2.5 Climate Change

2.5.1 Regulatory Setting

While climate change has been a concern since at least 1988, as evidenced by the establishment of the United Nations and World Meteorological Organization's Intergovernmental Panel on Climate Change (IPCC), the efforts devoted to greenhouse gas (GHG) emissions reduction and climate change research and policy have increased dramatically in recent years. These efforts are primarily concerned with the emissions of GHG related to human activity that include carbon dioxide (CO_2), methane, nitrous oxide, tetrafluoromethane, hexafluoroethane, sulfur hexafluoride, HFC-23 (fluoroform), HFC-134a (s, s, s, 2 –tetrafluoroethane), and HFC-152a (difluoroethane).

In 2002, with the passage of Assembly Bill 1493 (AB 1493), California launched an innovative and pro-active approach to dealing with GHG emissions and climate change at the state level. AB 1493 requires the California Air Resources Board (ARB) to develop and implement regulations to reduce automobile and light truck GHG emissions. These stricter emissions standards will apply to automobiles and light trucks beginning with the 2009 model year; however, in order to enact the standards, California needed a waiver from the EPA. The waiver was denied by EPA in December 2007 (see California v. Environmental Protection Agency, 9th Cir. Jul. 25, 2008, No. 08-70011). However, on January 26, 2009, it was announced that the EPA will reconsider its decision regarding the denial of California's waiver. On May 18, 2009, President Obama announced the enactment of a 35.5 miles per gallon (mpg) fuel economy standard for automobiles and light-duty trucks, which will take effect in 2012. On June 30, 2009 EPA granted California the waiver. California is expected to enforce its standards for 2009 to 2011 and then look to the federal government to implement equivalent standards for 2012 to 2016. The granting of the waiver will also allow California to implement even stronger standards in the future. The state is expected to start developing new standards for the post-2016 model years later this year.

On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05. The goal of this Executive Order is to reduce California's GHG emissions to: 1) 2000 levels by 2010, 2) 1990 levels by the year 2020 and 3) 80 percent below the 1990 levels by the year 2050. In 2006, this goal was further reinforced with the

passage of Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006. AB 32 sets the same overall GHG emissions reduction goals while further mandating that ARB create a plan, which includes market mechanisms, and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." Executive Order S-20-06 further directs state agencies to begin implementing AB 32, including the recommendations made by the state's Climate Action Team.

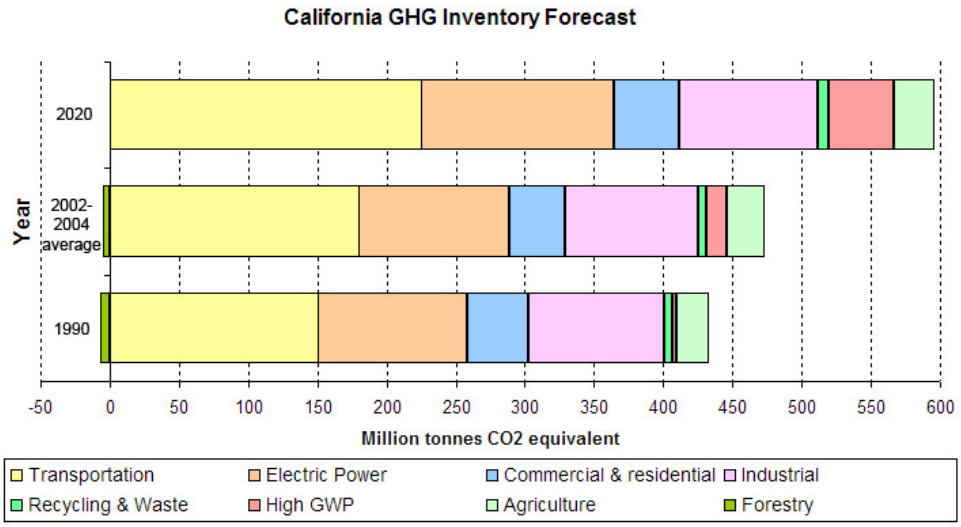
With Executive Order S-01-07, Governor Schwarzenegger set forth the low carbon fuel standard for California. Under this executive order, the carbon intensity of California's transportation fuels is to be reduced by at least 10 percent by 2020.

Climate change and GHG reduction is also a concern at the federal level; however, at this time, no legislation or regulations have been enacted specifically addressing GHG emissions reductions and climate change. California, in conjunction with several environmental organizations and several other states, sued to force the EPA to regulate GHG as a pollutant under the CAA (Massachusetts vs. Environmental Protection Agency et al., 549 U.S. 497 (2007). The court ruled that GHG does fit within the CAA's definition of a pollutant, and that the EPA does have the authority to regulate GHG. Despite the Supreme Court ruling, there are no promulgated federal regulations to date limiting GHG emissions.

According to Recommendations by the Association of Environmental Professionals on How to Analyze GHG Emissions and Global Climate change in CEQA Documents (March 5, 2007), an individual project does not generate enough GHG emissions to significantly influence global climate change. Rather, global climate change is a cumulative impact. This means that a project may participate in a potential impact through its incremental contribution combined with the contributions of all other sources of GHG. In assessing cumulative impacts, it must be determined whether a project's incremental effect is "cumulatively considerable." See CEQA Guidelines Sections 15064(i)(1) and 15130. To make this determination, the incremental impacts of the project must be compared with the effects of past, current, and probable future projects. To gather sufficient information on a global scale of all past, current, and future projects in order to make this determination is a difficult if not impossible task.

As part of its supporting documentation for the Draft Scoping Plan, ARB released an updated version of the GHG inventory for California (June 26, 2008). Shown below

is a graph from that update that shows the total GHG emissions for California for 1990, 2002–2004 average, and 2020 projected if no action is taken.



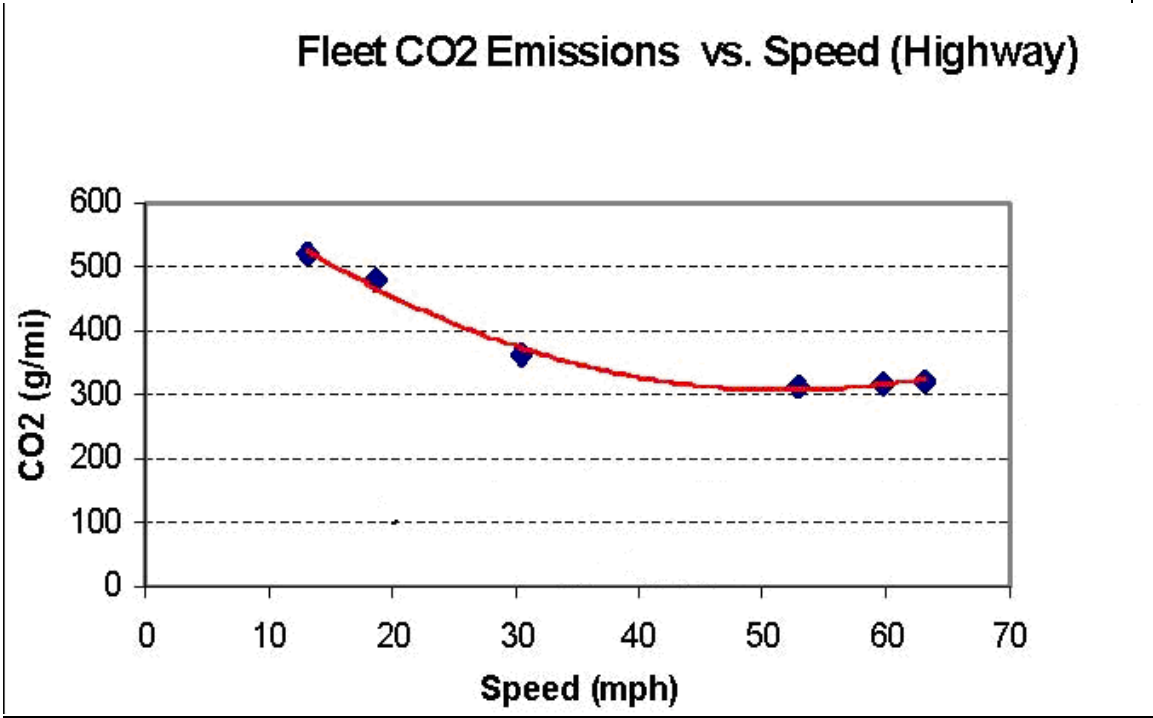
Source: http://www.arb.ca.gov/cc/inventory/data/forecast.htm

The California Department of Transportation (Department) and its parent agency, the Business, Transportation, and Housing Agency, have taken an active role in addressing GHG emission reduction and climate change. Recognizing that 98 percent of California's GHG emissions are from the burning of fossil fuels and 40 percent of all human-made GHG emissions are from transportation (see *Climate Action Program at Caltrans* [December 2006]), the Department has created and is implementing the *Climate Action Program at Caltrans* that was published in December 2006.[1]

One of the main strategies in the Department's Climate Action Program to reduce GHG emissions is to make California's transportation system more efficient. The highest levels of carbon dioxide from mobile sources, such as automobiles, occur at stop-and-go speeds (0–25 miles per hour [mph]) and speeds over 55 mph; the most severe emissions occur from 0–25 mph (see Figure below). Relieving congestion by enhancing operations and improving travel times in high congestion travel corridors may lead to an overall reduction in GHG emissions. The purpose of the project is to alleviate existing and future traffic congestion during peak hours. Therefore, the project would increase the number of vehicle hours traveled (VHT) within the project area. Although the project may result in an extremely small net increase in VMT, the

[1] http://www.dot.ca.gov/docs/ClimateReport.pdf.

carbon dioxide emissions would be increased due to the increase in VHT and the improved traffic flow.



Source: Center for Clean Air Policy— http://www.ccap.org/Presentations/Winkelman%20TRB%202004%20(1-13-04).pdf

2.5.2 Environmental Consequences

2.5.2.1 Long-Term Global Warming Impact

The purpose of the proposed project is to alleviate existing and future traffic congestion along SR-74 during peak hours. The proposed project will not generate new vehicular traffic trips since it will not construct new homes or businesses. However, there is a possibility that some traffic currently utilizing other routes would be attracted to use the improved facility, thus resulting in extremely small increases in VMT. The impact of GHG emissions is a global rather than a local issue. Therefore, the impact of the Build Alternative on GHG emissions was calculated using traffic data for the SCAG region.

As shown in Table 2.5.2-1, the proposed project would result in an extremely small increase in VMT and VHT in 2035.

Table 2.5.2-1 Change in Regional VMT and VHT

Year	Regional VMT	Regional VHT
2035 Regional No Build	344,523,122	10,453,545
2035 Regional Build	344,527,419	10,454,259

Source: Austin-Foust Associates, Inc., October 2008.
VHT = vehicle hours traveled VMT = vehicle miles traveled

The VMT and VHT data listed in Table 2.5.2-1, along with the EMFAC2007 emission rates, were used to calculate the CO_2 and CH_4 emissions for the 2035 regional conditions. The Build Alternatives would not substantially change the regional VMT. The results of the modeling were used to calculate the CO_2 equivalent (CO_{2eq}) emissions listed in Table 2.5.2-2. Emissions of CO_2 and CO_2e are combined to develop the CO_{2eq} emissions in Table 2.5.2-2. As shown in Table 2.5.2-2, the proposed project would increase the CO_{2eq} emissions within the region. However, the percentage increase in emissions of 0.004 percent is very small.

Table 2.5.2-2 Change in $CO_{2\ eq}$ Emissions

Alternative	Daily CO_{2eq} Emissions (lbs/day)	Increase from No Build (lbs/day)	Percent Increase from No Build
2035 No Build	339,303,325	-	-
2035 Build	339,318,068	14,743	0.004

Source: LSA Associates, Inc., October 2008.
CO_{2eq} = carbon dioxide equivalent lbs/day = pounds per day

Although the Build Alternatives would result in extremely small increases in VMT, VHT, and CO_2E, based on the *Traffic Study* (May 2008), the Build Alternatives would reduce congestion and improve LOS. Relieving congestion by enhancing operations and improving travel times in high-congestion travel corridors may lead, in general, to an overall reduction in GHG emissions; the modeling output in Table 2.5.2-2 focuses on VMT, but does not include the beneficial effect of improving traffic flow and speed.

2.5.2.2 Limitations and Uncertainties with Modeling

EMFAC

Although EMFAC can calculate CO_2 emissions from mobile sources, the model does have limitations when it comes to accurately reflecting CO_2 emissions. According to the National Cooperative Highway Research Program report, *Development of a Comprehensive Modal Emission Model* (April 2008), studies have revealed that brief

but rapid accelerations can contribute significantly to a vehicle's carbon monoxide and hydrocarbon emissions during a typical urban trip. Current emission-factor models are insensitive to the distribution of such modal events (i.e., cruise, acceleration, deceleration, and idle) in the operation of a vehicle and instead estimate emissions by average trip speed. This limitation creates an uncertainty in the model's results when compared to the estimated emissions of the various alternatives with baseline in an attempt to determine impacts. Although work by EPA and the CARB is underway on modal-emission models, neither agency has yet approved a modal emissions model that can be used to conduct this more accurate modeling. In addition, EMFAC does not include speed corrections for most vehicle classes for CO_2; for most vehicle classes, emission factors are held constant, which means that EMFAC is not sensitive to the decreased emissions associated with improved traffic flows for most vehicle classes. Therefore, unless a project involves a large number of heavy-duty vehicles, the difference in modeled CO_2 emissions due to speed change will be slight.

It is interesting to note that CARB is currently not using EMFAC to create its inventory of GHG emissions, and is unclear why the CARB has made this decision. Its Web site only states:

> "REVISION: Both the EMFAC and OFFROAD Models develop CO_2 and CH_4 [methane] emission estimates; however, they are not currently used as the basis for [CARB's] official [GHG] inventory which is based on fuel usage information. However, CARB is working towards reconciling the emission estimates from the fuel usage approach and the models."

Other Variables

With the current science, project-level analysis of GHG emissions is limited. Although a GHG analysis is included for this project, there are numerous key GHG variables that are likely to change dramatically during the design life of the proposed project and would thus dramatically change the projected CO_2 emissions.

First, vehicle fuel economy is increasing. The EPA's annual report, "Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2008 (http://www.epa.gov/oms/fetrends.htm)," which provides data on the fuel economy and technology characteristics of new light-duty vehicles, including cars, minivans, sports utility vehicles, and pickup trucks, confirms that average fuel economy has

improved each year beginning in 2005 and is now the highest since 1993. Most of the increase since 2004 is due to higher fuel economy for light trucks, following a long-term trend of slightly declining overall fuel economy that peaked in 1987. These vehicles also have a slightly lower market share, peaking at 52 percent in 2004, with projections at 48 percent in 2008. Table 2.5.2-3 shows the alternatives for vehicle fuel economy increases currently being studied by the National Highway Traffic Safety Administration in its Draft EIS for New Corporate Average Fuel Economy (CAFE) Standards (June 2008).

Table 2.5.2-3 Model Year 2015 Required Miles Per Gallon (mpg) by Alternative

No Action		25% Below Optimized	Optimized (Preferred)	25% Above Optimized	50% Above Optimized	Total Costs Equal Total Benefits	Technology Exhaustion
Cars	27.5	33.9	35.7	37.5	39.5	43.3	52.6
Trucks	23.5	27.5	28.6	29.8	30.9	33.1	34.7

Source: National Highway Traffic Administration, 2008.

Second, near-zero carbon vehicles will come into the market during the design life of this project. According to a March 2008 report released by University of California Davis (UC Davis), Institute of Transportation Studies:

> "Large advancements have occurred in fuel cell vehicle and hydrogen infrastructure technology over the past 15 years. Fuel cell technology has progressed substantially resulting in power density, efficiency, range, cost, and durability all improving each year. In another sign of progress, automotive developers are now demonstrating over 100 fuel cell vehicles (FCVs) in California – several in the hands of the general public – with configurations designed to be attractive to buyers. Cold-weather operation and vehicle range challenges are close to being solved, although vehicle cost and durability improvements are required before a commercial vehicle can be successful without incentives. The pace of development is on track to approach pre-commercialization within the next decade.
>
> "A number of the United States Department of Energy (DOE) 2010 milestones for FCV development and commercialization are expected to be met by 2010. Accounting for a five to six year production

> development cycle, the scenarios developed by the U.S. DOE suggest that 10,000s of vehicles per year from 2015 to 2017 would be possible in a federal demonstration program, assuming large cost share grants by the government and industry are available to reduce the cost of production vehicles."[1]

Third, and as previously stated, California has recently adopted a low-carbon transportation fuel standard. The CARB is scheduled to present draft regulations for low-carbon fuels in late 2008, with implementation of the standard to begin in 2010.

Fourth, driver behavior has been changing as the U.S. economy and oil prices have changed. In its January 2008 report, "Effects of Gasoline Prices on Driving Behavior and Vehicle Market,"[2] the Congressional Budget Office found the following results based on data collected from California: (1) freeway motorists have adjusted to higher gas prices by making fewer trips and driving more slowly; (2) the market share of sports utility vehicles is declining; and (3) the average prices for larger, less-fuel-efficient models have declined over the past five years as average prices for the most-fuel-efficient automobiles have risen, showing an increase in demand for the more fuel efficient vehicles.

Limitations and Uncertainties with Impact Assessment

Figure 2.5.2-1[3] is taken from the National Highway Traffic Safety Administration Draft Environmental Impact Statement for New CAFÉ Standards and illustrates how the range of uncertainties in assessing GHG impacts grows with each step of the analysis:

> "Cascade of uncertainties typical in impact assessments showing the "uncertainty explosion" as these ranges are multiplied to encompass a comprehensive range of future consequences, including physical, economic, social, and political impacts and policy responses."

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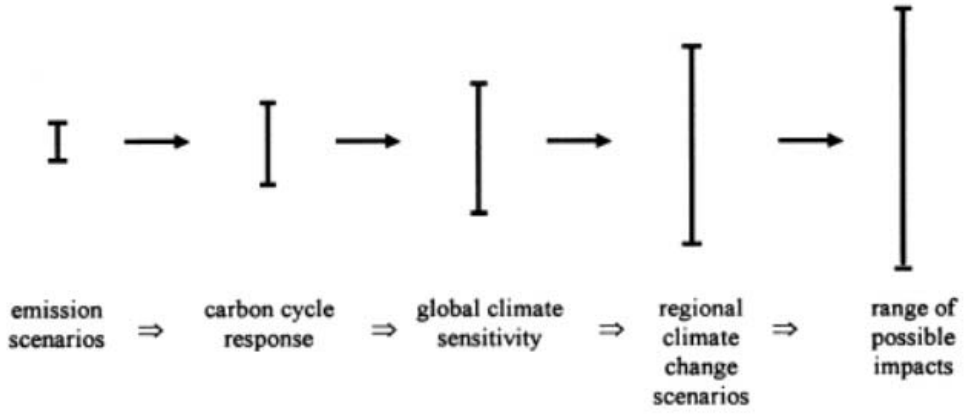
1 Cunningham, Joshua, Sig Cronich, Michael A. Nicholas. March 2008. Why Hydrogen and Fuel Cells are Needed to Support California Climate Policy, UC Davis, Institute of Transportation Studies, pp. 9–10.

2 http://www.cbo.gov/ftpdocs/88xx/doc8893/01-14-GasolinePrices.pdf.

3 National Highway Traffic Safety Administration Draft EIS for New CAFE Standards (June 2008, pp. 3-48 and 3-49.)

Figure 2.5.2-1 Cascade of Uncertainties



Source: National Highway Traffic Safety Administration, 2008.

Much of the uncertainty in assessing an individual project's impact on climate change surrounds the global nature of the climate change. Even assuming that the target of meeting the 1990 levels of emissions is met, there is no regulatory or other framework in place that would allow for a ready assessment of what the modeled 7.4 ton increase in CO_2 emissions would mean for climate change given the overall California GHG emissions inventory of approximately 430 million tons of $C0_2$ equivalent. This uncertainty only increases when viewed globally. The IPCC has created multiple scenarios to project potential future global GHG emissions as well as to evaluate potential changes in global temperature, other climate changes, and their effect on human and natural systems. These scenarios vary in terms of the type of economic development, the amount of overall growth, and the steps taken to reduce GHG emissions. Non-mitigation IPCC scenarios project an increase in global GHG emissions by 9.7 up to 36.7 billion metric tons of CO_2 from 2000 to 2030, which represents an increase of between 25 and 90 percent.[1]

The assessment is further complicated by the fact that changes in GHG emissions can be difficult to attribute to a particular project because the projects often cause shifts in the locale for some types of GHG emissions, rather than causing "new" GHG emissions. The extent to which the modeled 11.4–20.9-ton increase in CO_2 emissions represents a net global increase, reduction, or no change, is uncertain, and there are no

[1] Intergovernmental Panel on Climate Change (IPCC). February 2007. Climate Change 2007: The Physical Science Basis: Summary for Policy Makers. http://www.ipcc.ch/SPM2feb07.pdf.

models approved by regulatory agencies that operate at the global or even statewide scale.

The complexities and uncertainties associated with project level impact analysis are further borne out in the recently released Draft EIS completed by the National Highway Traffic Safety Administration CAFE standards (June 2008). As the text quoted below shows, even when dealing with GHG emission scenarios on a national scale for the entire passenger car and light truck fleet, the numerical differences among alternatives is very small and well within the error of sensitivity of the model.

> "In analyzing across the CAFE 30 alternatives, the mean change in the global mean surface temperature, as a ratio of the increase in warming between the B1 (low) to A1B (medium) scenarios, ranges from 0.5 percent to 1.1 percent. The resulting change in sea level rise (compared to the No Action Alternative) ranges, across the alternatives, from 0.04 centimeter to 0.07 centimeter. In summary, the impacts of the Model Year 2011-2015 CAFE alternatives on global mean surface temperature, sea level rise, and precipitation are relatively small in the context of the expected changes associated with the emission trajectories. This is due primarily to the global and multi-sectoral nature of the climate problem. Emissions of CO_2, the primary gas driving the climate effects, from the United States automobile and light truck fleet represented about 2.5 percent of total global emissions of all GHGs in the year 2000 (EPA, 2008; CAIT, 2008). While a significant source, this is a still small percentage of global emissions, and the relative contribution of CO_2 emissions from the United States light vehicle fleet is expected to decline in the future, due primarily to rapid growth of emissions from developing economies (which are due in part to growth in global transportation sector emissions).[1]"

Conclusion

Based on the above, it is Caltrans determination that in the absence of further regulatory or scientific information related to GHG emissions and CEQA significance, it is too speculative to make a determination regarding the project's direct impact and its contribution on the cumulative scale to climate change.

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[1] NHTSA Draft EIS for New CAFE Standards, June 2008, pp.3-77 to 3-78.

However, Caltrans is firmly committed to implementing measures to help reduce the potential effects of the project. These measures are outlined in the following section.

2.5.2.3 AB 32 Compliance

The Department continues to be actively involved on the Governor's Climate Action Team as ARB works to implement the Governor's Executive Orders and help achieve the targets set forth in AB 32. Many of the strategies the Department is using to help meet the targets in AB 32 come from the California Strategic Growth Plan, which is updated each year. Governor Arnold Schwarzenegger's Strategic Growth Plan calls for a $238.6 billion infrastructure improvement program to fortify the state's transportation system, education, housing, and waterways, including $100.7 billion in transportation funding through 2016.[1] As shown on the figure below, the Strategic Growth Plan targets a significant decrease in traffic congestion below today's level and a corresponding reduction in GHG emissions. The Strategic Growth Plan proposes to do this while accommodating growth in population and the economy. A suite of investment options has been created that, combined together, yield the promised reduction in congestion. The Strategic Growth Plan relies on a complete systems approach of a variety of strategies: system monitoring and evaluation, maintenance and preservation, smart land use and demand management, and operational improvements.

As part of the *Climate Action Program at Caltrans*[2] (December 2006), the Department is supporting efforts to reduce vehicle miles traveled by planning and implementing smart land use strategies: job/housing proximity, and developing transit-oriented communities and high-density housing along transit corridors. The Department is working closely with local jurisdictions on planning activities; however, the Department does not have local land use planning authority. The Department is also supporting efforts to improve the energy efficiency of the transportation sector by increasing vehicle fuel economy in new cars and light and heavy-duty trucks; the Department is doing this by supporting ongoing research efforts at universities, by supporting legislative efforts to increase fuel economy, and by its participation on the Climate Action Team. It is important to note, however, that the control of the fuel economy standards is held by EPA and ARB. Lastly, the use of

[1] Governor's Strategic Growth Plan, Figure (http://gov.ca.gov/pdf/gov/CSGP.pdf).

[2] http://www.dot.ca.gov/docs/ClimateReport.pdf.

alternative fuels is also being considered; the Department is participating in funding for alternative fuel research at UC Davis.

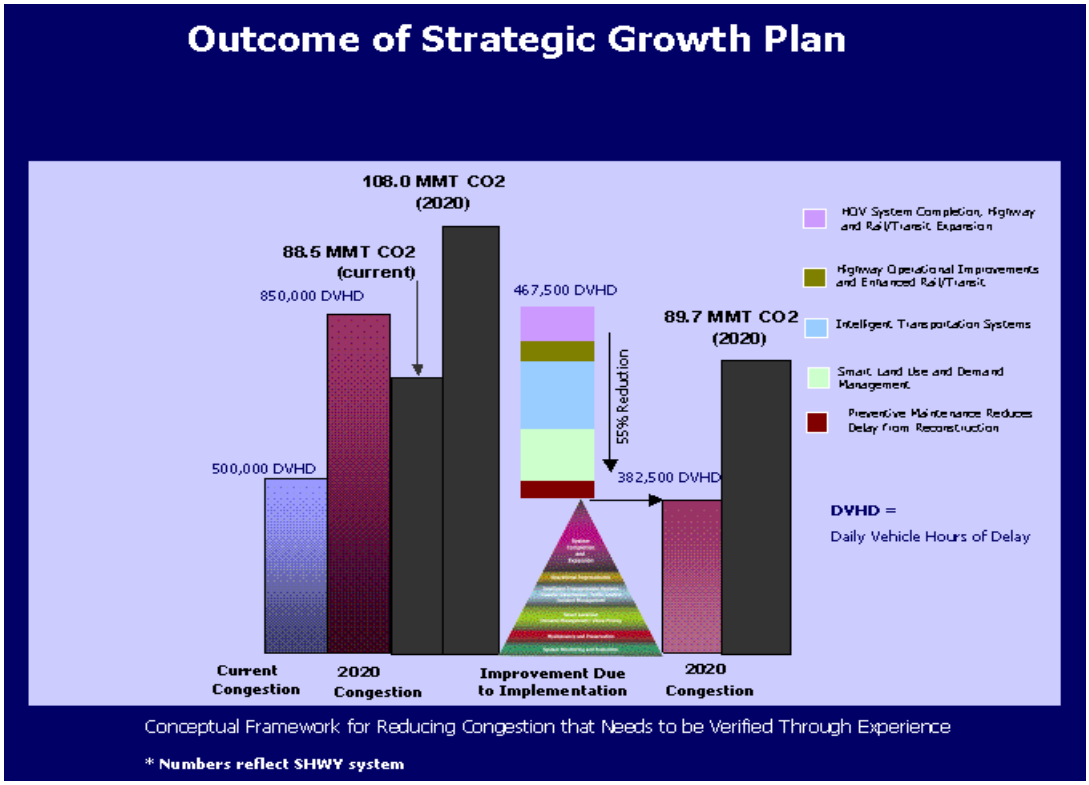

Table 2.5.2-4 summarizes the Department and statewide efforts that Caltrans is implementing in order to reduce GHG emissions. For more detailed information about each strategy, please see the Climate Action Program at Caltrans.[1]

To the extent that it is applicable or feasible for the project and through coordination with the project development team, the following measures will also be included in the project to reduce the GHG emissions and potential climate change impacts from the project:

Landscaping will use reclaimed water, where possible. Currently 30 percent of the electricity used in California is used for the treatment and delivery of water. Use of reclaimed water helps conserve this energy, which reduces GHG emissions from electricity production.

[1] http://www.dot.ca.gov/docs/ClimateReport.pdf, December 2006.

Table 2.5.2-4 Climate Change Strategies

Strategy	Program	Partnership		Method/Process	Estimated CO_2 Savings (MMT)	
		Lead	Agency		2010	2020
Smart Land Use	Intergovernmental Review (IGR)	Caltrans	Local Governments	Review and seek to mitigate development proposals	Not Estimated	Not Estimated
	Planning Grants	Caltrans	Local and regional agencies & other stakeholders	Competitive selection process	Not Estimated	Not Estimated
	Regional Plans and Blueprint Planning	Regional Agencies	Caltrans	Regional plans and application process	0.975	7.8
Operational Improvements & Intelligent Trans. System (ITS) Deployment	Strategic Growth Plan	Caltrans	Regions	State ITS; Congestion Management Plan	.007	2.17
Mainstream Energy & Greenhouse Gas into Plans and Projects	Office of Policy Analysis & Research; Division of Environmental Analysis	Interdepartmental effort		Policy establishment, guidelines, technical assistance	Not Estimated	Not Estimated
Educational & Information Program	Office of Policy Analysis & Research	Interdepartmental, CalEPA, CARB, CEC		Analytical report, data collection, publication, workshops, outreach	Not Estimated	Not Estimated
Fleet Greening & Fuel Diversification	Division of Equipment	Department of General Services		Fleet Replacement B20 B100	0.0045	0.0065 0.45 .0225
Non-vehicular Conservation Measures	Energy Conservation Program	Green Action Team		Energy Conservation Opportunities	0.117	.34
Portland Cement	Office of Rigid Pavement	Cement and Construction Industries		2.5 % limestone cement mix 25% fly ash cement mix > 50% fly ash/slag mix	1.2 .36	3.6
Goods Movement	Office of Goods Movement	Cal EPA, CARB, BT&H, MPOs		Goods Movement Action Plan	Not Estimated	Not Estimated
Total					2.72	18.67

CARB = California Air Resources Board
BT&H = Business Transportation and Housing Cal EPA = California Environmental Protection Agency Caltrans = California Department of Transportation
CEC = California Energy Commission CO_2 = Carbon Dioxide MPOs = Metropolitan Planning Organization

Landscaping reduces surface warming and through photosynthesis decreases CO_2. Trees removed as a result of the proposed project will be replaced within the right–of-way or in suitable locations within the community or greater region.

The use of lighter color surfaces such as Portland cement helps to reduce the albedo effect and cool the surface; in addition, the Department has been a leader in the effort to add fly ash to Portland cement mixes. Adding fly ash reduces the GHG emissions associated with cement production. Use of this would be in accordance with the Department's specifications and design standards and could be used in areas such as curb/gutter, retaining walls, driveways, and sidewalks.

According to Caltrans Standard Specification Provisions, idling time for lane closure during construction is restricted to ten minutes in each direction; in addition, the contractor must comply with Air Quality Management District's rules, ordinances, and regulations in regards to air quality restrictions.

Caltrans and the California Highway Patrol are working with regional agencies to implement Intelligent Transportation Systems (ITS) to help manage the efficiency of the existing highway system. ITS is commonly referred to as electronics, communications, or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system.