

An aerial photograph of San Diego, showing a coastal city with residential areas, green spaces, and a large bridge spanning a body of water. The image is positioned on the left side of the cover, partially overlapping the dark blue background.

San Diego County Greenhouse Gas Inventory

An Analysis of Regional Emissions and  
Strategies to Achieve AB 32 Targets

# On-Road Transportation Report

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September 2008



An aerial photograph of San Diego, California, showing a coastal city with a mix of residential and commercial buildings. In the foreground, a large concrete bridge with multiple piers spans a body of water. The city extends to the beach and ocean in the background.

## On-Road Transportation Report

### Acknowledgements

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This project could not have happened without the generous support of the San Diego Foundation, San Diego Association of Governments, and NRG Energy, Inc.

The authors would like to thank the following individuals (listed alphabetically by organization) for their help in providing data, reviewing drafts and providing insightful comments, and for their advice and counsel during the project: Kevin Eslinger, Nesamani Kalandiyur, Jeff Long, Ben Montoya, Webster Tasat and Walter Wong of the California Air Resources Board (CARB); Brian Holland of San Diego Association of Governments (SANDAG); and, Rob Anderson, David Barker, and Gregory Katsapis of San Diego Gas and Electric (SDG&E). We would also like to thank Mary Bean for the graphic design of the report and Merry Maisel of Sherwood Associates for editing the report.

For an electronic copy of this report and the full documentation of the San Diego Greenhouse Gas Inventory project, go to [www.sandiego.edu/epic/ghginventory](http://www.sandiego.edu/epic/ghginventory).

## Table of Contents

<b>1. Introduction</b>	2
1.1. Key Findings	2
<b>2. Emissions from the On-Road Transportation Sector</b>	3
2.1. Emissions Reduction Targets	5
<b>3. Emissions Reduction Strategies – Wedges</b>	6
3.1. AB 1493 (Pavley 1 and 2)	7
3.2. Federal Corporate Average Fuel Economy (CAFE) Standards	7
3.3. Low Carbon Fuel Standard (LCFS)	7
3.4. 10% Reduction in Vehicle Miles Traveled (VMT)	8
3.5. Climate Change Scoping Plan: Reduction (Measures 9 and 11)	8
<b>4. On-Road Transportation Methodology</b>	8
4.1. Computation, Process, and Data	8
4.2. Historical Emissions and Forecasts	9
4.3. Wedge Configuration and Scenario Development	9
<b>End Notes</b>	13

## Table of Figures

<b>Figure 1.</b> San Diego County GHG Emissions by Category (2006).	3
<b>Figure 2.</b> GHG Emissions from On-Road Transportation, San Diego County	3
<b>Figure 3.</b> GHG Emissions from On-Road Vehicles, San Diego County (2006)	4
<b>Figure 4.</b> GHG Emissions from Passenger Cars and Light-duty Trucks, San Diego County	4
<b>Figure 5.</b> GHG Emissions from On-Road Transportation by Vehicle Type, San Diego County	4
<b>Figure 6.</b> Fuel Consumption by On-Road Transportation Vehicles, San Diego County.	5
<b>Figure 7.</b> Vehicle Miles Traveled by On-Road Vehicles, San Diego County	5
<b>Figure 8.</b> Hypothetical GHG Emissions Reduction Targets for On-Road Vehicles, San Diego County	6
<b>Figure 9.</b> On-Road Transportation GHG Emissions Reduction Strategies, San Diego County	6
<b>Figure 10.</b> San Diego County On-Road Transportation: Wedge Scenario 1 (CAFE, Pavley, LCFS, 10% VMT Reduction, and Scoping Plan)	11
<b>Figure 11.</b> San Diego County On-Road Transportation: Wedge Scenario 2 (CAFE, LCFS, 10% VMT Reduction and Scoping Plan)	12
<b>Figure 12.</b> San Diego County On-Road Transportation: Wedge Scenario 3 (CAFE, 10% VMT Reduction and Scoping Plan)	12

## List of Tables

<b>Table 1.</b> San Diego County On-Road Transportation: Vehicle Class Examples	3
<b>Table 2.</b> GHG Emissions Reduction Strategies for On-Road Transportation, San Diego County	6
<b>Table 3.</b> San Diego County On-Road Transportation: Scenarios of Potential Reduction Strategy Order and Net Emissions	10
<b>Table 4.</b> Summary of Wedge Scenario Descriptions and GHG Reductions, San Diego County On-Road Transportation	11

# 1. Introduction

On-road transportation is a significant source of greenhouse gas (GHG) emissions. In San Diego County, emissions from on-road vehicles account for about 46% of regional GHG emissions. This report, a component of the San Diego County Greenhouse Gas Inventory project, provides an estimate of historical GHG emissions associated with on-road transportation from 1990 to 2006 and future emissions to 2020 for San Diego County. Using emissions reduction targets codified in California's Global Warming Solutions Act of 2006 (AB 32) as a guide, this report also establishes emissions reductions targets for the region's on-road transportation sector. Although AB 32 does not require individual sectors or jurisdictions (e.g., cities and counties) to reduce emissions by a specific amount, the project team calculated the theoretical emissions reductions necessary in each emissions category (e.g., transportation, electricity, etc.) in order for San Diego County to reduce emissions to 1990 levels by 2020 – the statewide statutory target under AB 32. Finally, the report identifies and quantifies potential emissions reduction strategies to determine the feasibility of reducing on-road transportation related emissions to 1990 levels by 2020.

To the extent possible, the project team followed the same calculation methodology used by the California Air Resources Board (CARB) to develop the statewide GHG inventory. In some instances, when doing so could yield a more accurate or precise result, the project modified the CARB method.

This report, which is intended as an overview of the findings from research and analysis conducted for the on-road transportation sector, includes the following sections:

- Section 2 provides an overview of GHG emissions from on-road transportation in San Diego County, including total emissions, a breakdown of emissions by vehicle type (passenger car, light-duty truck, heavy-duty vehicles etc.), a summary of the highest emitting vehicle types and their respective characteristics and activities and projections to 2020.
- Section 3 discusses emissions reduction targets as well as strategies to reduce on-road transportation GHG emissions to 1990 levels by 2020.
- Section 4 provides a detailed discussion of the method used to estimate emissions for this category.

## 1.1. Key Findings

- On-road transportation is the largest greenhouse-gas-emitting category, with 16 MMT CO<sub>2</sub>E in 2006, a 10% increase over 1990.
- Emissions from on-road vehicles are expected to increase to 19 MMT CO<sub>2</sub>E by 2020, a 20% increase over 2006 levels and a 33% increase over 1990 levels.
- Passenger vehicles (cars and light-duty trucks) emit more greenhouse gases than the other vehicle classes in the on-road transportation category. In 2006, passenger vehicles emitted 14 MMT CO<sub>2</sub>E, 89% of all greenhouse gas (GHG) emissions from the on-road transportation sector. Light-duty trucks include light- and medium-duty trucks and sport utility vehicles (SUVs), and these have become the greatest emitters. They accounted for 24% of San Diego County's total GHG emissions in 2006.
- A combination of emissions reduction measures, including vehicle efficiency, clean fuels, and reductions in vehicle miles traveled, can reduce GHG emissions from the on-road transportation sector to 1990 levels by 2020.



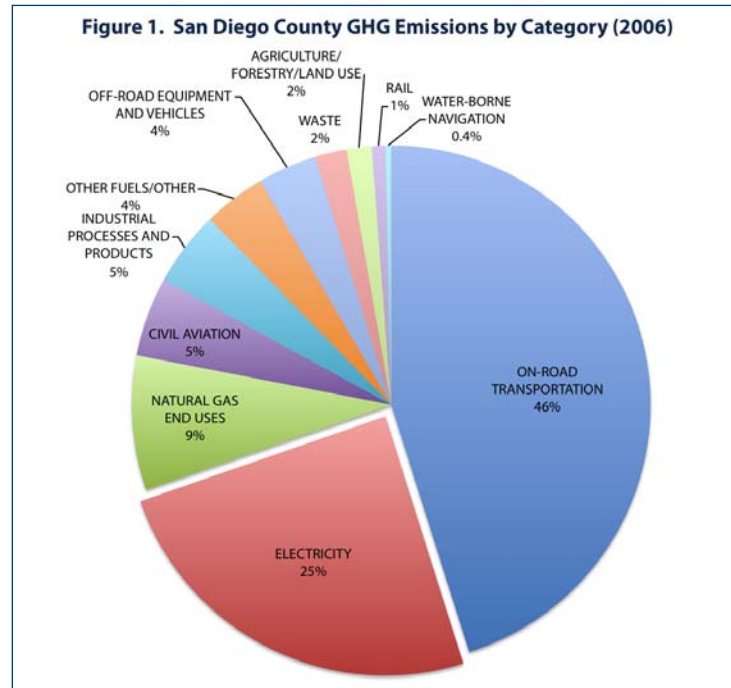
## 2. Emissions from the On-Road Transportation Category

The on-road transportation category is the single largest contributor of GHG emissions in San Diego County. In 2006, emissions from this category were 16 million metric tons of carbon dioxide equivalent (MMT CO<sub>2</sub>E), which comprised approximately 46% of all GHG emissions produced in San Diego County (Figure 1). This category will likely continue to be the most dominant emitter through 2020, when its emissions are expected to reach 19 MMT CO<sub>2</sub>E.

On-road transportation emissions are primarily the result of fuel combustion from motorized vehicles that travel San Diego County freeways, highways, streets, and roads. Carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) are the main greenhouse gases that transportation vehicles emit. This section analyzes the emissions of these three gases; emissions due to refrigerant losses are accounted for in the industrial section.

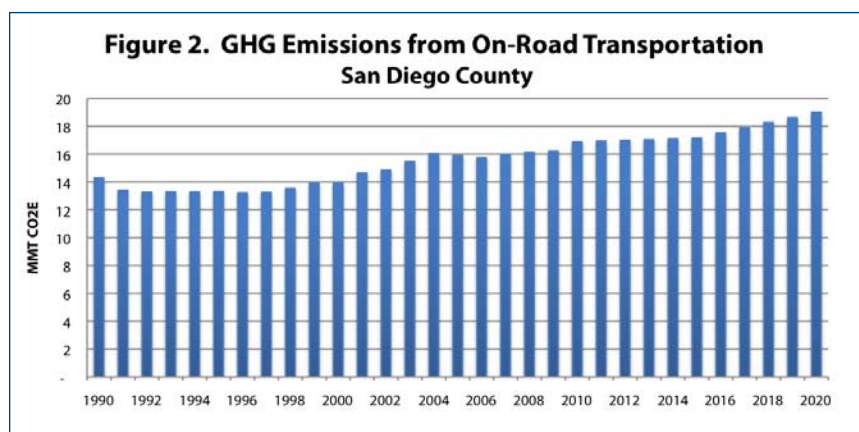
The vehicle classes included in this analysis are passenger cars; light-, medium-, and heavy-duty trucks; buses; motor homes; and motorcycles. Table 1 lists examples of these types of vehicles. Medium-duty trucks have been included in the light-duty trucks category because their function is similar, primarily individual/personal transport.

Under a business-as-usual scenario (based on the San Diego Association of Governments (SANDAG) Regional Transportation Plan), annual emissions from this category are expected to increase to 19 MMT CO<sub>2</sub>E by 2020, a 20% increase over 2006 levels. This scenario assumes that transportation growth and fuel consumption continue at the present rate with no major policy or behavioral changes.<sup>1</sup> Figure 2 shows the total emissions from all on-road vehicles from 1990 to 2005 and the forecast to 2020.



**Table 1. San Diego County On-Road Transportation: Vehicle Class Examples**

Vehicle Type	Example
Passenger car	Honda Accord, BMW 330, Chevy Impala, Chrysler 300
Light-duty truck	Ford Ranger and Explorer, Toyota Tacoma, GM full-size truck, SUV's
Heavy-duty truck	18 wheel trucks, large FedEx and U-haul trucks
Bus	Metropolitan Transit System (MTS) bus
Motorcycle	Suzuki Hayabusa, Harley Davidson Road King



Greenhouse gas emissions vary significantly among vehicle types. Figure 3 illustrates that passenger cars and light-duty trucks are currently the largest contributors of greenhouse gases. Together these two vehicle categories account for approximately 89% of emissions from the on-road transportation sector and 41% of all GHG emissions in the county.

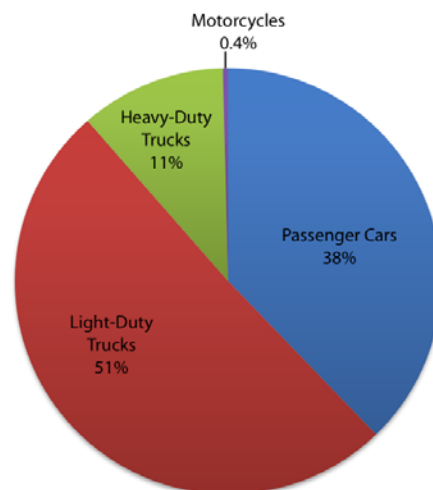
The amount of GHG emitted by each vehicle type has varied over time. Between 1990 and 2001, passenger cars emitted the most; however, since 2002, light-duty trucks have surpassed passenger cars as the largest class of emitters. Figure 4 shows this trend.

Light-duty trucks are expected to continue to be the largest emitting vehicle class, representing nearly 50% of on-road emissions and nearly 22% of the county's 2020 total emissions (Figure 5). Passenger cars are projected to represent about 38% of on-road emissions by that same time.

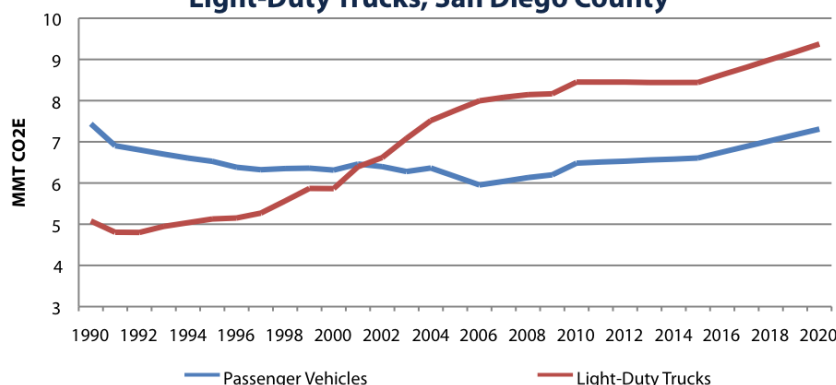
The two main drivers of emissions in the on-road transportation category are total fuel consumption and vehicle miles traveled. Figure 6 shows fuel consumption by vehicle type. It demonstrates that passenger cars and light duty trucks consistently consume over 85% of the fuel used by on-road vehicles. Combined fuel consumption from these two vehicle classes is expected to increase 21%, from 1.5 billion gallons in 2006 to more than 1.8 billion by 2020. Motorcycles consume the least amount of fuel, from 6.8 million gallons per year in 2006 to a forecast 10 million in 2020.

On the basis of business-as-usual projections, light-duty trucks will continue to be the largest fuel consumers through 2020. However, continued dramatic increases in fuel price may shift a large portion of light-duty truck

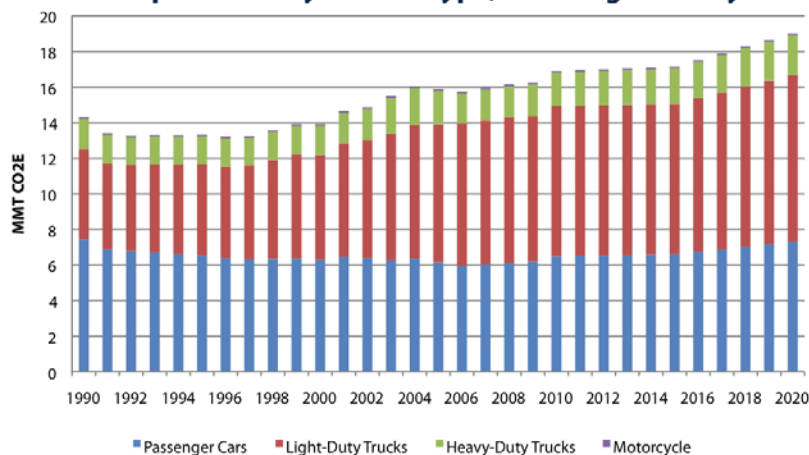
**Figure 3. GHG Emissions from On-Road Vehicles, San Diego County (2006)**



**Figure 4. GHG Emissions from Passenger Cars and Light-Duty Trucks, San Diego County**



**Figure 5. GHG Emissions from On-Road Transportation by Vehicle Type, San Diego County**



use toward more fuel-efficient passenger car use. Heavy-duty truck fuel consumption is expected to increase steadily from 170 million gallons in 2006 to 220 million in 2020, nearly 30%.

The number of miles driven by a vehicle in a year is a strong factor in determining its emissions. In 1990, the total number of vehicle miles traveled was 22 billion. This number increased 31% to 30 billion by 2006. In 1990, passenger cars accounted for about 60% of total vehicle miles traveled, while light-duty trucks accounted for 35%. By 2006, these two vehicle classes each accounted for about 48% of overall miles traveled in San Diego County. The total number of miles driven by on-road vehicles annually in San Diego County is expected to increase another 31% to 37 billion miles by 2020, a 64% increase over 1990 levels. Figure 7 demonstrates the trend.

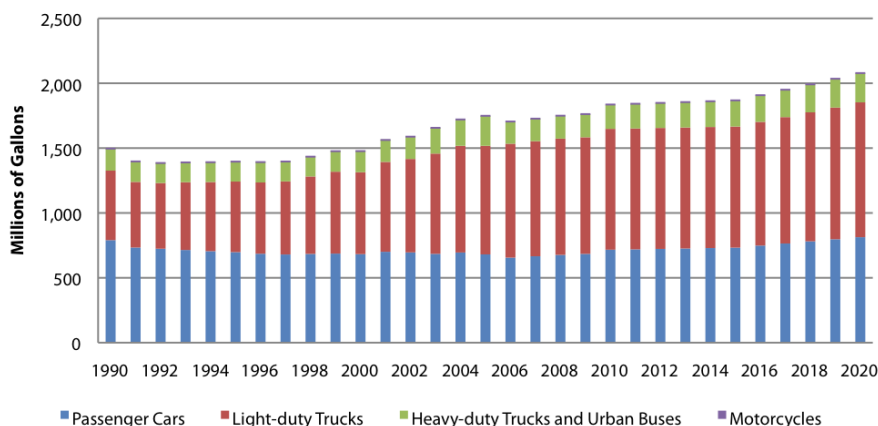
## 2.1. Emissions Reduction Targets

In 2006, California Governor Arnold Schwarzenegger signed the Global Warming Solutions Act (AB 32), establishing statutory

limits on GHG emissions in California. AB 32 seeks to reduce statewide emissions to 1990 levels by the year 2020. Even though it does not specify reduction targets for specific areas or jurisdictions, this study calculated theoretical reductions targets proportionally for San Diego County. To meet the targets established by AB 32, San Diego would have to reduce projected on-road transportation emissions by 4.7 MMT CO<sub>2</sub>E from 2006 levels to reach 1990 levels – a 24.7% reduction.

Earlier, in 2005, Governor Schwarzenegger signed Executive Order S-3-05, which established long-term targets for GHG emissions reductions to 80% below 1990 levels by 2050. While this reduction target is not law, it is generally accepted as the long-term target toward which California regulations should aim. Like AB 32, Executive Order S-3-05 was intended to be a statewide target, but if applied hypothetically to San Diego County, total emissions from on-road transportation would have to be reduced to 2.9 MMT CO<sub>2</sub>E – a reduction of nearly 16.1 MMT CO<sub>2</sub>E below the 2020 business-as-usual forecast and 12.9 MMT CO<sub>2</sub>E below 2006 levels.

**Figure 6. Fuel Consumption by On-Road Transportation Vehicles in San Diego County**



**Figure 7. Vehicle Miles Traveled by On-Road Vehicles in San Diego County**

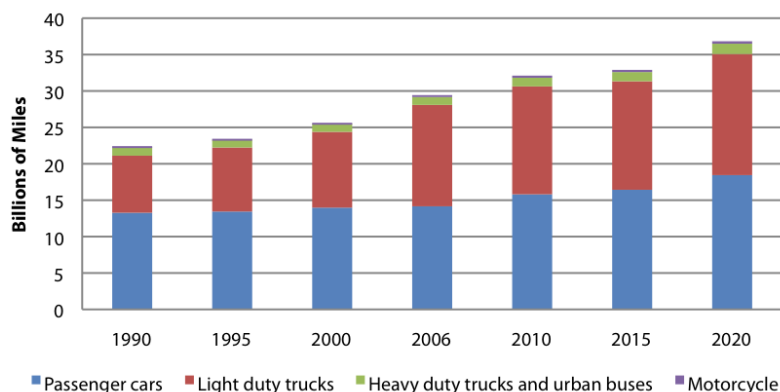


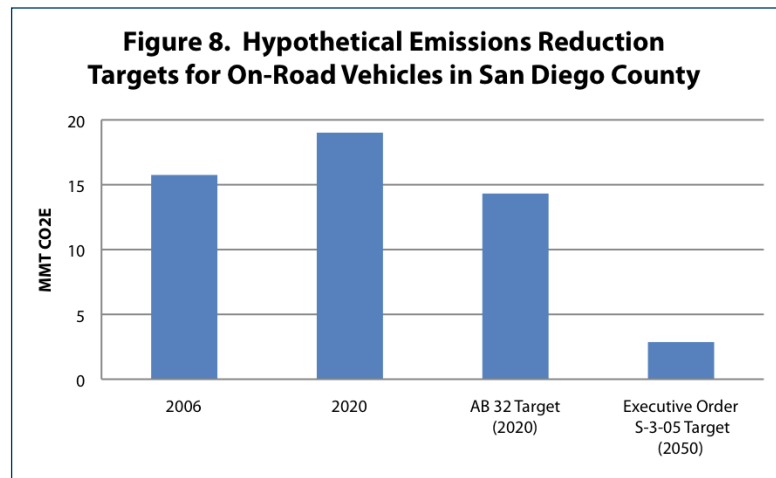
Figure 8 compares 2006 emissions levels, 2020 business-as-usual projections, AB 32, and Executive Order S-3-05 targets.

### 3. Emissions Reduction Strategies – Wedges

To illustrate how San Diego County could achieve AB 32 reduction targets for the on-road transportation category, the project team developed several emissions reductions strategies and calculated the “wedges” illustrated in Table 2 and Figure 9. This approach was adapted from the well-known study by Pacala and Socolow, who demonstrated that global emissions could be reduced to levels that would stabilize climate change with existing technologies.<sup>2</sup>

The project team developed five wedges to reduce GHG emissions from the on-road transportation category to 1990 levels. Each wedge relies on either existing statutes or policy directives currently under consideration addressing total fuel consumption, fuel type, and vehicle miles traveled (VMT). The wedges are also based on effects of the Corporate Average Fuel Economy (CAFE) standard included in Title 49 of the Energy Independence and Security Act of 2007;<sup>3</sup> California’s AB 1493, which is also referred to as the “Pavley” bill<sup>4</sup>; the Low Carbon Fuel Standard (LCFS)<sup>5</sup>; a 10% VMT reduction; and several vehicle efficiency measures included in CARB’s Climate Change Draft Scoping Plan.<sup>6</sup> Table 2 shows each wedge and the amount of emissions that it could reduce by 2020. The combined emissions reductions represented by these five wedges is 6.8 MMT CO<sub>2</sub>E, about 45% of the total amount needed to reach the AB 32 targets for the entire region.

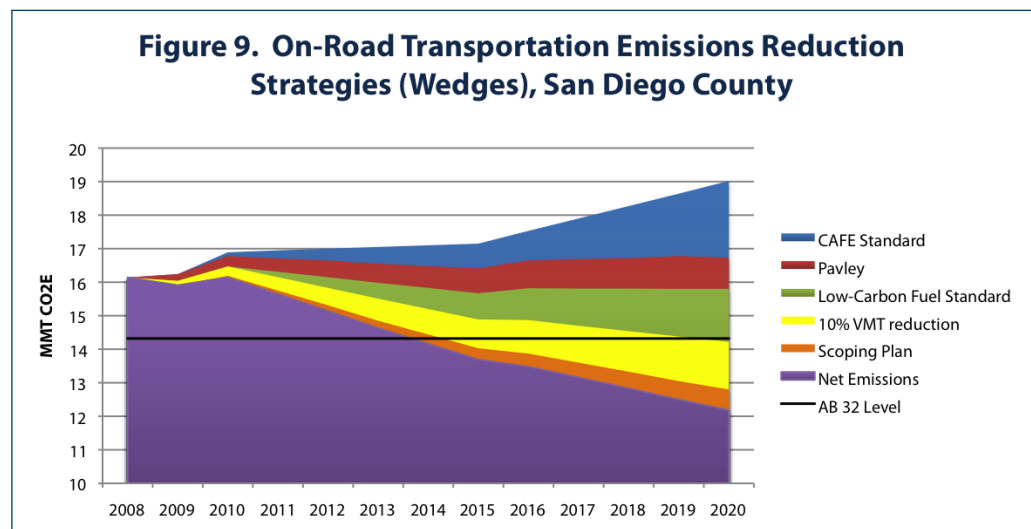
Figure 9 is a graphical representation of how each wedge reduces emissions from the business-as-usual projection.



**Table 2. Emissions Reduction Strategies for On-Road Transportation**

Emissions Reduction Wedge	Emissions Reduction (MMT CO <sub>2</sub> E)	% of Total Reduction
CAFE Standards	2.3	33%
Pavley (incremental increase over CAFE)*	0.9	14%
Low-Carbon Fuel Standard	1.6	23%
Reduce VMT by 10%	1.4	21%
Climate Change Scoping Plan	0.6	9%
<b>Total</b>	<b>6.8</b>	<b>100%</b>

\*Total Pavely wedge is equal to 3.2 (CAFE + Pavley)





### 3.1. AB 1493 (Pavley 1 and 2)

AB 1493, or the Pavley Bill, is a standard for new light-duty passenger vehicles that could reduce San Diego County emissions from these vehicles by 21% by 2020.<sup>7</sup> The law, which has not been implemented due to legal challenges, requires auto manufacturers to reduce vehicle emissions of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and hydrofluorocarbons (HFCs) in light-duty vehicles. AB 1493 defines light-duty passenger vehicles as including passenger cars, light-duty trucks, and medium-duty trucks/vehicles. Under the law, manufacturers would need to reduce greenhouse gases from tailpipe emissions and fugitive emissions from air-conditioning systems.

If implemented, the Pavley bill regulations would begin with the 2009 model year and end in 2016, when an 11% reduction in emissions is required. The period from 2009 to 2016 is known as “Pavley 1”; the period from 2017 to 2020 is “Pavley 2” and would require a 20% GHG reduction by 2020. Pavley 2 is a commitment made by the California Air Resources Board to extend progress from Pavley 1 and to increase the greenhouse gas reduction requirement to 20%.

### 3.2. Federal Corporate Average Fuel Economy (CAFE) Standards

The federal Corporate Average Fuel Economy (CAFE) standard determines the fuel efficiency of certain vehicle classes in the United States. The current standard has remained largely unchanged since 1990. In 2007, as part of the Energy and Security Act of 2007, CAFE standards were increased for new light-duty vehicles to 35 miles per gallon by 2020.<sup>8</sup> The new CAFE standards will take effect no sooner than 2011, which was the start date used in this analysis. Unlike the Pavley Bill, which has a specific GHG emissions reduction target, the CAFE standards simply prescribe fuel economy, which will also result in greenhouse gas reductions.

In a study comparing Pavley 1 and 2 with the federal CAFE standard, CARB reported that the CAFE standard would reduce GHG emissions by 5% by 2016 and 12% by 2020<sup>9</sup>; the Pavley 1 and 2 standards are expected to reduce emissions by 20 % by 2020. The CAFE standard requires reductions from light- and heavy-duty vehicles, whereas Pavley 1 and 2 only require reductions from light-duty vehicles. A reduction requirement for heavy-duty vehicles has not yet been determined for CAFE; therefore, for purposes of this study, the emissions reduction requirement for heavy-duty vehicles is taken to be the same as the Federal standard for light-duty vehicles on a percentage basis, which is 5% by 2016 and 12% by 2020. Even though the effects of the Pavley Bill are greater than the effects of the new CAFE standards for light-duty vehicles, we chose to calculate separate values for each; however, the reader should note that the combined values presented for CAFE and Pavley are equivalent to the effects of Pavley regarding light-duty vehicles because we show only the incremental increase of Pavley over the CAFE standard.<sup>10</sup>

### 3.3. Low Carbon Fuel Standard (LCFS)

The Low Carbon Fuel Standard (LCFS) was included in a California Governor’s Executive Order that was promulgated in January 2007. This strategy addresses the type of fuel used in vehicles. Efficiency standards affect the total amount of fuel used, whereas the low-carbon fuel standard seeks to reduce the carbon content of the fuel, therefore reducing GHG emissions even if total fuel consumption is not reduced. The Low-Carbon Fuel Standard has been approved by CARB as a discrete early action item under AB 32 and implementing regulations are currently under development. Because regulations have not been finalized, for the purposes of this study it was reasonable to assume that the effects of the Low-Carbon Fuel Standard would be a 10% reduction in GHG emissions from fuel use by 2020.

### 3.4. 10% Reduction in Vehicle Miles Traveled (VMT)

Vehicle miles traveled (VMT) is the third significant driver of emissions. No standard exists to regulate the number of miles driven, but reducing the total number of miles driven by 2020 can significantly reduce GHG emissions. The project team calculated the effects of a 10% reduction of vehicle miles traveled. This reduction is based in part upon the April 2008 Department of Transportation, Federal Highway Administration, “Traffic Volume Trends April 2008” report, which states “cumulative travel for 2008 decreased by 2.1 percent.” This decrease in VMT is only for the first quarter of 2008<sup>11</sup>; therefore, it seemed both conservative and reasonable to extrapolate to a 10% reduction of VMT by 2020.

Although the link between vehicle miles traveled and increasing fuel prices is unclear, the report from the Federal Highway Administration indicates that this is the largest downward trend in 25 years.<sup>12</sup> And although predicting fuel prices is complex and beyond the scope of this project, it is likely that fuel prices will be higher in 2020 than they are today, therefore putting downward pressure on vehicle miles traveled.

### 3.5. Climate Change Scoping Plan: Reduction (Measures 9 and 11)<sup>13</sup>

The Climate Change Scoping Plan is a comprehensive plan that has been developed by the CARB to achieve the goals of AB 32, the Global Warming Solutions Act of 2006. Included in the Scoping Plan are strategies to reduce emissions by increasing efficiency, optimizing aerodynamics, and converting combustion-only vehicles to hybrids. Although these on-road emissions reduction measures are intended for implementation at the state level, several on-road transportation strategies in this plan were scaled down to San Diego County using data related to CO<sub>2</sub>E emissions, vehicle population, and vehicle type. When scaled down, the CARB's transportation efficiency, aerodynamics, and hybrid conversion strategies translate to an emissions reduction of 0.6 MMT CO<sub>2</sub>E for San Diego County by 2020.

The measures in the Scoping Plan are a combination of strategies targeting light-, medium-, and heavy-duty vehicles. The county's 2020 emissions reduction target for light-duty vehicles is 0.47 MMT CO<sub>2</sub>E, which is to be accomplished by improving vehicle efficiency. The county's heavy- and medium-duty vehicle target in relationship to this plan is a 0.14 MMT CO<sub>2</sub>E reduction, achieved by optimized aerodynamics and hybridization.

## 4. On-Road Transportation Methodology

The on-road transportation methodology includes analysis of most motorized vehicles that travel San Diego County freeways, highways, streets, and roads. The vehicle types analyzed include: passenger cars; light-, medium-, and heavy-duty trucks; buses; motor homes; and motorcycles. The GHG gases that were analyzed include carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), and methane (CH<sub>4</sub>). These gases comprise the majority of GHG gases emitted due to combustion from on-road vehicles.

### 4.1. Computation, Process, and Data

The on-road transportation GHG emissions were computed in two steps. First, by obtaining San Diego County on-road GHG emission data using the CARB on-road emissions modeling tool, Emissions FAcT or EMFAC. Second, further computations were conducted that followed the computational methodology used by CARB to develop their California GHG emissions inventory.<sup>14</sup>

EMFAC uses emissions rate and vehicle activity data to compute on-road vehicle emissions. Development of the data is based on variables such as vehicle population and age, vehicle type and weight, fuel type and consumption, vehicle miles traveled (VMT), vehicle technology, and emissions reduction technology.

In addition to the first step of using outputs for CO<sub>2</sub> and CH<sub>4</sub> from EMFAC, total hydrocarbons (THC), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), molecular weight ratios, fuel consumption, and mass-balance methods were used to compute the final output of the major GHG gases (CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub>) from on-road vehicles. This final computation is similar to the methodology used by CARB to develop its 2007 California GHG Emissions Inventory.<sup>15</sup> When the GHG emissions inventory methodology for California was not applicable or did not make sense on a county scale, the CARB methodology was modified to apply to San Diego County. The main difference between the CARB computations and this study is the ratio of Federal Highway Administration fuel sales to the EMFAC computational fuel consumption for California. This ratio was not pertinent to San Diego County and computations were modified accordingly.

The EMFAC emissions output is generated in tons per day. This daily emissions rate was converted to an annual emissions rate based on the vehicle type (noncommercial or commercial). Noncommercial vehicle annual emissions were calculated on the basis of 347 effective days per year and included passenger cars, light-duty trucks, and motorcycles. Commercial vehicles included heavy-duty trucks and buses and their annual output was calculated on the basis of 327 effective days per year, on the assumption that vehicle activity and miles traveled decrease on weekends. GHG emissions from buses and motor homes were also included in this inventory. Owing to their similar gross vehicle weights, their respective emissions were included in the heavy-duty truck category.

## 4.2. Historical Emissions and Forecasts

Emissions from 1990 to 2005 were computed by Tanaka Research and Consulting using the method described in section 4.1. Forecasts from 2006 to 2020 used the same methodology described for 1990 to 2005, but the EMFAC inputs were provided by the SANDAG Transportation Division and were based on the Regional Transportation Plan. The final computation used the same methodology as the 1990 to 2005 time frame.

## 4.3. Wedge Configuration and Scenario Development

The project team calculated the following three wedge scenarios using the five wedges described above to assess whether and by how much the order in which the wedges were subtracted from the business-as-usual projection affected the total reductions:

1. Business-as-usual (BAU) case reduced by Pavley 1 and 2, CAFE, LCFS, a 10% VMT reduction and Climate Change Scoping Plan reduction
2. BAU reduced by CAFE, LCFS, 10% VMT reduction and Climate Change Scoping Plan reduction
3. BAU reduced by CAFE, 10% VMT reduction and Climate Change Scoping Plan reduction.

To calculate the effect of the emissions reductions included in each wedge, the project team subtracted the first wedge from the business-as-usual scenario. The second wedge was subtracted from the result of the first calculation (wedge), and so on. The order in which the wedges are calculated affects the net emissions after all the wedges are subtracted. Table 3 shows the results of the calculation for six scenarios, each using a different order. The project team chose to calculate wedges based on order 1 because its net emissions was closest to the 2020 net emissions average of the six possible reduction orders in Table 3. Also, since implementation of the tailpipe emissions standards included in the Pavley Bill has been delayed by litigation and Federal inaction, the project team thought it was reasonable to make the Federal CAFE standard the first wedge, since it is already law.

**Table 3. San Diego County On-Road Transportation:  
Scenarios of Potential Reduction Strategy Order and Net Emissions**

Year	Order 1	Order 2	Order 3	Order 4	Order 5	Order 6
	Net emission= BAU-CAFE- Pavley- LCFS-10% VMT Reduction- Scoping Plan	Net emission= BAU-CAFE- LCFS- Pavley- 10% VMT Reduction- Scoping Plan	Net emission= BAU- Pavley- CAFE- LCFS- 10% VMT Reduction- Scoping Plan	Net emission= BAU- Pavley- LCFS- CAFE- 10% VMT Reduction- Scoping Plan	Net Emission= BAU-LCFS- CAFE- Pavley- 10% VMT Reduction- Scoping Plan	Net emission= BAU-LCFS- Pavley- CAFE-10% VMT Reduction- Scoping Plan
1990	14.3	14.3	14.3	14.3	14.3	14.3
1995	13.3	13.3	13.3	13.3	13.3	13.3
2000	13.9	13.9	13.9	13.9	13.9	13.9
2005	15.9	15.9	15.9	15.9	15.9	15.9
2010	16.1	16.1	16.1	16.1	16.1	16.1
2015	13.7	13.7	13.6	13.6	13.8	13.7
2020	12.2	13.0	11.9	11.9	12.4	12.1

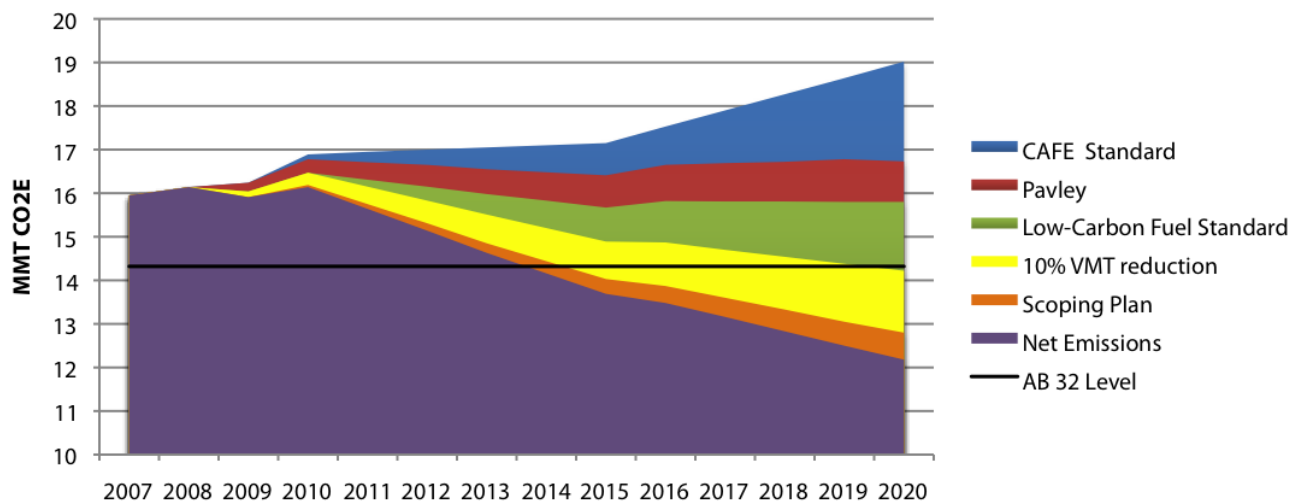
Wedge scenarios 1, 2, and 3 illustrate the significance of implementing the five wedges (CAFE, Pavley, LCFS, Climate Change Scoping Plan, and a 10% VMT reduction). A wedge summary is given in Table 4.

**Table 4. Summary of Wedge Scenario Descriptions and GHG Reductions, San Diego County On-Road Transportation**

Wedge Scenario	Wedges Included	2020 Net GHG Emissions after Application of Wedge Scenario (MMT CO <sub>2</sub> E)	Additional Emissions Reductions Required to Meet AB 32 Targets (MMT CO <sub>2</sub> E)
Wedge Scenario 1	BAU-CAFE-Pavley-LCFS - 10% VMT- Scoping Plan	12.2	-2.1 (meets and exceeds AB 32 target)
Wedge Scenario 2	BAU-CAFE-LCFS- 10% VMT- Scoping Plan	12.9	-1.4 (meets and exceeds AB 32 target)
Wedge Scenario 3	BAU-CAFE-10% VMT- Scoping Plan	14.5	0.2

Wedge scenario 1 is the most comprehensive of the three wedge scenarios; it incorporates all five reduction strategies: CAFE, Pavley, LCFS, 10% VMT reduction, and Scoping Plan. This scenario is one of two that were able to meet/exceed the AB 32 target by reducing 2020 GHG emissions to 1990 levels. This shows the importance of all five reduction strategies. Scenario 1 has a net GHG emissions of 12.2 MMT CO<sub>2</sub>E, which is 1.8 MMT CO<sub>2</sub>E below the AB 32 requirement of 14.3 MMT CO<sub>2</sub>E. The results of scenario 1 are displayed in Figure 10.

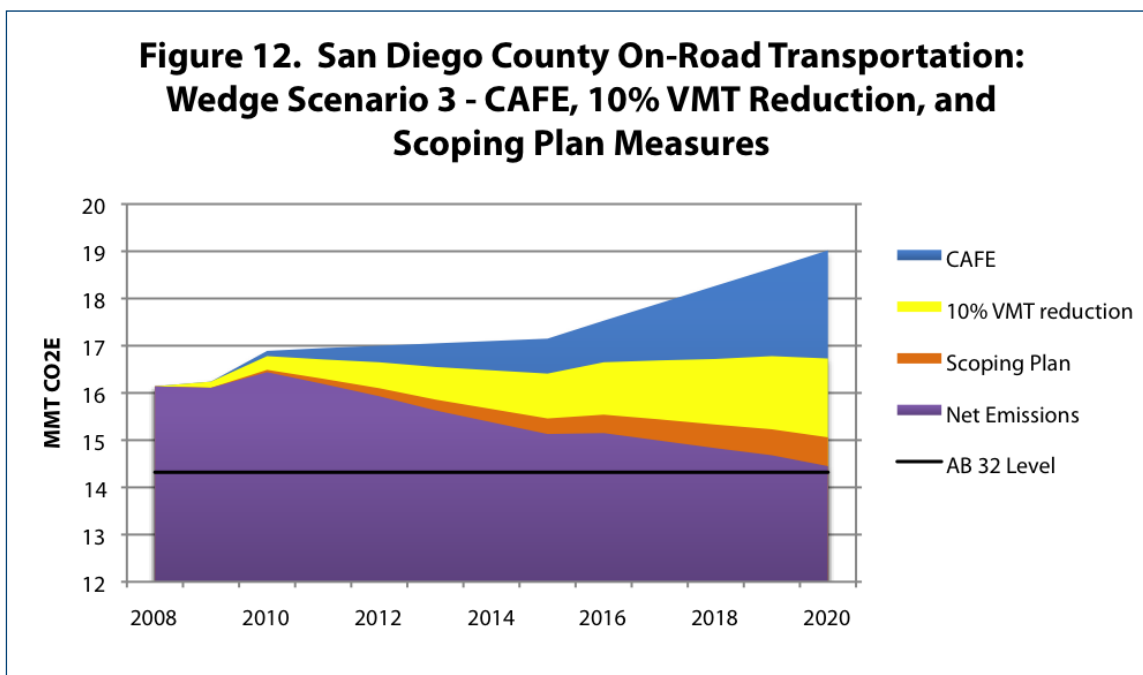
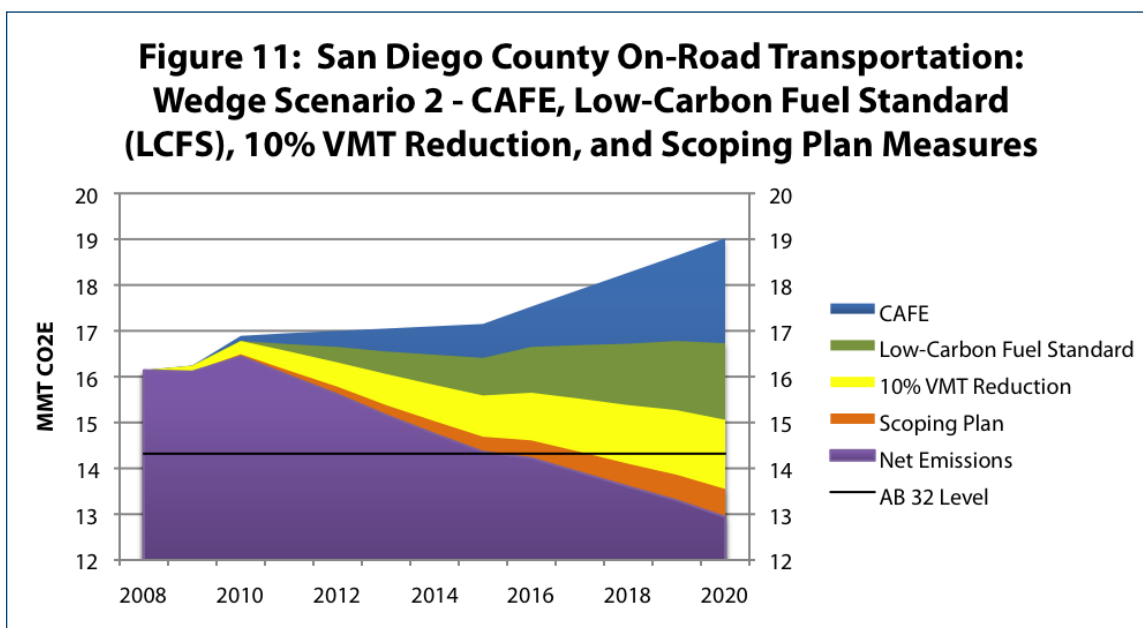
**Figure 10. San Diego County On-Road Transportation: Wedge Scenario 1 - CAFE, Pavley 1 and 2, Low-Carbon Fuel Standard, 10% VMT Reduction, and Scoping Plan**





Wedge scenario 2 is similar to scenario 1, but does not include Pavley 1 and 2, and has net emissions of 13.3 MMT CO<sub>2</sub>E in 2020, which is 1 MMT CO<sub>2</sub>E below the AB 32 target of 14 MMT CO<sub>2</sub>E. The results of scenario 2 are displayed in Figure 11.

Wedge scenario 3 includes the CAFE reduction strategy, the 10% VMT reduction and the Scoping Plan (Figure 12). This scenario did not meet the AB 32 target of 14.32 MMT CO<sub>2</sub>E. This scenario has a net emissions of 14.9 MMT CO<sub>2</sub>E in 2020, which is 0.6 MMT CO<sub>2</sub>E short of reaching the AB 32 target.



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## End Notes

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