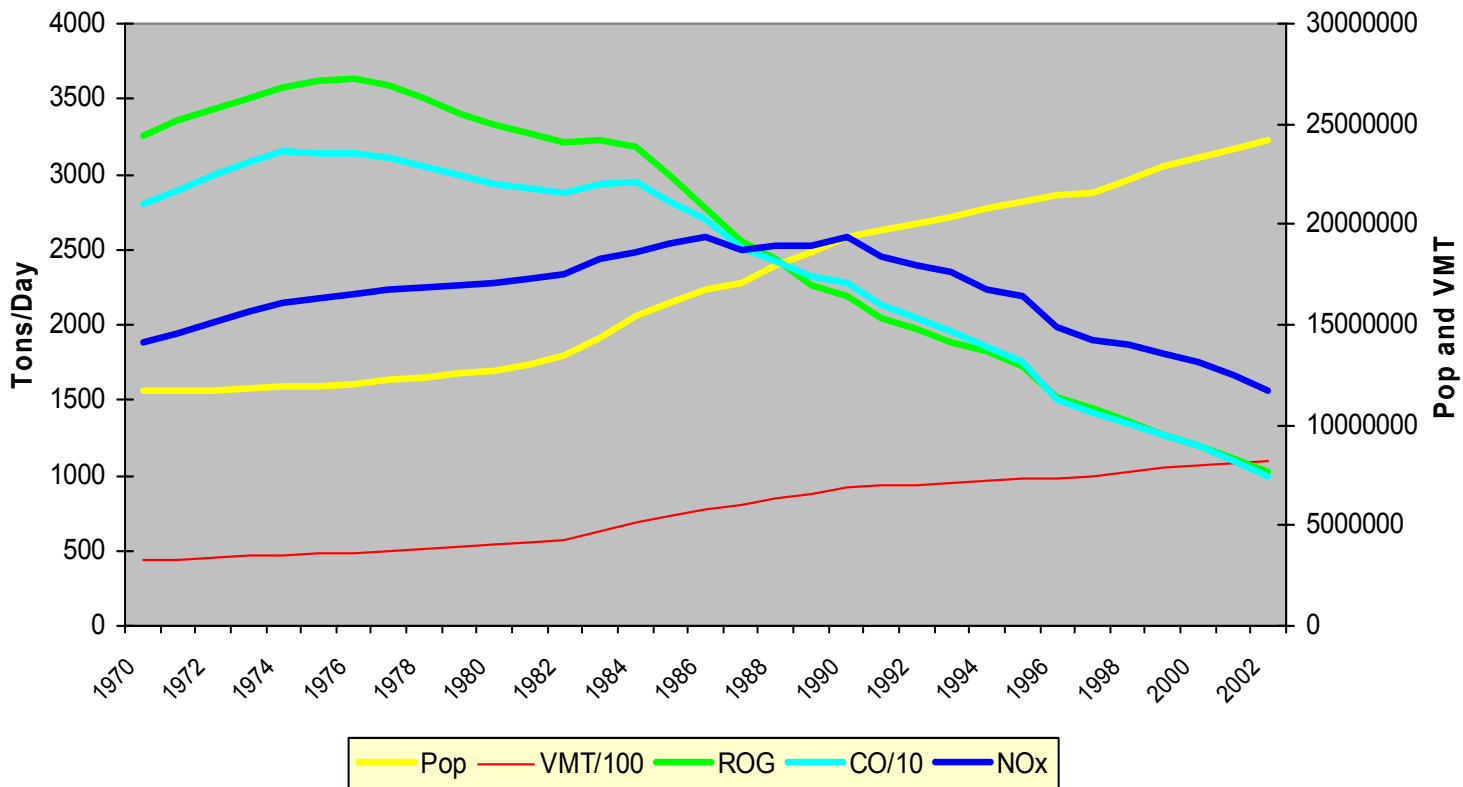


INVENTORY BY CLASS – STATEWIDE 2010 (v2.08)



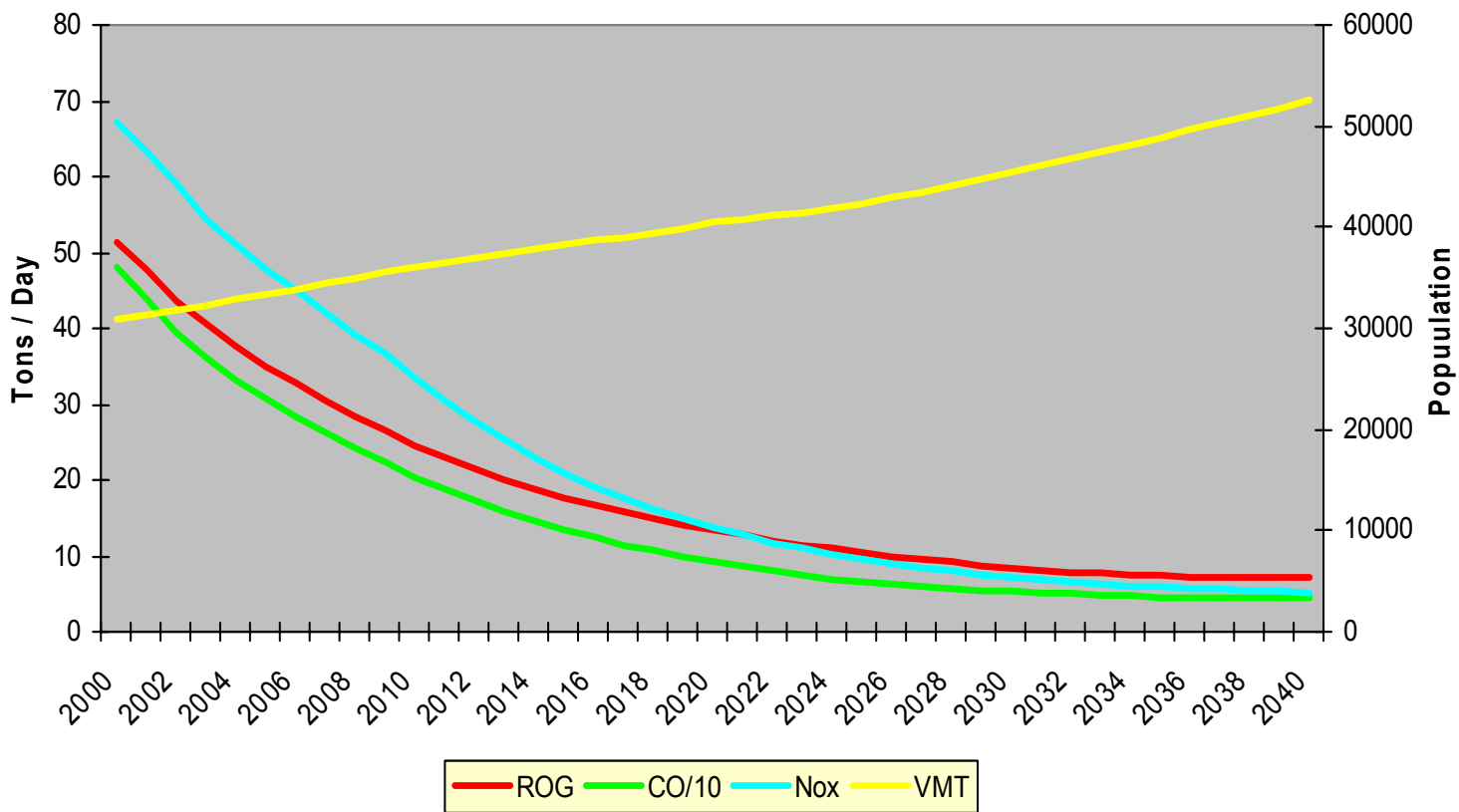
EMISSION TREND ANALYSIS (PAST)

STATEWIDE ON-ROAD MOBILE SOURCE EMISSIONS



EMISSIONS TREND ANALYSIS (FUTURE)

SOUTH COAST AIR BASIN ON-ROAD MOBILE SOURCE EMISSIONS



POSSIBLE MODIFICATIONS TO THE EMISSIONS INVENTORY

- ◆ Revised Implementation Schedule for LEVII Evap
- ◆ Correct Usage Rates for School Buses
- ◆ Correct Monthly Average Gasoline RVP
- ◆ Correction to 2007+ HDD Emission Rates
- ◆ Extended Idle for Heavy-Duty Trucks
- ◆ Extended Idle for School Buses
- ◆ Update Population and Registration Distributions
- ◆ Update Activity Information
 - Υ SCAG/MTC/SJVAB/SACOG/NCC

Revised Implementation Schedule for LEVII

BACKGROUND

- ◆ Exhaust and Evaporative Emissions Technology Groups are modeled independently in EMFAC
- ◆ EMFAC2001 v2.06 was updated to include modifications in response to changes to ARB's LEVII and U.S. EPA's Tier II programs
- ◆ Exhaust Tech Fractions Were Properly Modified - EVAP Tech Fractions Were Not
- ◆ EMFAC2001 v2.06-2.08 has too few PZEVs

Revised Implementation Schedule for LEVII PROPOSAL

- ◆ Align Evaporative and Exhaust Tech Group Fractions
- ◆ Proposed change would shift assumed new-car sales from near-zero evaporative emissions to zero-evaporative emission vehicles (PZEV)

Revised Implementation Schedule for LEVII INVENTORY EFFECTS

ROG Emission Effects Due to Evap Tech Changes - Statewide, Summer Episodic

Calendar Year	On-Road Evaporative Emissions Change					Change All On-road
	(tons/day)					
	Diurnal	Hot Soak	Running	Resting	Total	
2000	0.00	0.00	0.00	0.00	0.00	0%
2010	-0.04	-0.03	0.02	-0.06	-0.10	0%
2020	-0.65	-0.76	-1.80	-0.92	-4.13	-1%
2030	-1.70	-2.00	-5.34	-2.40	-11.44	-5%

Correct Usage Rates for School Buses

BACKGROUND

- ◆ EMFAC runs on an hourly basis
- ◆ EMFAC2000 assumes School Buses activity is limited to morning and afternoon peaks. However, VMT and Trips were assumed to occur throughout the day.
- ◆ EMFAC2001 v2.06-2.08 properly applied speed profiles (morning/afternoon) Statewide but did not restrict VMT and Trips.
- ◆ Implication - VMT and Trips were spread throughout the day, but because there was no activity outside the morning/afternoon peaks, the associated emissions were effectively “dropped”.

Correct Usage Rates for School Buses PROPOSAL

- ◆ Apply School Bus VMT and Trips only to the appropriate hours of operation (morning/afternoon peak), for all portions of the state.
- ◆ Affects Running Exhaust, Starts, Hot Soak, and Running Loss Emissions

Correct Usage Rates for School Buses

INVENTORY EFFECTS

Statewide Emissions Effects - Summer Episodic

Calendar Year	Reactive Organic Gases (tons per day) from School Buses						% Increase To Sbus Inventory	% Increase To Total* Inventory
	Exhaust		Evaporative Emissions					
	Running	Starts	Diurnal	Hot Soak	Run-Loss	Resting		
1980	2.72	0.20	0.00	0.05	0.53	0.00	154%	0.1%
1990	1.80	0.14	0.00	0.04	0.26	0.00	156%	0.1%
2000	1.20	0.08	0.00	0.01	0.15	0.00	167%	0.1%
2010	0.92	0.05	0.00	0.01	0.06	0.00	168%	0.2%
2020	0.77	0.03	0.00	0.01	0.03	0.00	171%	0.2%
Calendar Year	Carbon Monoxide (tons per day) from School Buses						% Increase To Sbus Inventory	% Increase To Total* Inventory
	Running	Starts						
1980	57.27	1.80	0.00	0.00	0.00	0.00	161%	0.2%
1990	35.67	1.61	0.00	0.00	0.00	0.00	162%	0.2%
2000	19.37	1.03	0.00	0.00	0.00	0.00	171%	0.2%
2010	10.87	0.71	0.00	0.00	0.00	0.00	180%	0.2%
2020	6.45	0.50	0.00	0.00	0.00	0.00	194%	0.3%

Correct Usage Rates for School Buses

INVENTORY EFFECTS - continued

Statewide Emissions Effects - Summer Episodic

Calendar Year	Oxides of Nitrogen (tons per day) from School Buses						% Increase To Sbus Inventory	% Increase To Total* Inventory
	Running	Starts						
1980	5.94	0.01	0.00	0.00	0.00	0.00	211%	0.3%
1990	9.27	0.03	0.00	0.00	0.00	0.00	219%	0.4%
2000	10.56	0.03	0.00	0.00	0.00	0.00	232%	0.6%
2010	10.89	0.02	0.00	0.00	0.00	0.00	235%	1.1%
2020	9.00	0.02	0.00	0.00	0.00	0.00	235%	2.1%

Calendar Year	Particulate Matter (PM10) (tons per day) from School Buses						% Increase To Sbus Inventory	% Increase To Total* Inventory
	Running	Starts		PMTW	PMBW			
1980	0.25	0.00	0.00	0.01	0.01	0.00	217%	0.6%
1990	0.39	0.00	0.00	0.01	0.01	0.00	228%	0.6%
2000	0.39	0.00	0.00	0.02	0.02	0.00	233%	0.8%
2010	0.44	0.00	0.00	0.01	0.01	0.00	235%	0.8%
2020	0.48	0.00	0.00	0.01	0.01	0.00	248%	0.8%

(* Total refers to emissions from all vehicle classes)

Correct Monthly Average Gasoline RVP

BACKGROUND

- ◆ EMFAC calculates monthly, summer (ozone episodic), winter (CO episodic), and annual average inventories
- ◆ The volatility of the dispensed gasoline is stored in EMFAC as a function of calendar year, month and county. The RVPs are predicted from historical relationships between Nominal and Empirical RVPs.
- ◆ State regulations (13 CCR §§2262 and 2262.4(a)(2)) require refiners starting in 1996 to produce and sell low-volatility gasoline (less than 7 psi RVP) in the summer ozone months.
- ◆ EMFAC currently predicts RVPs exceeding 7 psi for some phase-in months.


Correct Monthly Average Gasoline RVP BACKGROUND - continued

- ◆ The maximum monthly RVP was being used for the winter episodes rather than an average RVP of the winter months
- ◆ Changing the RVPs of individual months necessitates a change in the episodic and annual average RVPs
- ◆ Summer Episodic Estimates unaffected


Correct Monthly Average Gasoline RVP PROPOSAL

- ◆ Reduce Predicted Monthly RVPs to below 7.0 psi during control periods (RVP = 6.8 psi)
- ◆ Redefine RVP for winter episodes to be the mean of the RVPs for winter months
- ◆ Affected Areas Include
 - Υ Placer/Humboldt/Trinity/San Mateo/Fresno
 - Υ San Luis Obispo/ Imperial
- ◆ Recalculate episodic and annual average RVPs for all areas of the state

Correct Monthly Average Gasoline RVP INVENTORY EFFECTS



	Change in ROG in 2010 (Tons per Day)				
Season	SCAB	SB Co.	SFAB	SAC Co.	Statewide
Annual Average	0.00	-0.03	-0.28	-0.14	-2.40
Winter Episodic	-21.30	-0.50	-7.90	-1.60	-45.60
Summer Episodic	0.00	0.00	0.00	0.00	0.00



Correction to 2007+ HDD Emission Rates

BACKGROUND

- ◆ Recently adopted standards call for significant reduction in emission from Heavy-Duty-Diesel Vehicles
- ◆ Although current model reflects standard change for HC, CO and NOx - Changes in PM not currently included



Correction to 2007+ HDD Emission Rates PROPOSAL

- ◆ Reflect impact of standards on PM
- ◆ Other Proposed Changes
 - Υ Include recently collected test data
 - Υ Modify deterioration rate data

Correction to 2007+ HDD Emission Rates PROPOSAL

- ◆ Heavy-Heavy Diesel Found to be “Cleaner” Than Medium-Heavy-Duty Vehicles for some model Years.
- ◆ Add Test Results of Five Additional Vehicles (Two 1998 and Three 2000 model Year)
- ◆ Correct Deterioration for all Model Year Groups

Correction to 2007+ HDD Emission Rates PROPOSAL NOx Emission Factors in Grams/Mile



Heavy-Heavy Duty Diesel Vehicle NOx in Grams per Mile						
	Current		Proposed		Current	Proposed
Model Yr.	ZM	DR	ZM	DR	100K	100K
1998	23.01	.037	28.99	.031	23.38	29.30
1999-02	13.36	.013	18.72	.031	13.49	19.03
2003-06	6.68	.007	9.36	.015	6.75	9.51
2007+	0.67	.007	0.94	.002	0.74	0.96

Deterioration Rates (DRs) Are Expressed as g/mi/10K miles

Correction to 2007+ HDD Emission Rates INVENTORY EFFECTS (Statewide tons/day in 2010)

	HC	CO	NOx	PM
	Medium-Heavy-Duty Diesels			
Current	3.56	24.61	99.13	3.71
Proposed	3.42	20.42	98.08	3.02
% Difference	-4	-17	-1	-19
	Heavy-Heavy-Duty Diesels			
Current	2.60	57.58	282.9	6.77
Proposed	1.79	63.79	347.2	6.50
% Difference	-31	11	23	-4

Correction to 2007+ HDD Emission Rates INVENTORY EFFECTS (Statewide tons/day in 2020)

	HC	CO	NOx	PM
	Medium-Heavy-Duty Diesels			
Current	2.60	20.61	40.73	4.13
Proposed	1.79	9.91	37.56	1.28
% Difference	-31	-52	-8	-69
	Heavy-Heavy-Duty Diesels			
Current	7.95	38.58	96.83	7.15
Proposed	7.49	27.12	120.50	2.52
% Difference	-6	-30	24	-65

Extended Idle for Heavy-Heavy-Diesel Trucks

BACKGROUND

- ◆ EMFAC includes only idle activity associated with “idle trips”
 - Υ (Key on to Key-off events with no appreciable movement)
- ◆ Total idle time was restricted to avoid possible double counting
- ◆ Analysis of second by second activity data from 84 instrumented trucks suggest that idle is underestimated in EMFAC

Extended Idle for Heavy-Heavy-Diesel Trucks PROPOSAL

- ◆ Increase the per trip idle time for heavy-heavy-duty diesel trucks from 5 minutes per trip to 21 minutes per trip.
- ◆ Decrease the number of trips per day from approximately 10 to 5.
- ◆ The proposed change would ascribe an average of 105 minutes of idle per vehicle per day.

Extended Idle for Heavy-Duty Trucks INVENTORY EFFECTS

Heavy-Heavy-Duty Diesel Truck Idle Emissions (Tons per Day) S_t atewide - 2002

	HC	CO	NOx	PM10
Current	0.16	1.03	3.14	0.09
Proposed	1.33	8.37	25.7	0.76
Difference	1.17	7.34	22.5	0.67

Extended Idle for School Buses BACKGROUND

- ◆ Measures are being considered to limit idle time for school buses
- ◆ Idle emissions for school buses are not currently included in EMFAC

Extended Idle for School Buses PROPOSAL

- ◆ Incorporate idle activity based on chase studies into the inventory
- ◆ This would add about 32 minutes of idle per bus per day

Pick up Students:

5.75 Stops * 1.38 Minutes of Idle/Stop = 7.94 (Morning)

Unload Bus at School 7.94 (Morning)

Load Bus at School 7.94 (Afternoon)

Drop off Students:

5.75 Stops * 1.38 Minutes of Idle/Stop = 7.94 (Afternoon)
Min. of Idle/Day

**Addition of School Bus Idle
Tons per Day Statewide in 2002**

	HC	CO	NOx	PM10
GASOLINE	0.10	0.60	0.01	0.00
DIESEL	0.05	0.36	1.10	0.02
TOTAL	0.15	0.96	1.11	0.02

Update Population and Registration Distributions

BACKGROUND

- ◆ EMFAC employs vehicle population and registration distribution information from California's Department of Motor Vehicles.
- ◆ Version 2.08 contains data from 1997 to 1998 calendar year data.
- ◆ EMFAC backcasts from the oldest data and forecasts from the most recent data

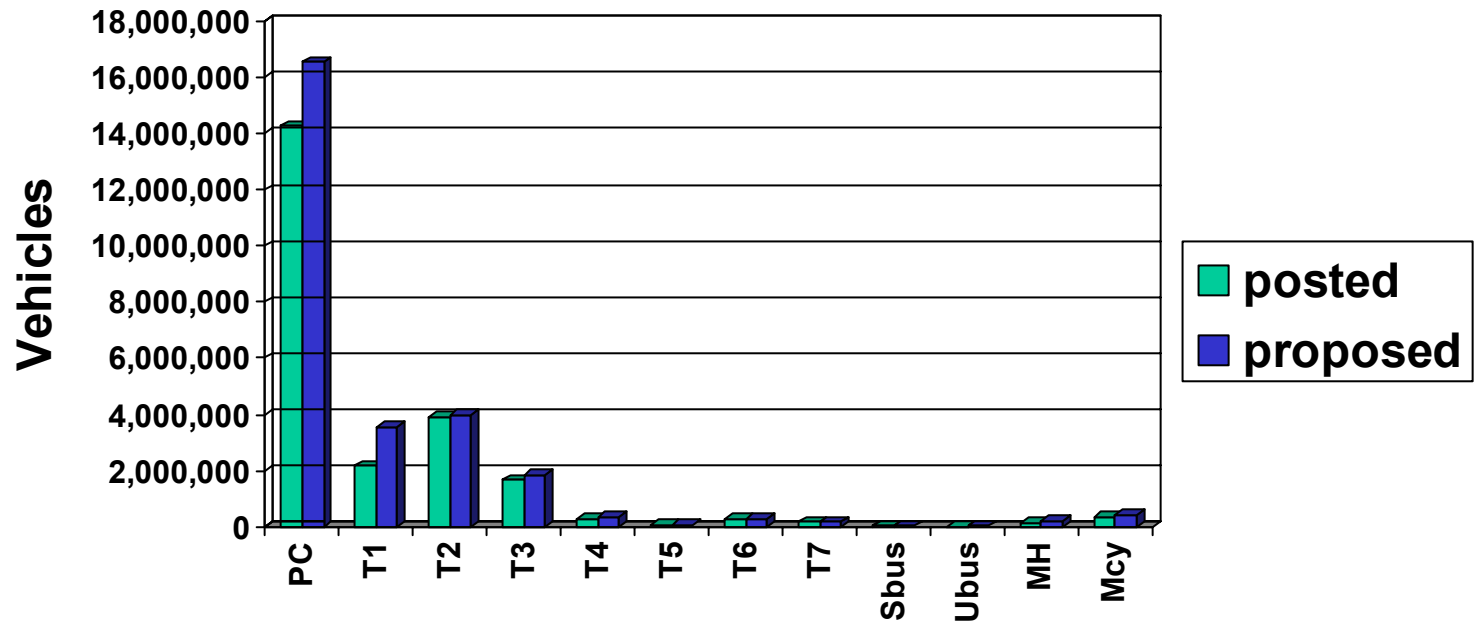
Update Population and Registration Distributions PROPOSAL

- ◆ Update the fleet characterization information with latest DMV data.



Update Population and Registration Distributions PROPOSAL

Statewide Population Year 2000 (v2.08)



Update Population and Registration Distributions INVENTORY EFFECTS

- ◆ Statewide Population Year 2000 as predicted by v2.08 = 23,306,205
- ◆ Statewide Population Year 2000 according to analysis of DMV data = 27,627,173
- ◆ Analysis of current data suggests a 18.5% increase in vehicle population.
- ◆ Increases in population result in increases in “per-vehicle” emission (Evaporative, Starting, tire wear, brake wear)

Update Activity Information BACKGROUND

- ◆ Local Planning Agencies Periodically Update Activity Data
- ◆ ARB adjusts population and/or mileage accrual rates to match provided VMTs
- ◆ Speed Distributions

Update Activity Information PROPOSAL

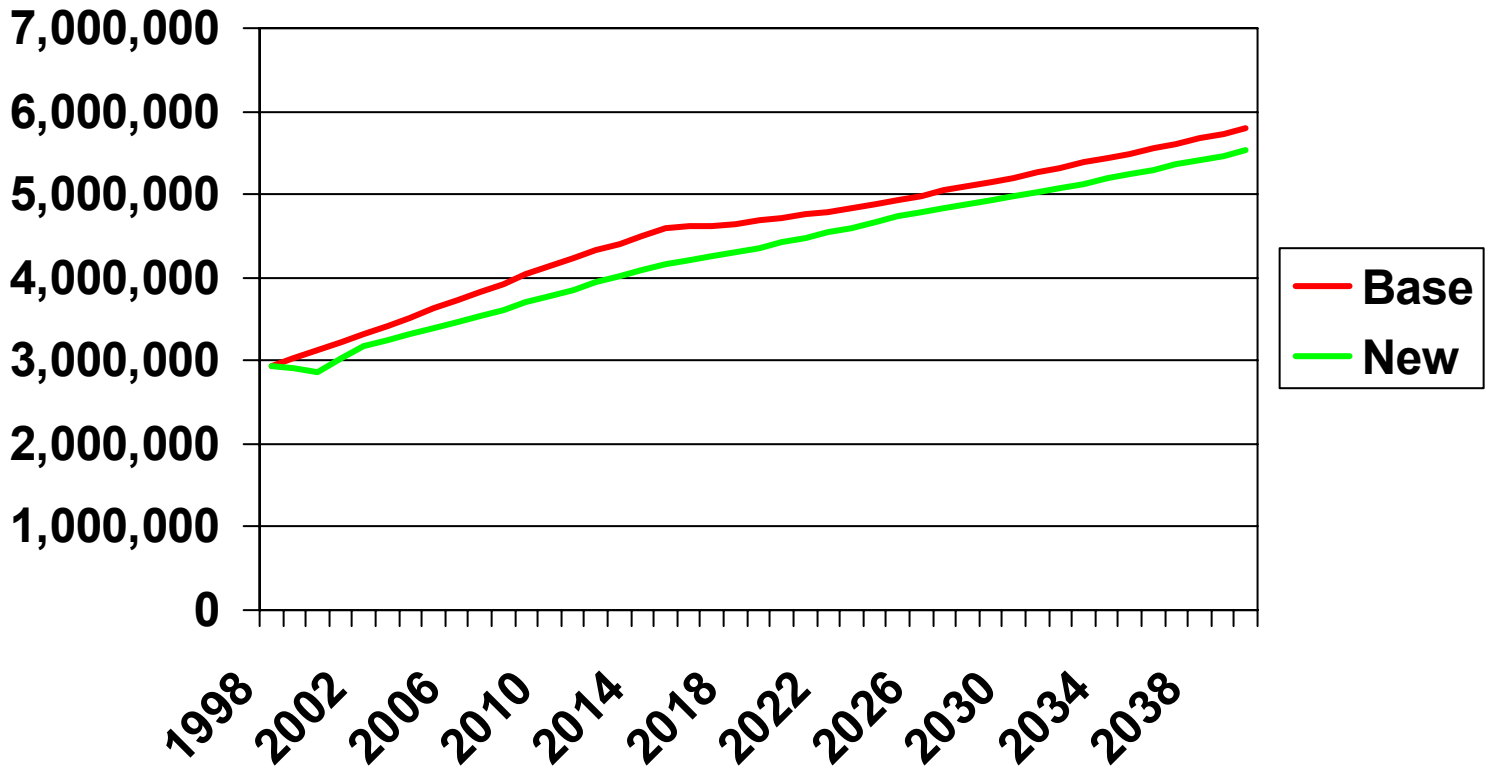
- ◆ Update EMFAC with the latest Speed and VMT data

UPDATED ACTIVITY DATA

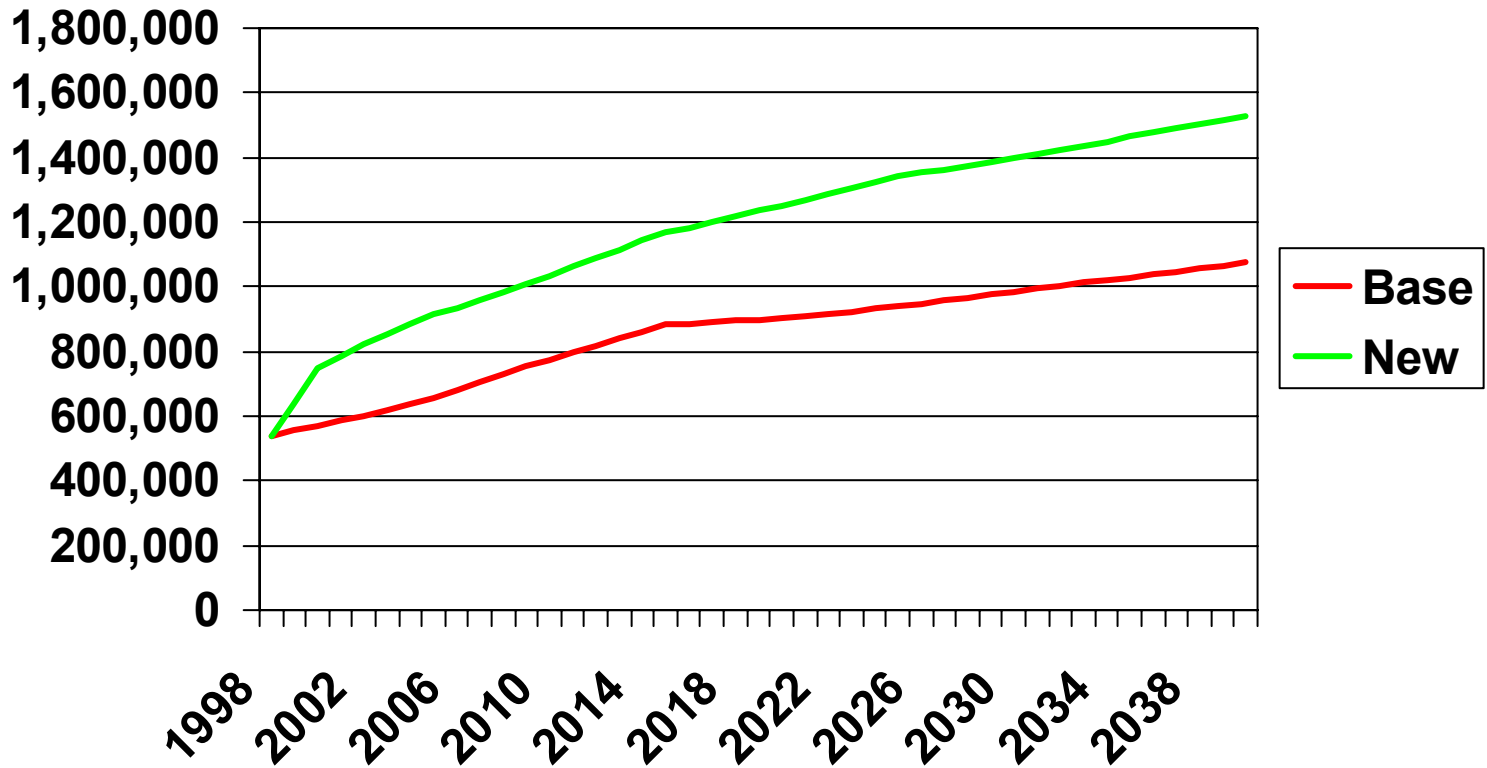
UPDATED ACTIVITY		
AIR BASINS	COUNTIES	Calendar Years VMT/SPEED
Mojave Desert	Kern	1998,2005,2015,2025
Mountain Counties	El Dorado	2000,2002,2005,2015,2025
	Placer	2000,2002,2005,2015,2025
North Central Coast	Monterey	2000,2010,2020,2025
	San Benito	2000,2010,2020,2025
	Santa Cruz	2000,2010,2020,2025
Sacramento Valley	Placer	2000,2002,2005,2015,2025
	Sacramento	2000,2002,2005,2015,2025
	Yolo	2000,2002,2005,2015,2025
	Yuba	2000,2002,2005,2015,2025
San Francisco Bay Area	Alameda	2000,2005,2010,2020,2025
	Contra Costa	2000,2005,2010,2020,2025
	Marin	2000,2005,2010,2020,2025
	Napa	2000,2005,2010,2020,2025
	San Francisco	2000,2005,2010,2020,2025
	San Mateo	2000,2005,2010,2020,2025
	Santa Clara	2000,2005,2010,2020,2025
	Solano	2000,2005,2010,2020,2025
San Joaquin Valley	Kern	1998,2005,2015,2025
	Madera	2000,2002,2005,2015,2020,2025
	Merced	2000,2002,2005,2015,2020,2025
	San Joaquin	1999,2002,2005,2015,2025
	Stanislaus	1999,2002,2005,2006,2015,2020,2025



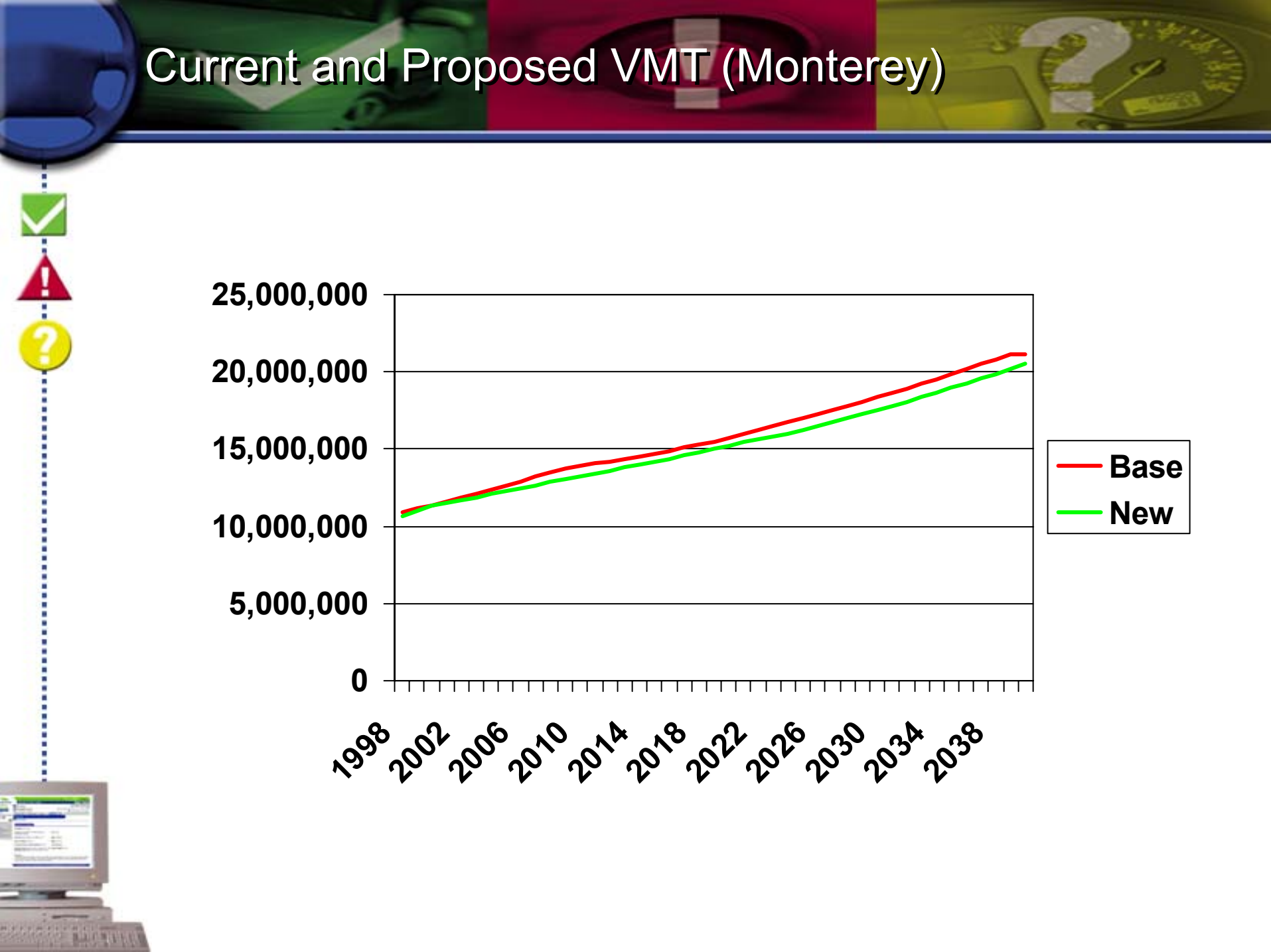
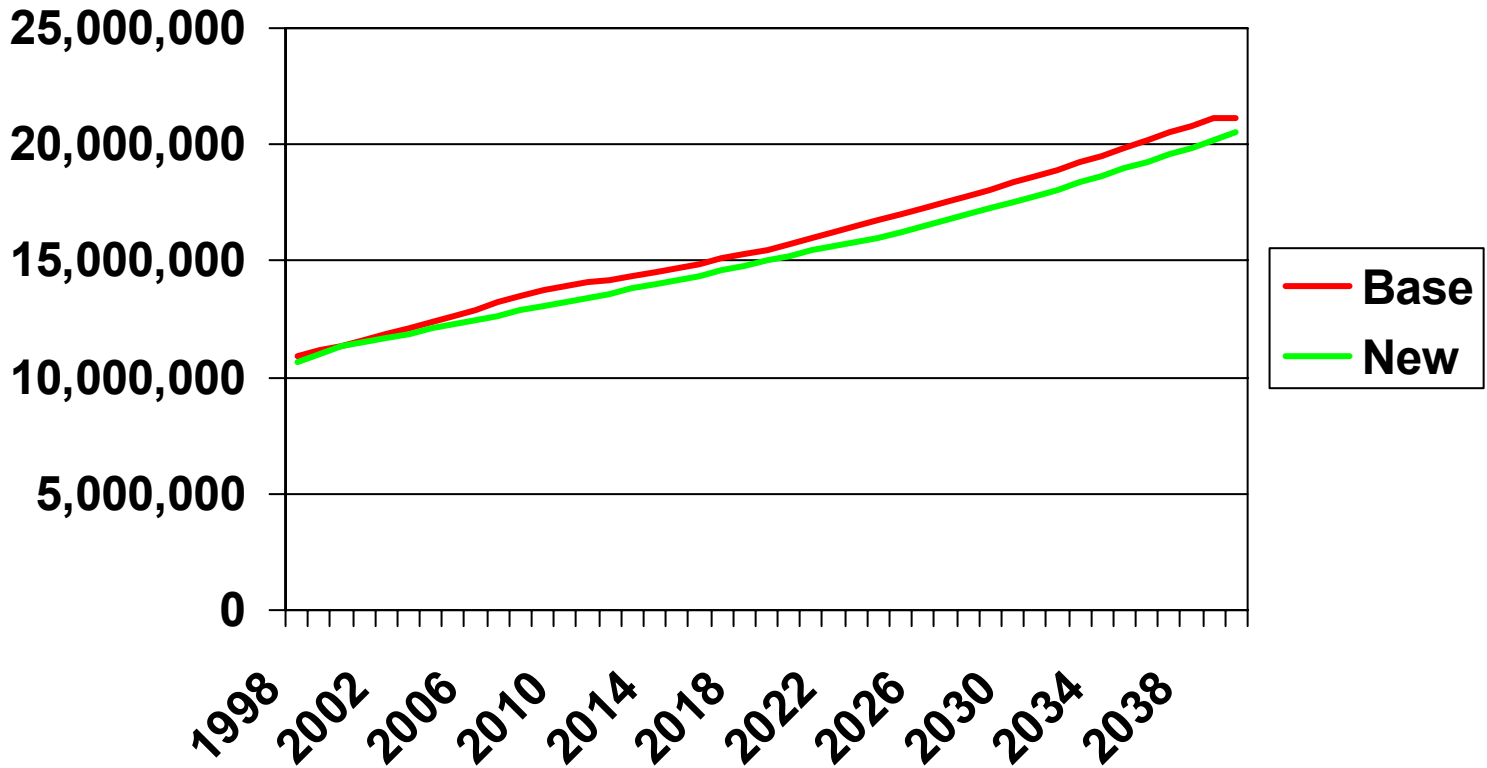
Current and Proposed VMT (El Dorado)



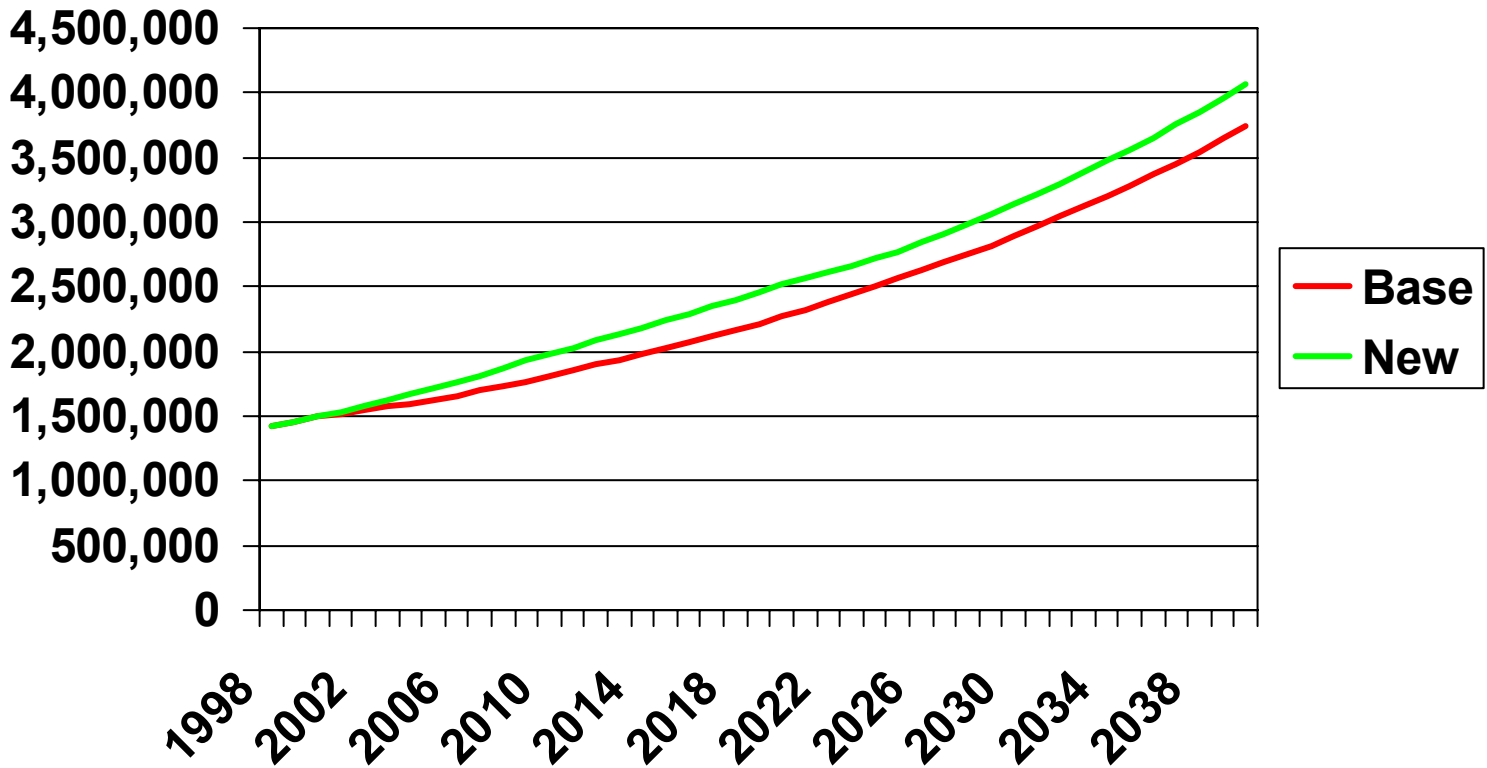
Current and Proposed VMT (Placer-Mountain)



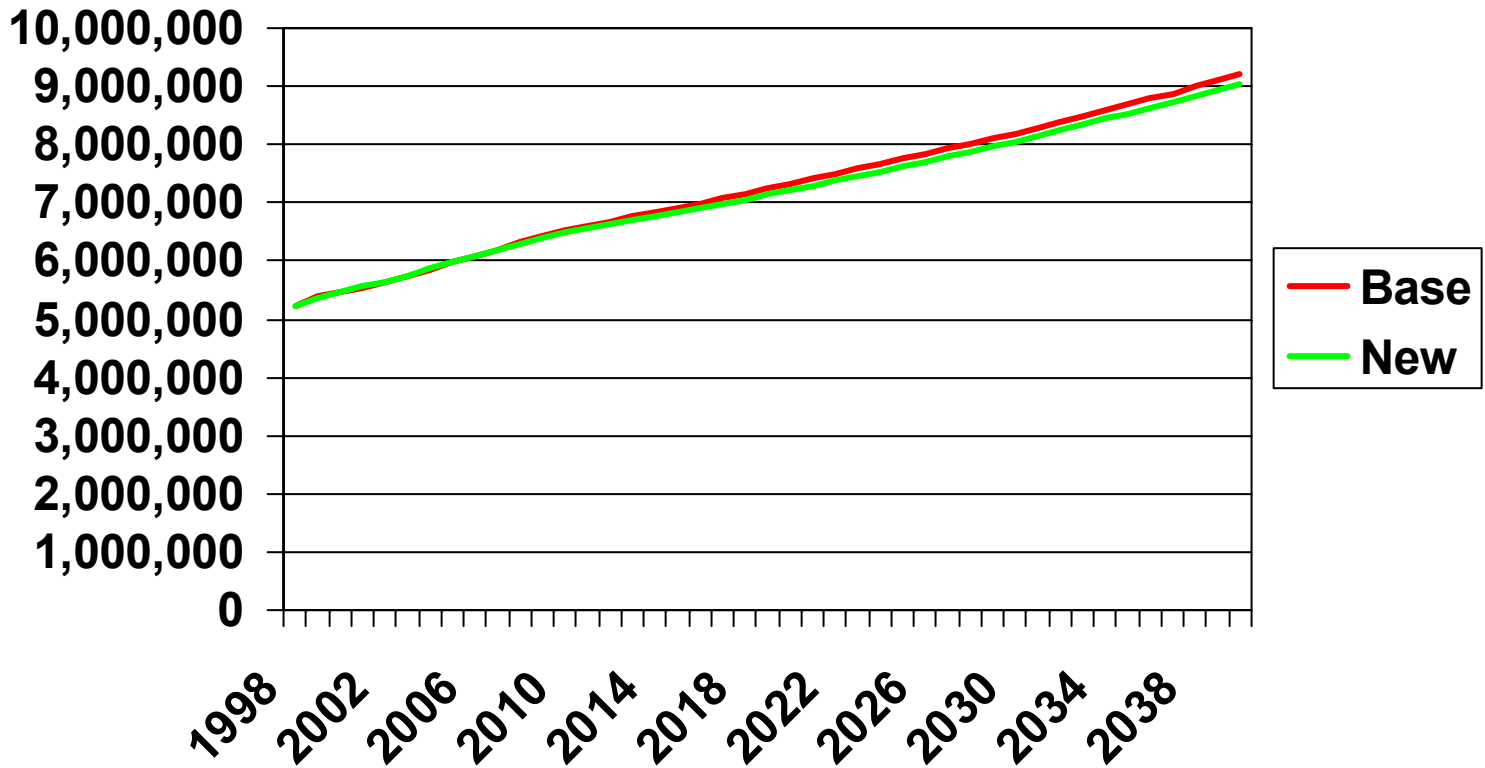
Current and Proposed VMT (Monterey)



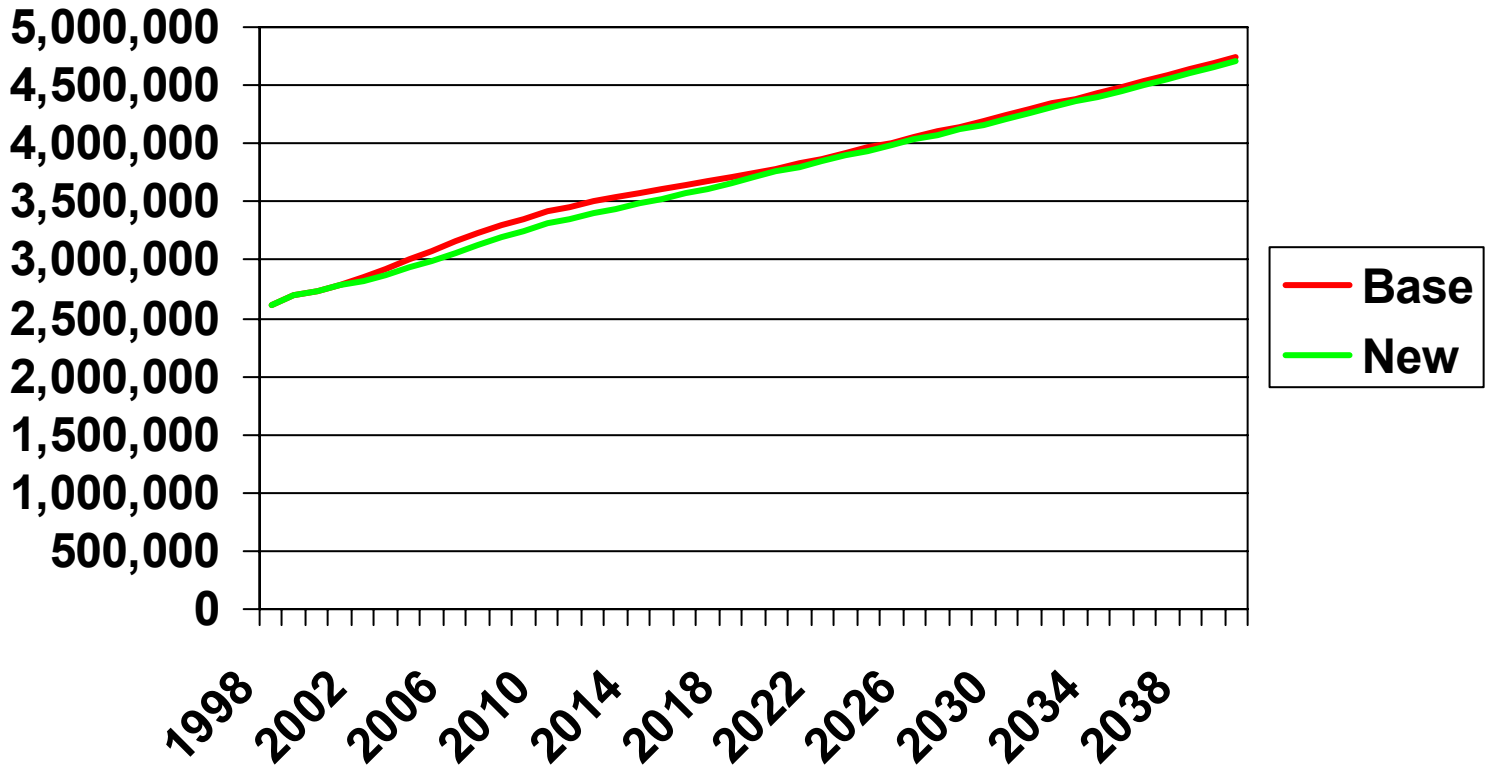
Current and Proposed VMT (San Benito)



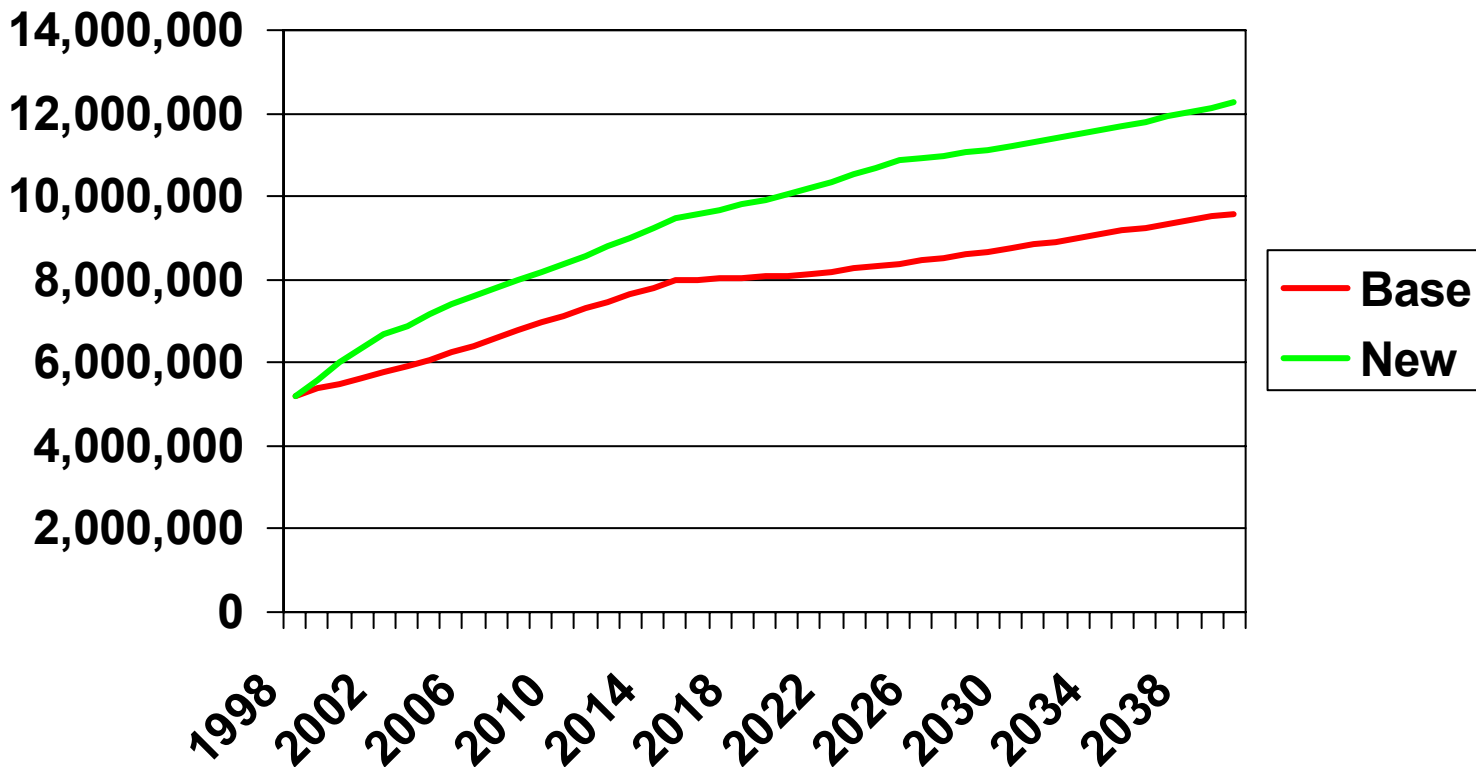
Current and Proposed VMT (Santa Cruz)



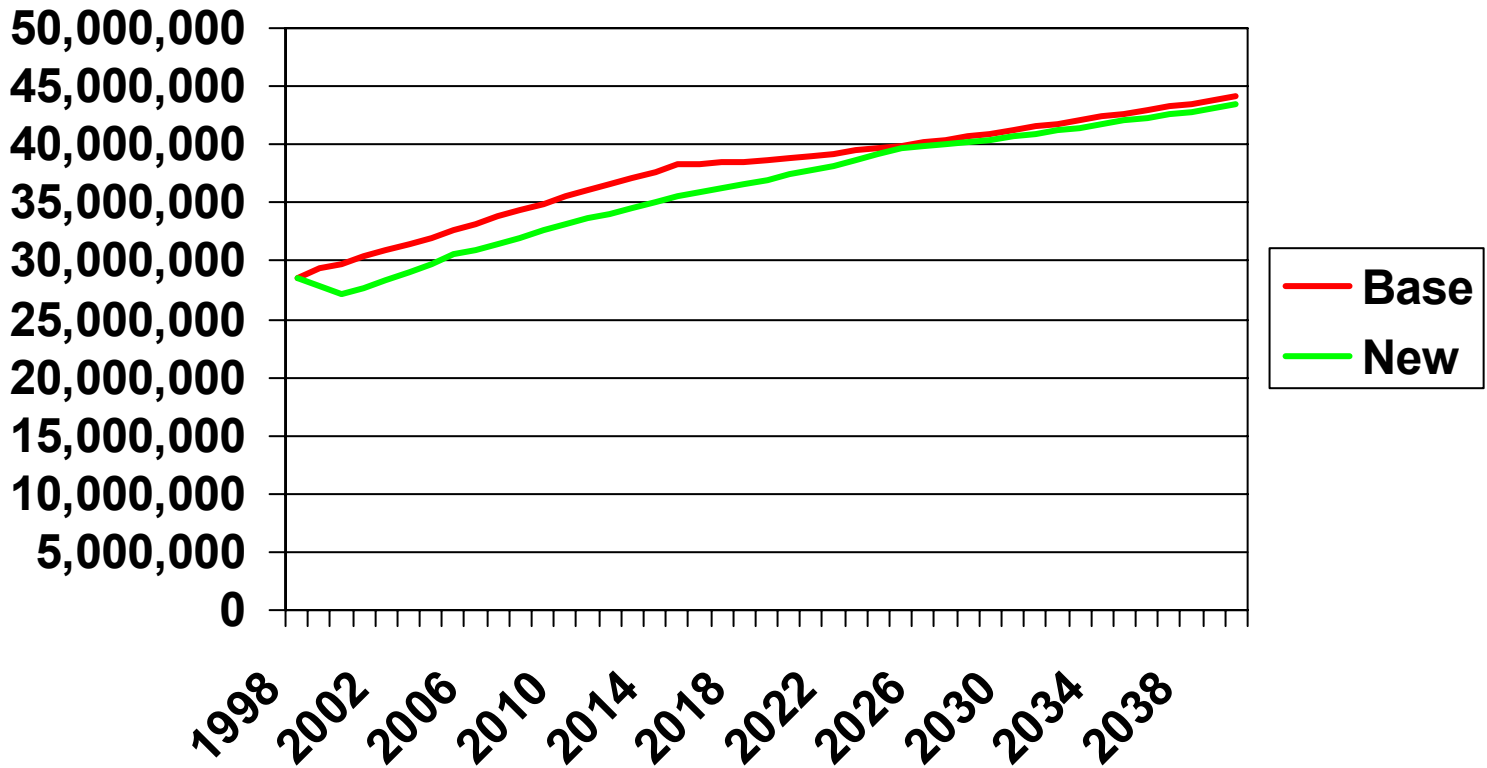
Current and Proposed VMT (Sonoma – North Coast)



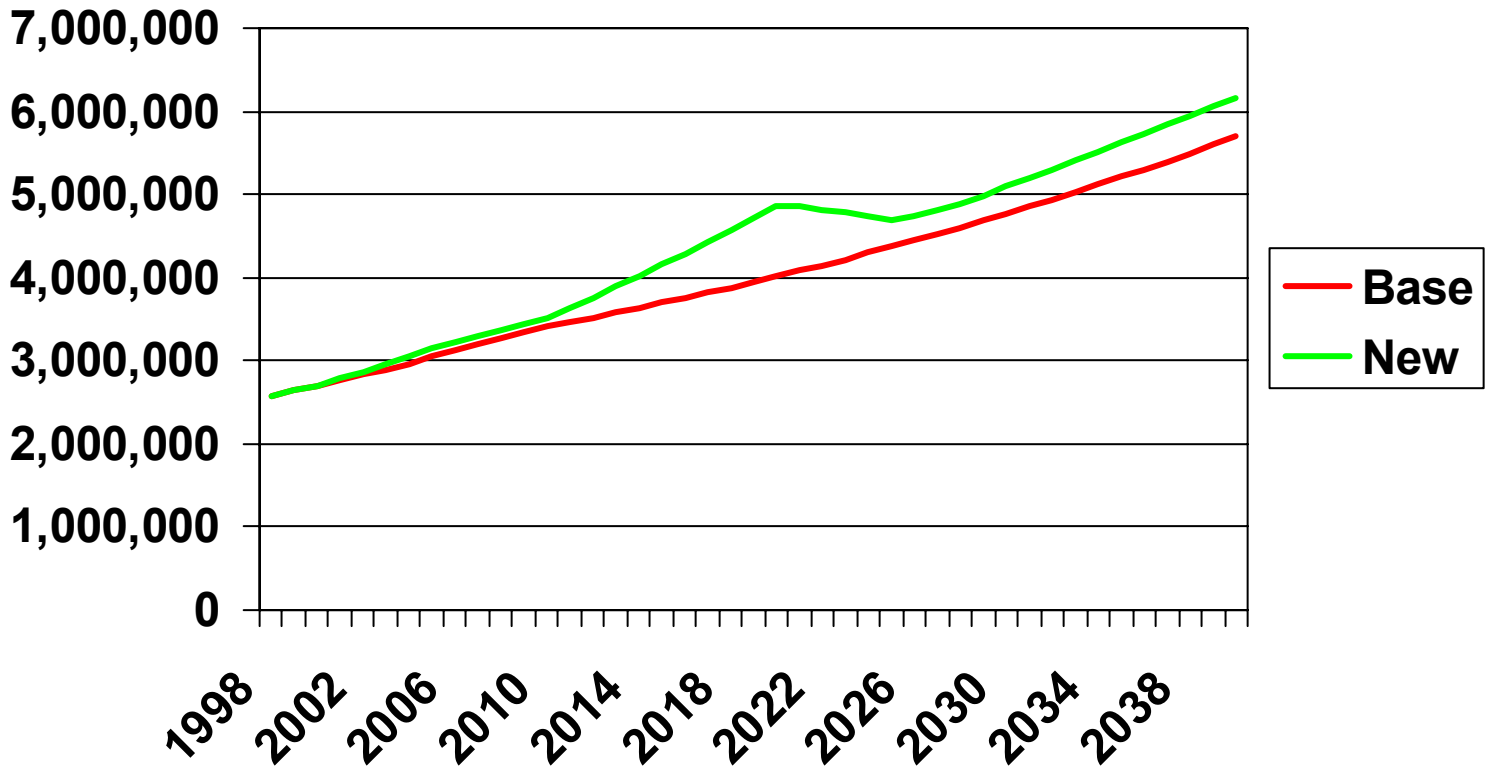
Current and Proposed VMT (Placer – Sacramento)



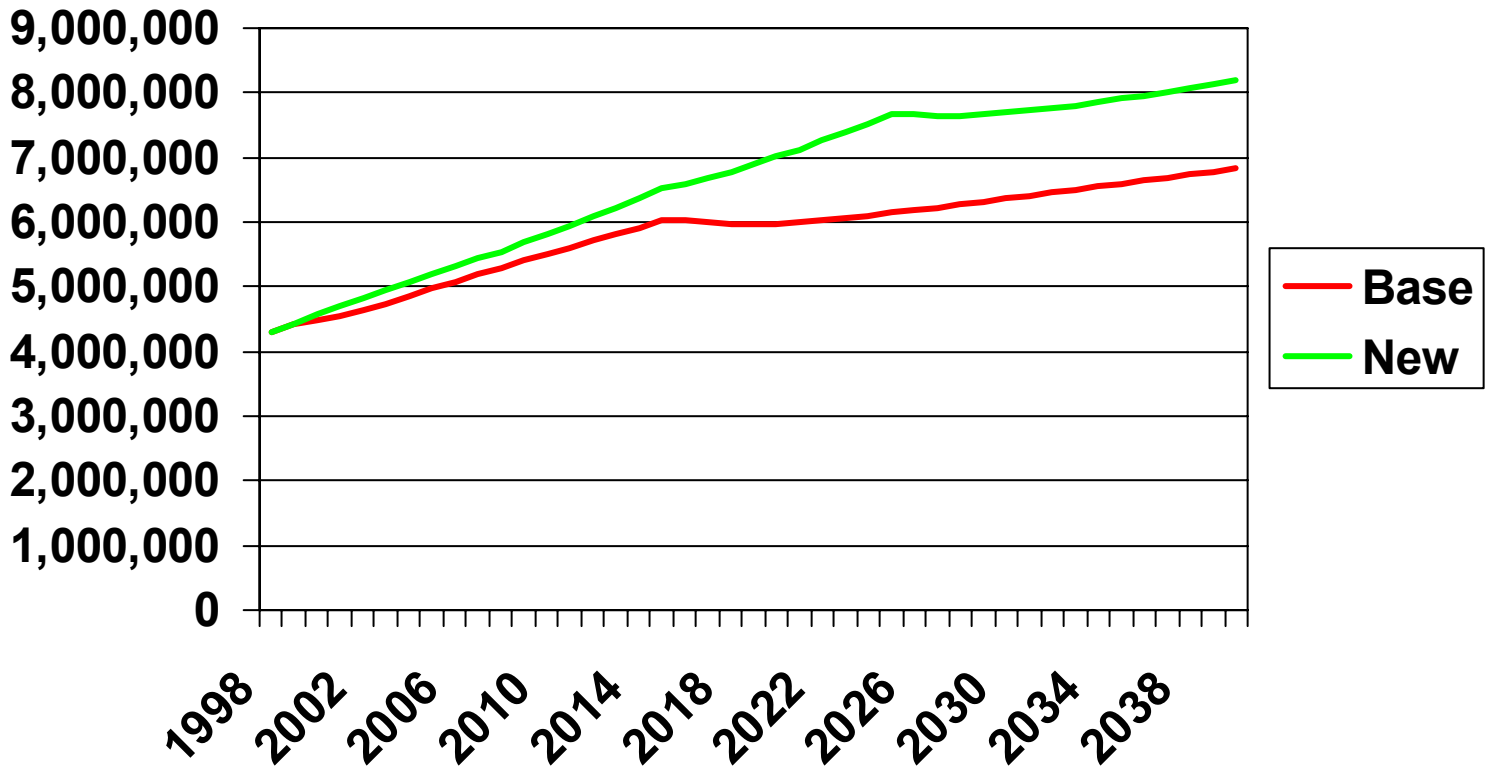
Current and Proposed VMT (Sacramento)



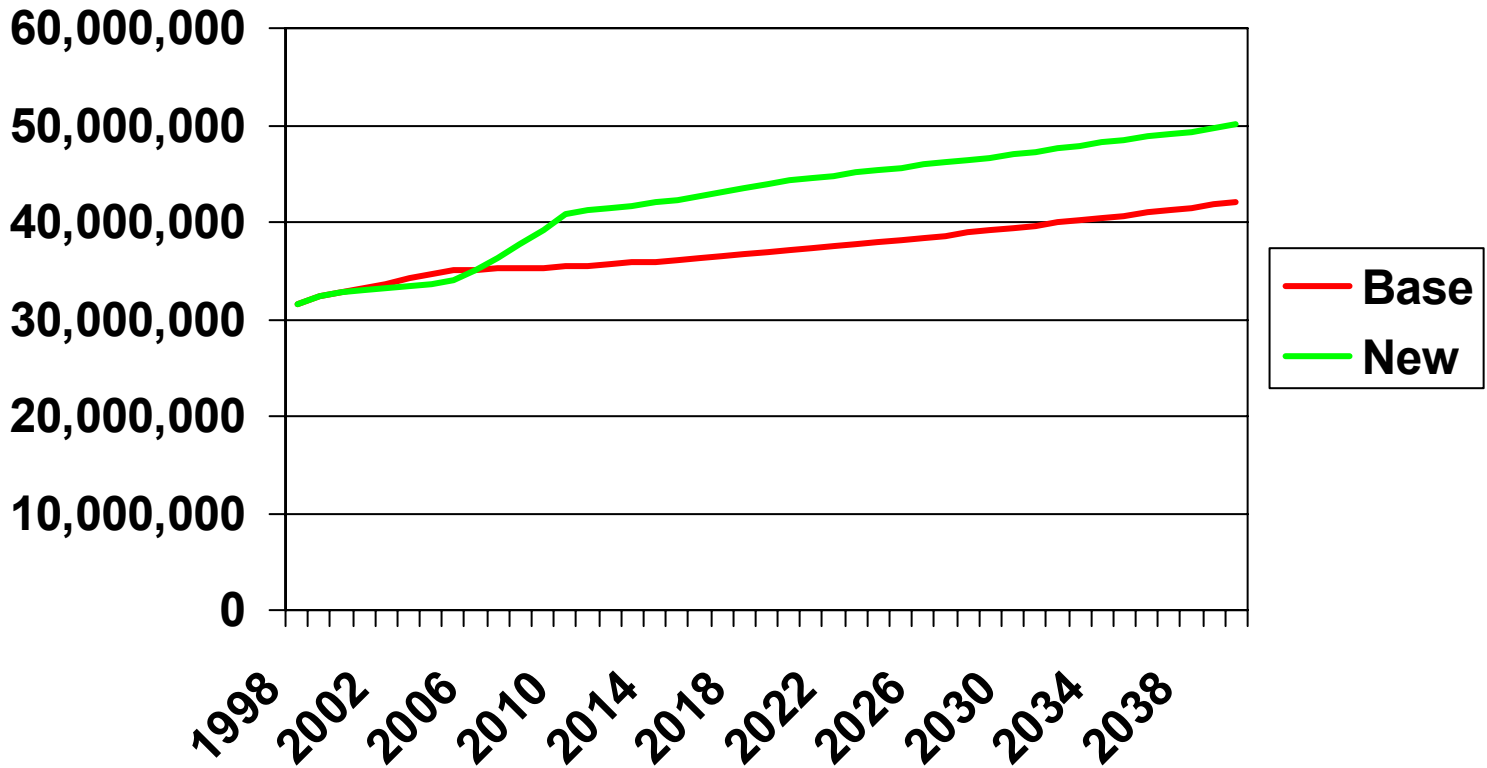
Current and Proposed VMT (Solano)



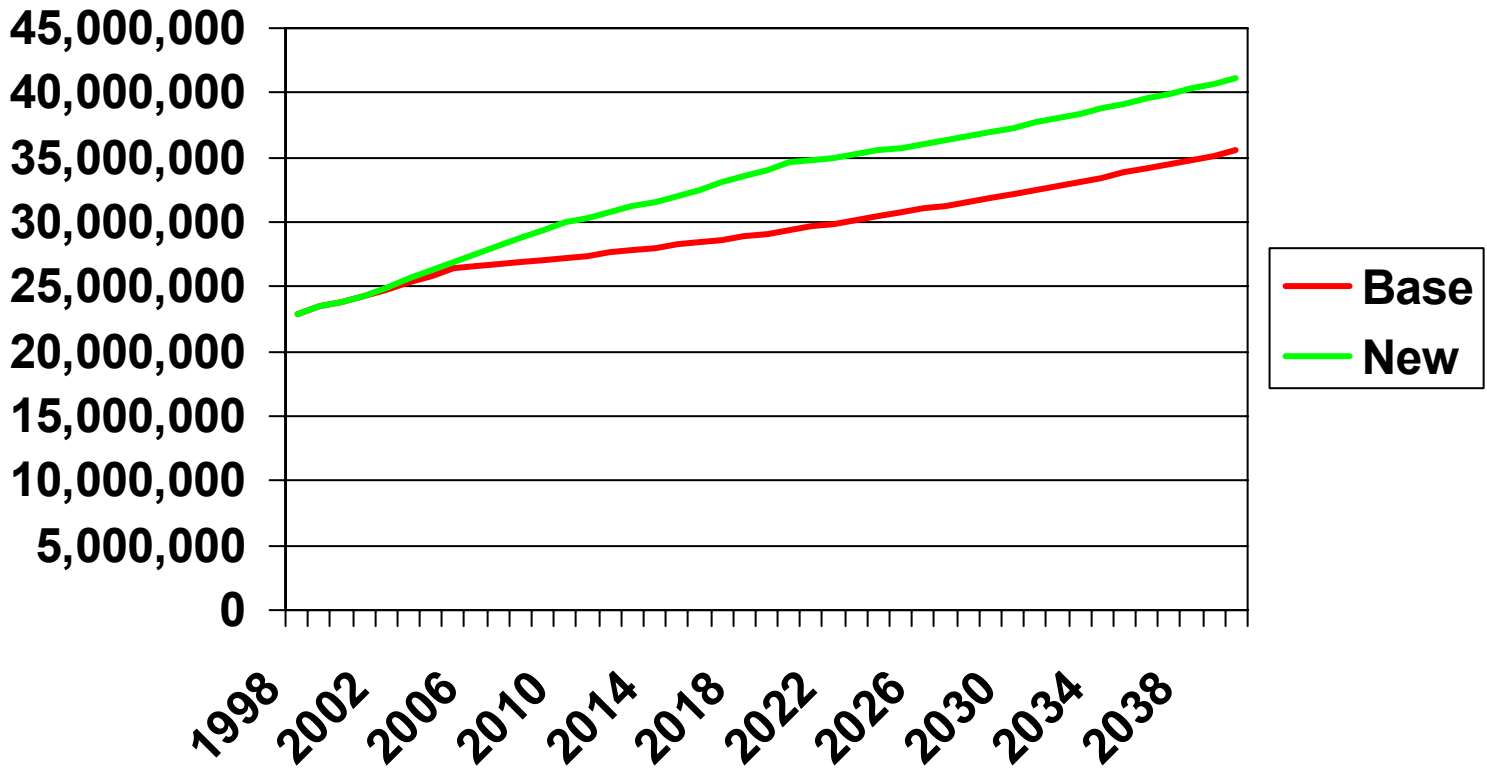
Current and Proposed VMT (Yolo)



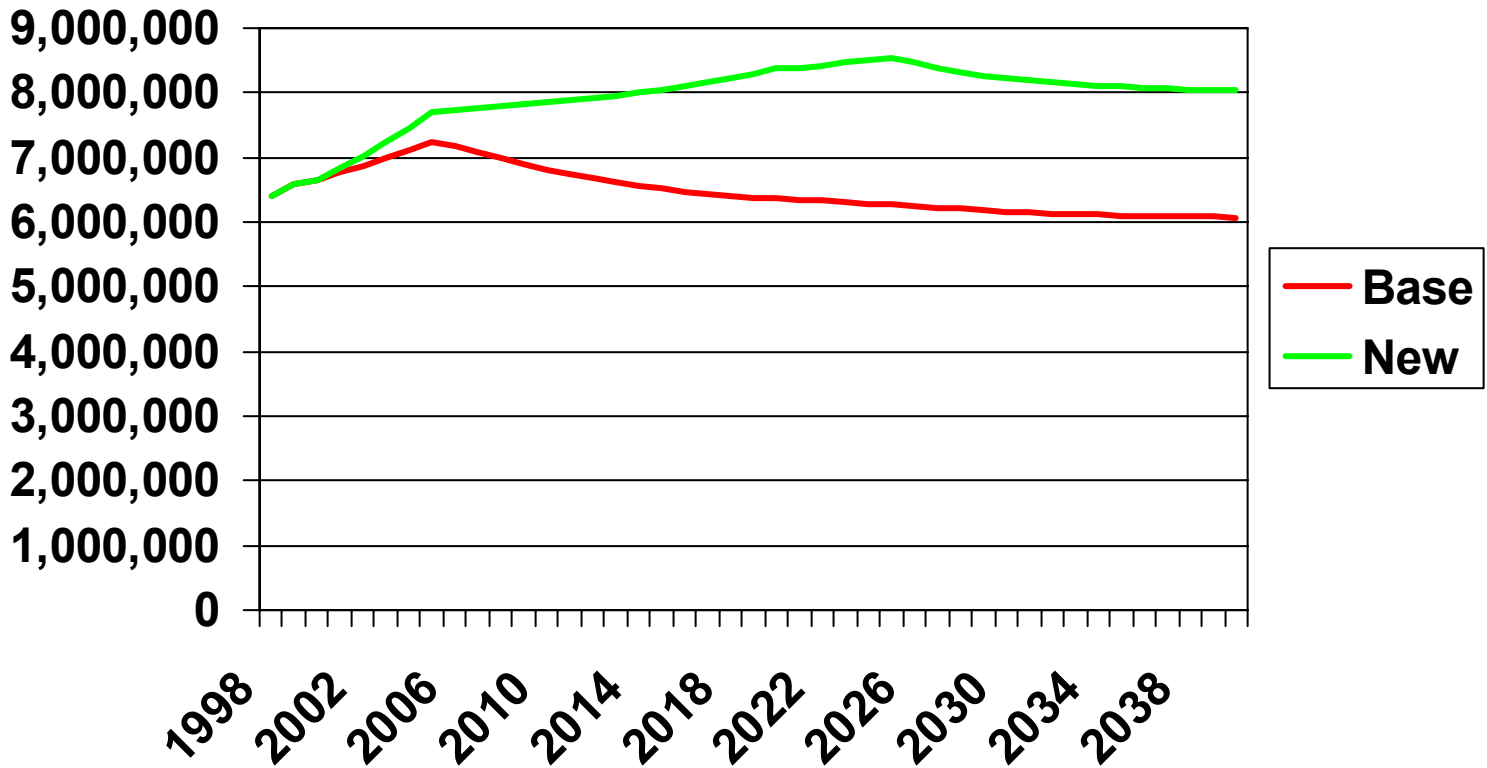
Current and Proposed VMT (Alameda)



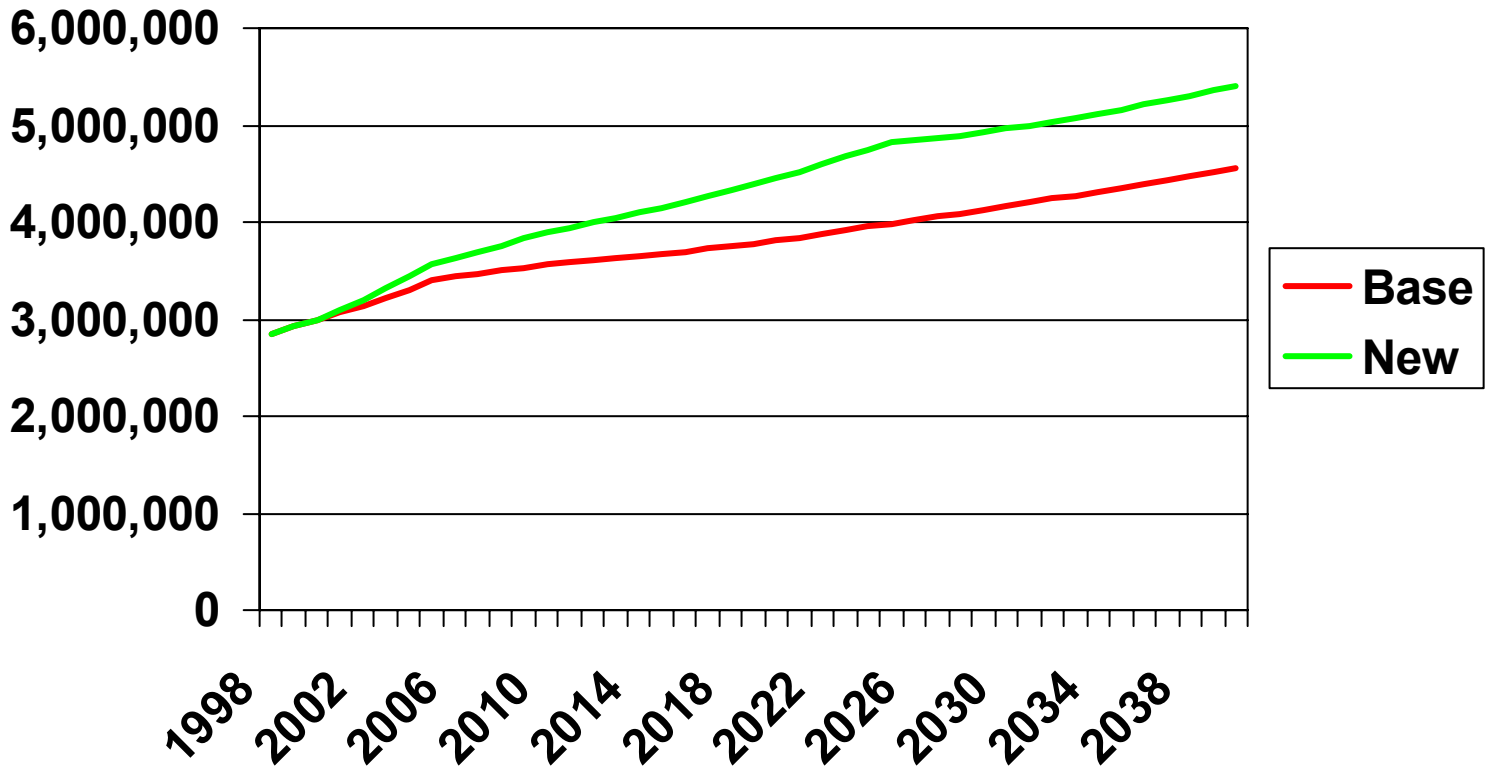
Current and Proposed VMT (Contra Costa)



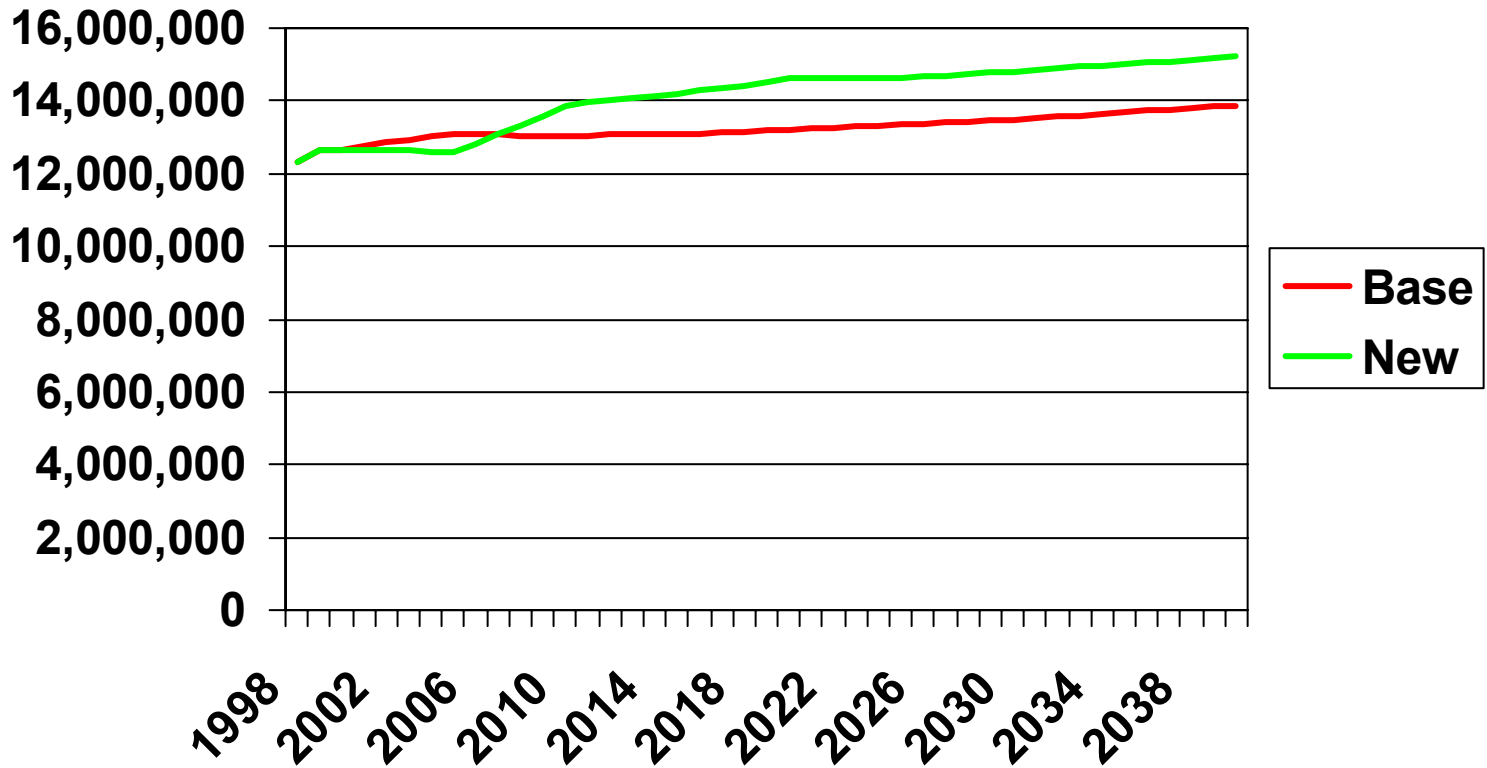
Current and Proposed VMT (Marin)



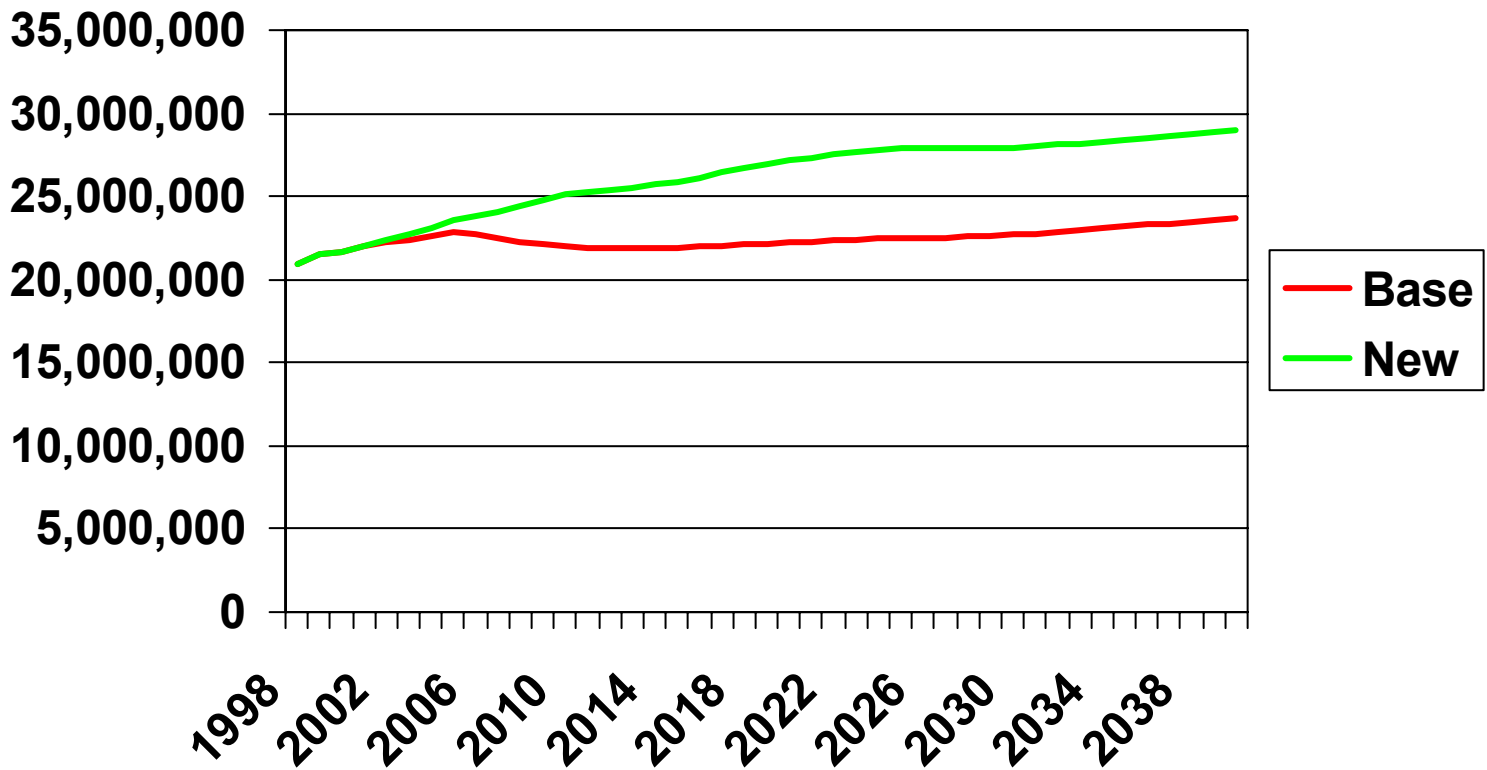
Current and Proposed VMT (Napa)



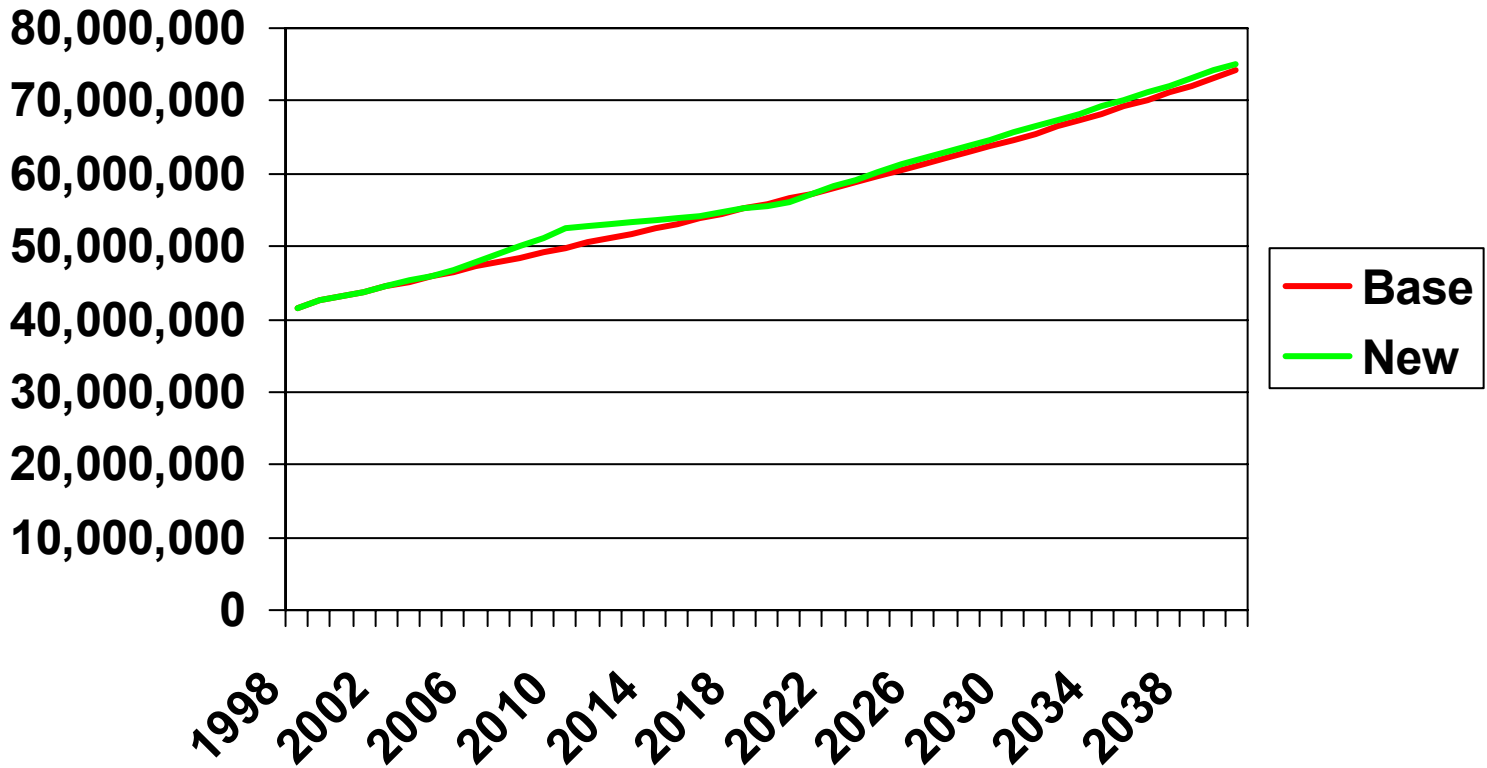
Current and Proposed VMT (San Francisco)



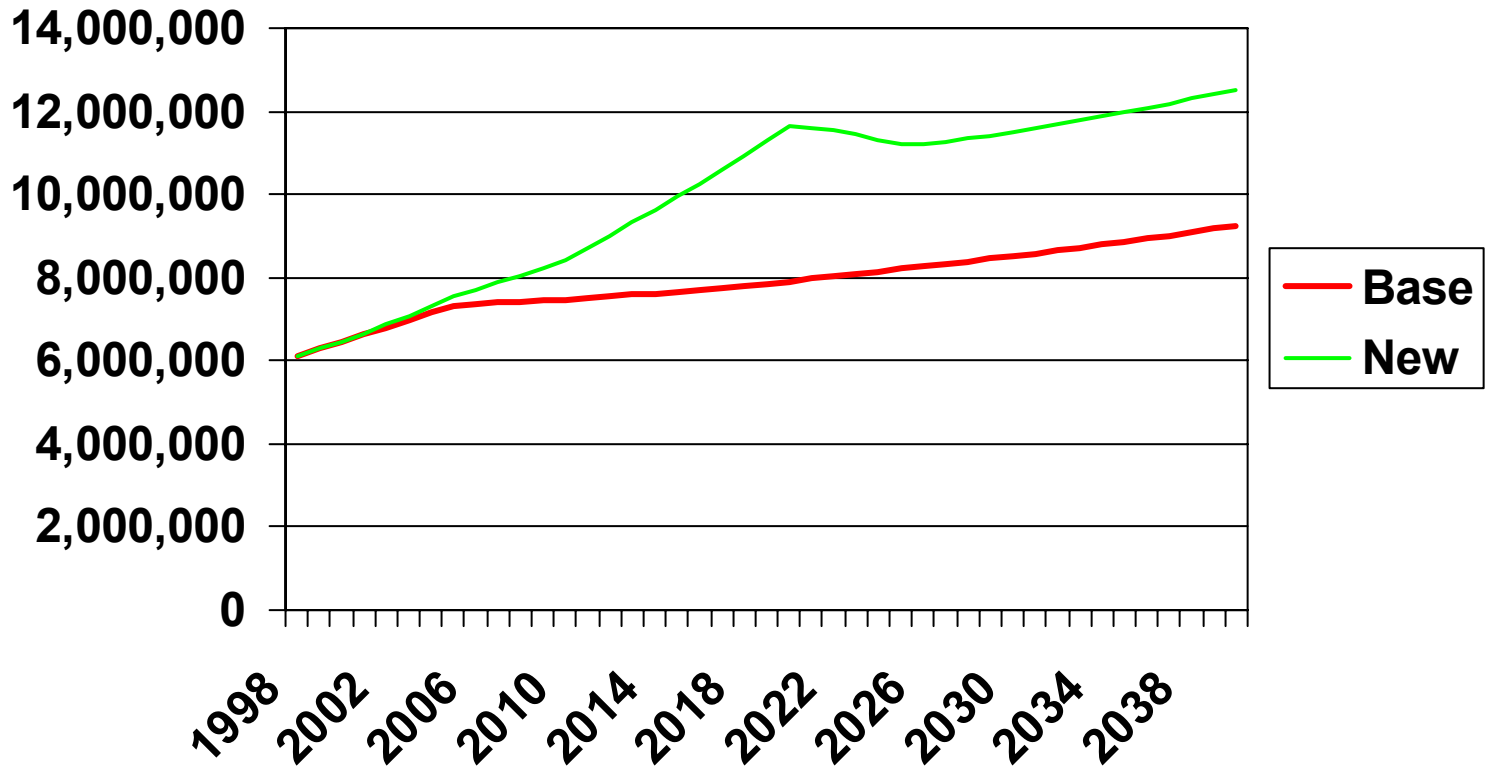
Current and Proposed VMT (San Mateo)



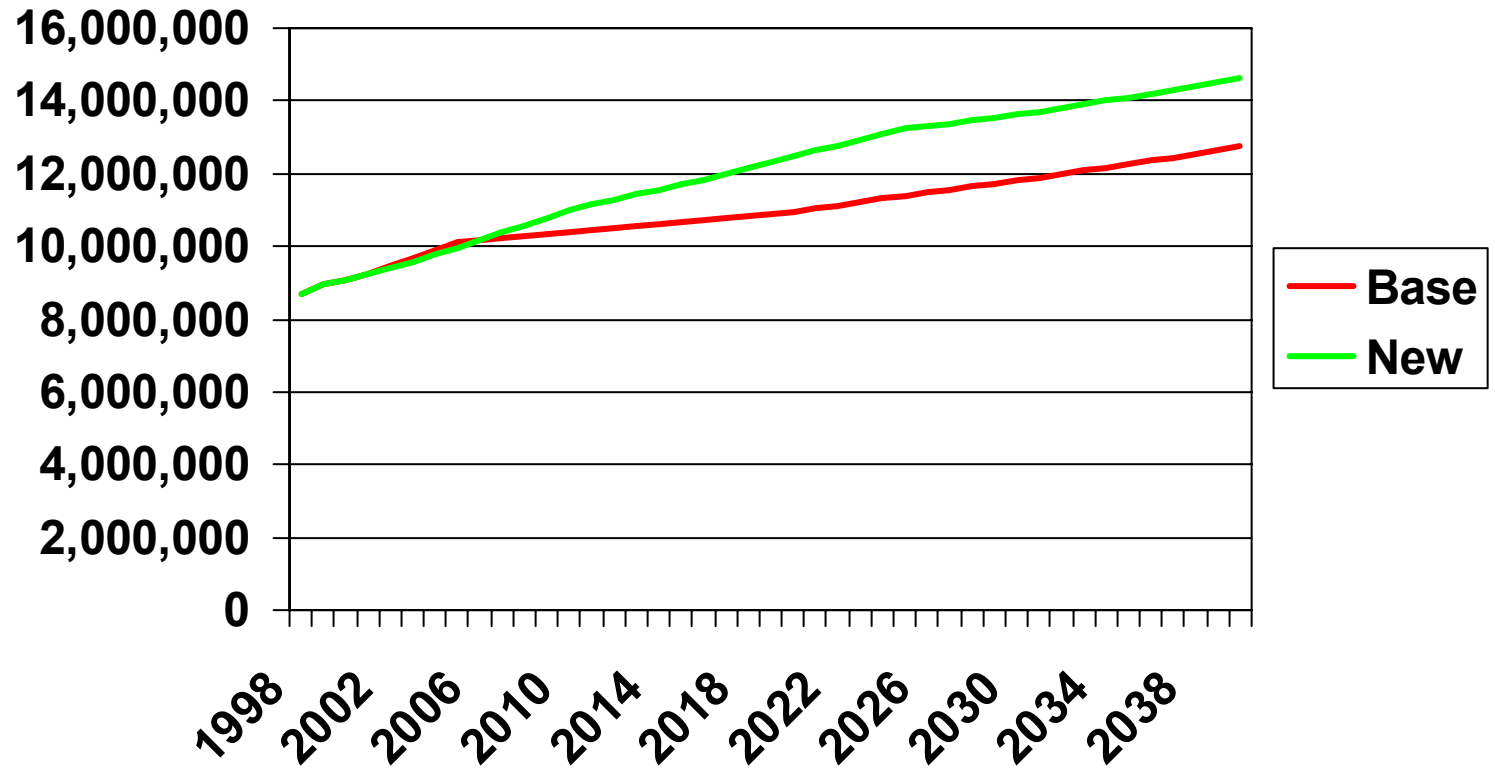
Current and Proposed VMT (Santa Clara)



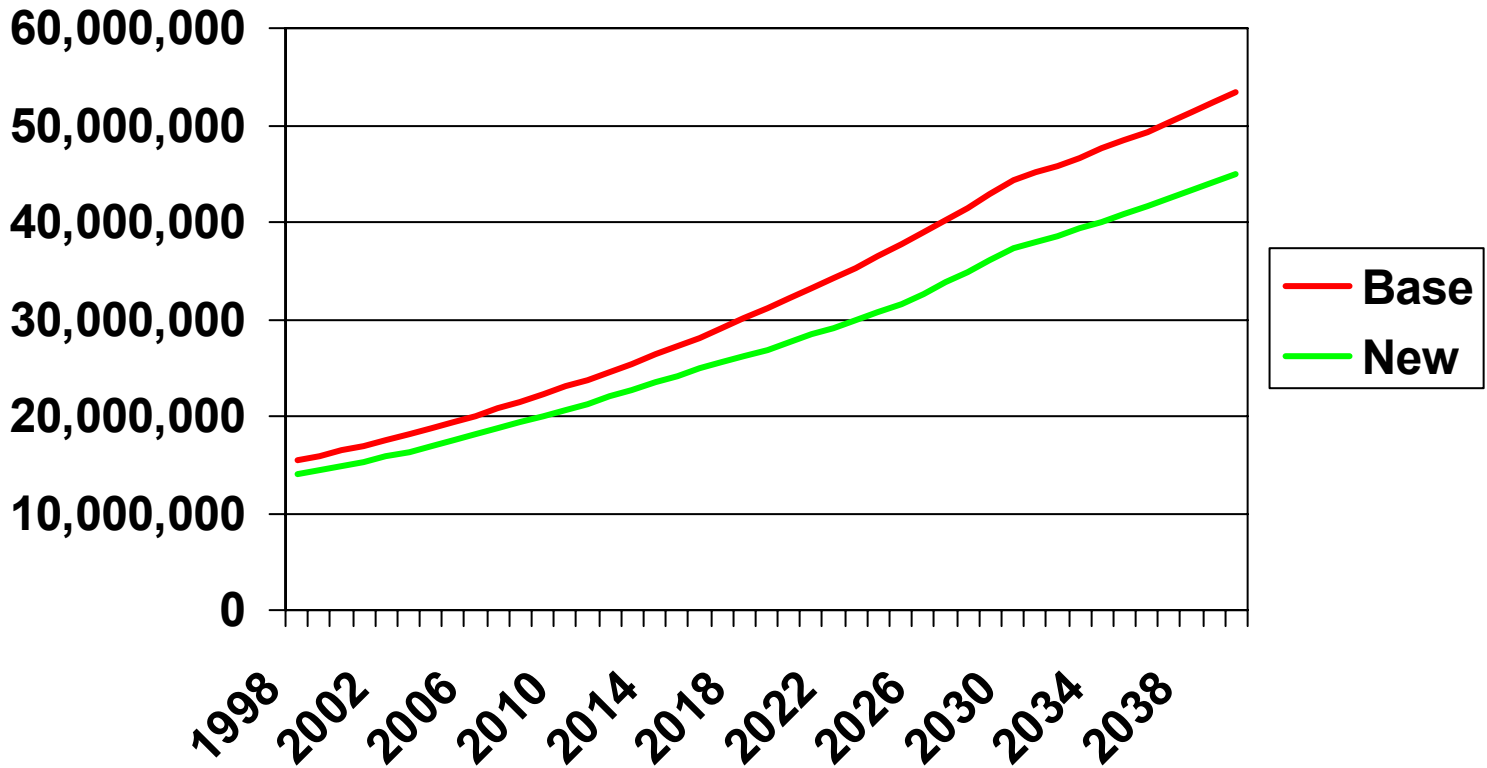
Current and Proposed VMT (Solano–San Francisco)



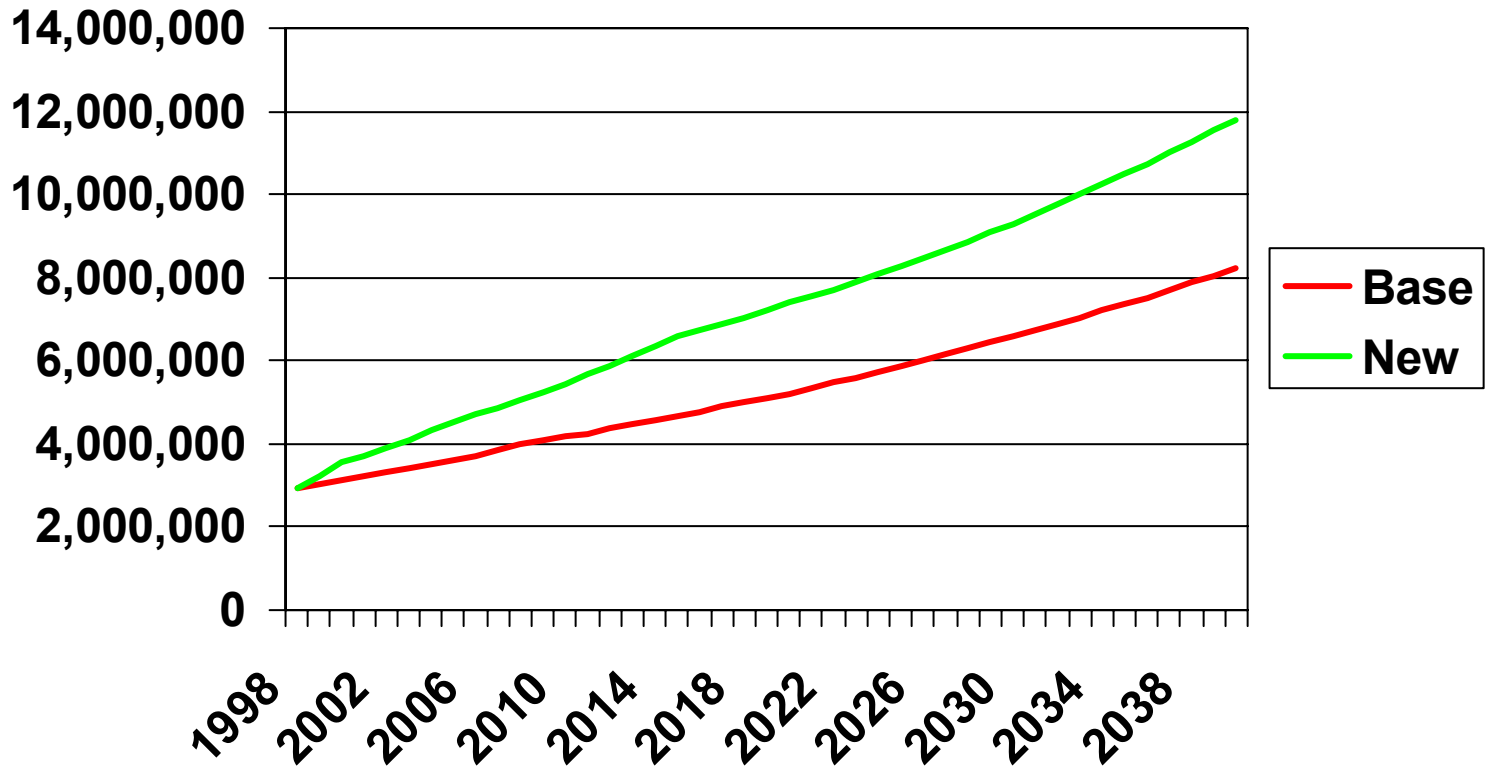
Current and Proposed VMT (Sonoma–San Francisco)



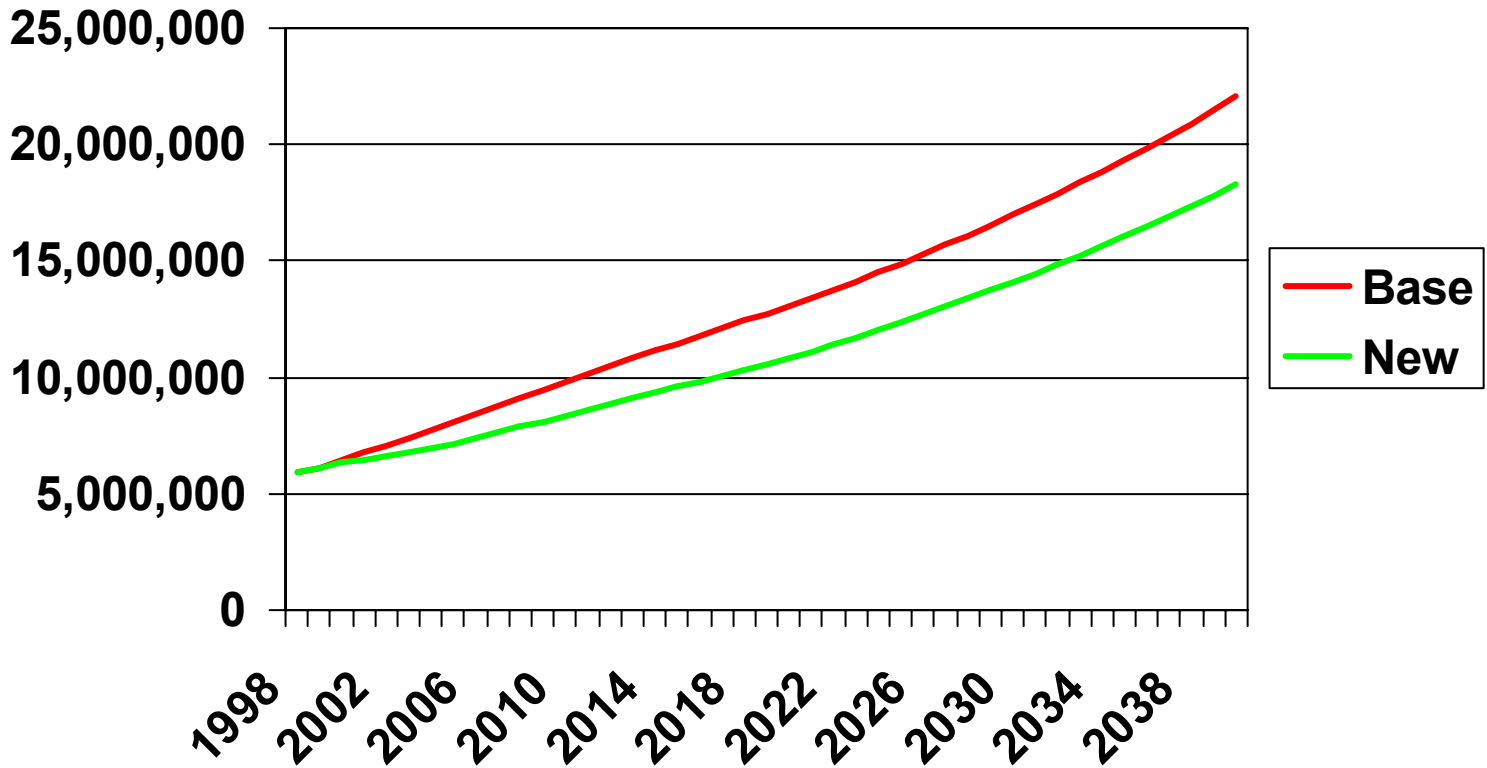
Current and Proposed VMT (Kern)



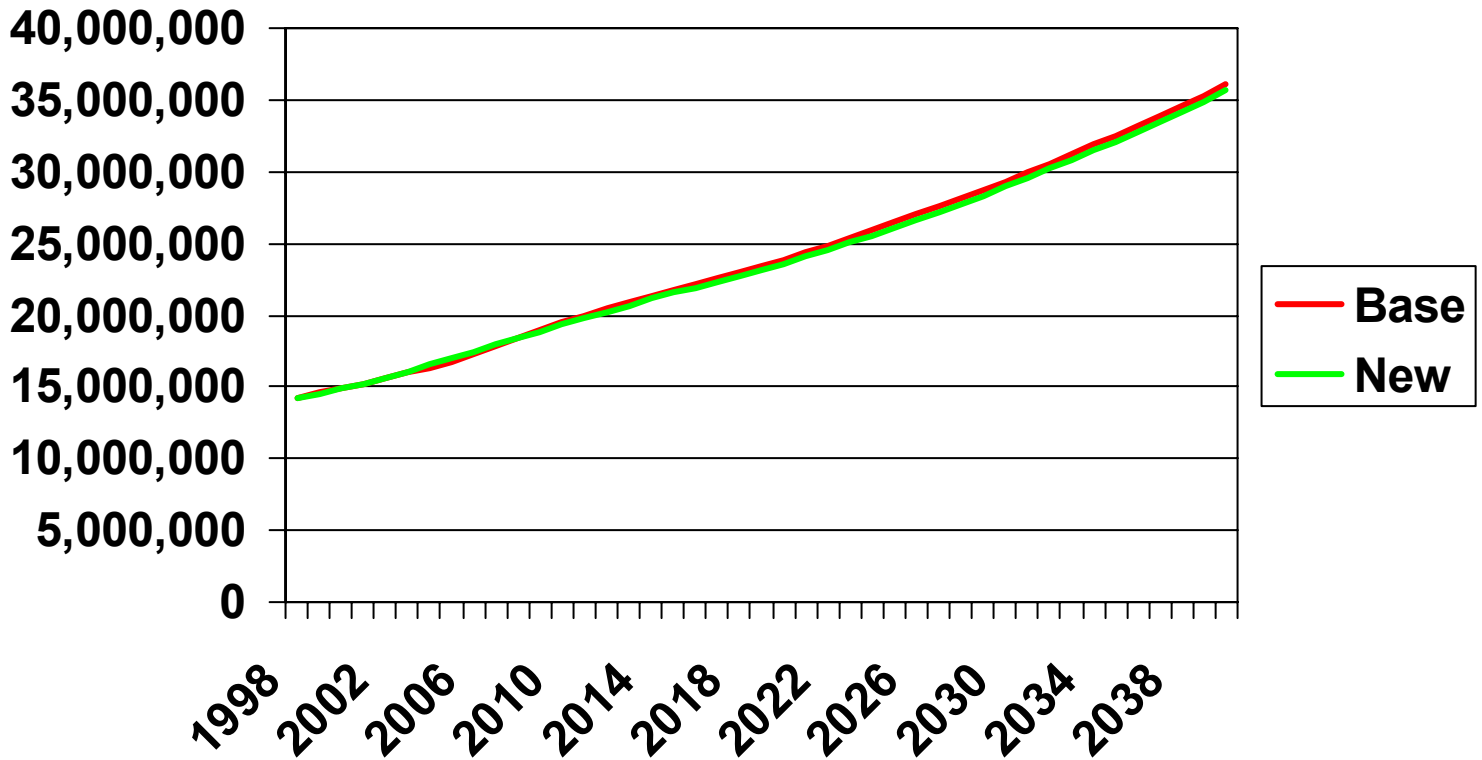
Current and Proposed VMT (Madera)



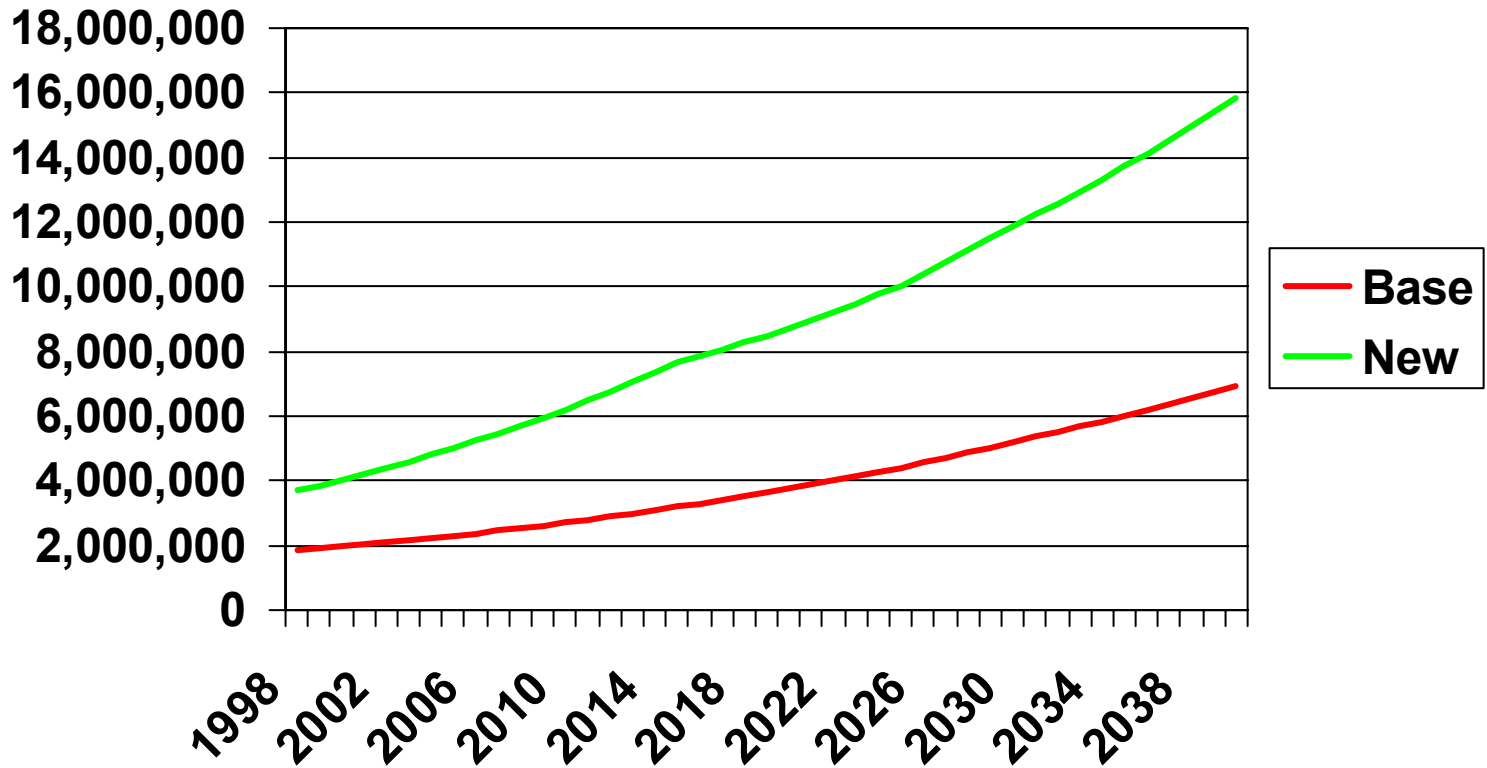
Current and Proposed VMT (Merced)



Current and Proposed VMT (San Joaquin)



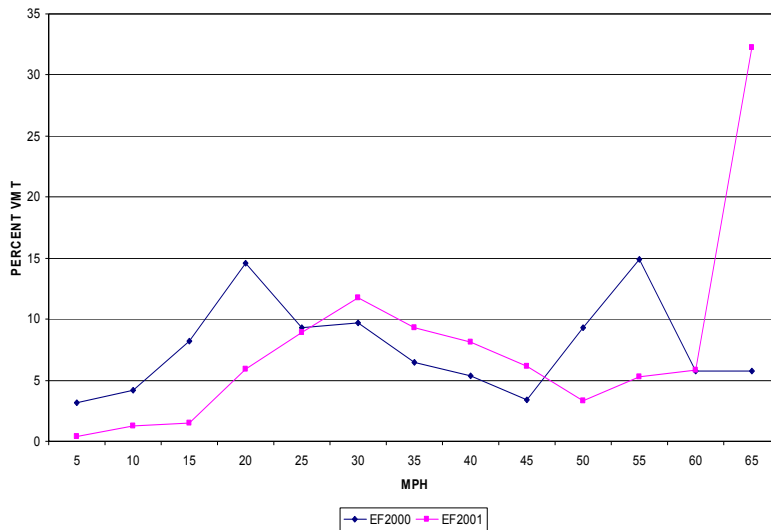
Current and Proposed VMT (Kern - Mojave)



Update Activity Information Observations - Speed



PERCENT VMT BY SPEED - SD
(CY2000 -8 AM)



◆ AM-Peak

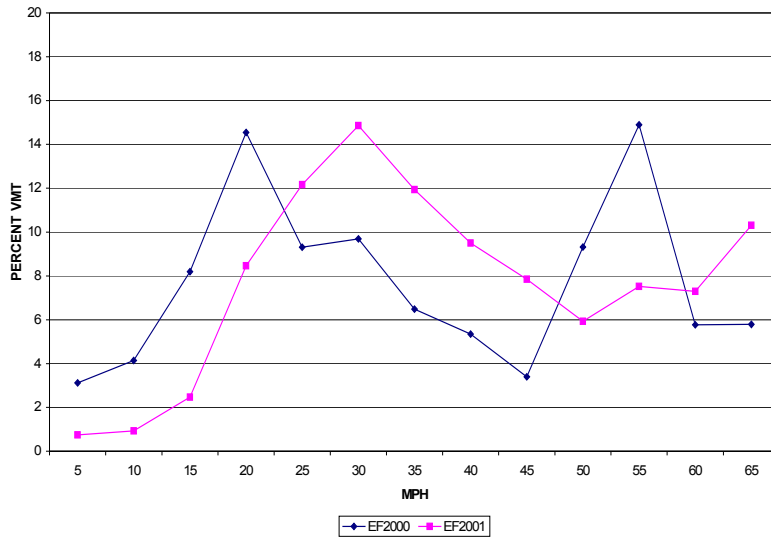
- Υ Less VMT at low speeds
- Υ More VMT at intermediate speeds
- Υ Significantly more VMT at extreme speeds



Update Activity Information Observations - Speed



PERCENT VMT BY SPEED -SD
(CY2000 -5 P M)



◆ PM-Peak

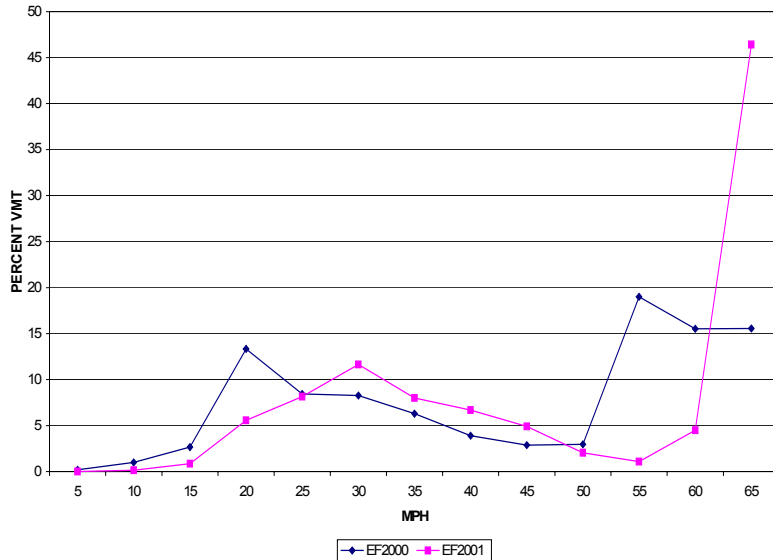
- Υ Less VMT at low speeds
- Υ More VMT at intermediate speeds
- Υ More VMT at extreme speeds



Update Activity Information Observations - Speed



PERCENT VMT BY SPEED -SD
(CY2000 -5 AM)



◆ Off-Peak

- Υ Less VMT at low speeds
- Υ More VMT at intermediate speeds
- Υ Significantly more VMT at extreme speeds




OVERVIEW OF THE WIS WHAT IF SCENARIO GENERATOR



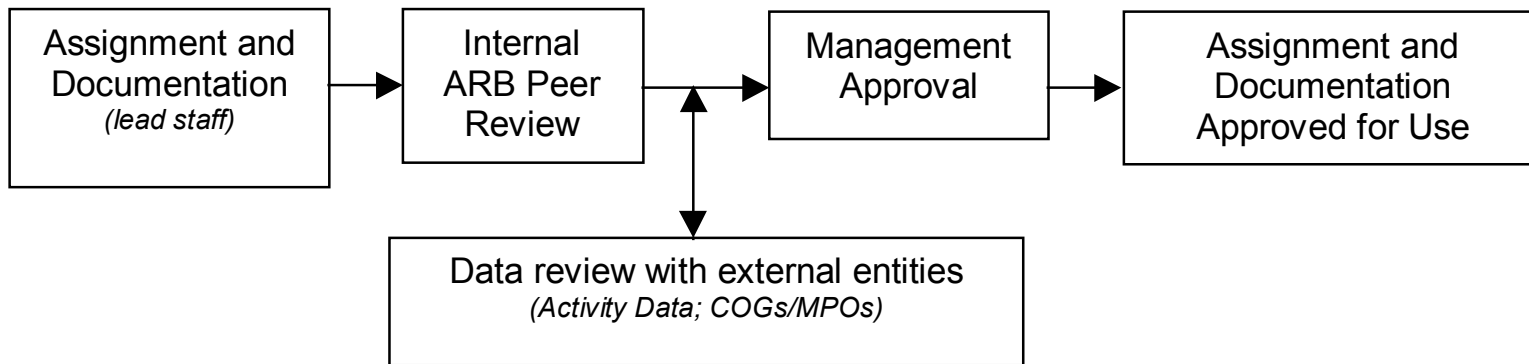
Real-Time Demonstration



PURPOSE OF QUALITY ASSURANCE PLAN

- 
- ◆ Ensure integrity and credibility of the on-road inventory
 - Υ Emissions model (EMFAC)
 - Υ Activity data
 - Υ Analyses conducted using our tools
 - ◆ Ensure best possible science for plans and regulations

THE ARB QA PROCESS





◆ Documentation

Υ A web-based, tiered approach to record assumptions, analyses and results

◆ Peer Review

Υ Internal and external

◆ Accountability

Υ Checks and signoffs before management approval of analyses and changes



Real-Time Demonstration

