TECHNICAL EVALUATION OF THE GREENHOUSE GAS EMISSIONS REDUCTION QUANTIFICATION FOR BUTTE COUNTY ASSOCIATION OF GOVERNMENTS' SB 375 2016 SUSTAINABLE COMMUNITIES STRATEGY

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California Environmental Protection Agency

Air Resources Board

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BACKGROUND

The Sustainable Communities and Climate Protection Act of 2008 (SB 375) is intended to support the State's broader climate goals by encouraging integrated regional transportation and land use planning that reduces greenhouse gas (GHG) emissions from passenger vehicle use. California's metropolitan planning organizations (MPO) develop regional Sustainable Communities Strategies (SCS) containing land use, housing, and transportation strategies that, if implemented, can meet the per capita passenger vehicle-related GHG emissions targets (targets) for 2020 and 2035 set by the California Air Resources Board (CARB or Board). Once an MPO adopts an SCS, SB 375 directs CARB to accept or reject an MPO's determination that its SCS, if implemented, would meet the targets.

On January 27, 2017, Butte County Association of Governments (BCAG) submitted its 2016 SCS for CARB to review with estimates of 6 percent and 7 percent decrease in GHG per capita emission reductions by 2020 and 2035 compared to 2005, respectively. The region's GHG per capita emissions targets are 1 percent increase for both 2020 and 2035, compared to 2005. This report reflects CARB's technical evaluation of BCAG's 2016 SCS GHG quantification.

CARB DETERMINATION

ACCEPT

Based on a review of all available evidence, including model inputs, outputs, the SCS strategies, performance indicators, and implementation efforts so far, CARB accepts BCAG's determination that its 2016 SCS would, if implemented, meet the targets of a 1 percent increase for both 2020 and 2035, respectively.

BCAG's 2016 SCS contains nearly the same strategies as their first SCS, which CARB reviewed and accepted as meeting the targets in April 2013. For the 2016 SCS, BCAG incorporated modeling improvements and updated inputs and assumptions for trip rates and auto operating costs that show an increase in quantified GHG emission reductions for the same set of strategies. These improved modeling assumptions coupled with relatively minor reductions in anticipated growth in population and employment, contributed to changes in the quantification of GHG reductions.

SCOPE AND METHODOLOGY

CARB examined BCAG's modeling inputs and assumptions, model responsiveness to variable changes, model calibration and validation results, and performance indicators using the general method described in CARB's July 2011 document entitled *Description of Methodology for ARB Staff Review of Greenhouse Gas Reductions from Sustainable Communities Strategies Pursuant to SB 375*.[1]

In addition, as BCAG's 2016 SCS is an update to their adopted 2012 SCS, CARB also performed an additional qualitative review of BCAG's implementation actions over the past four years. CARB looked for evidence that BCAG has put in place enabling project investments, programs, incentives, or guidance to help demonstrate the region's commitment to implementing their first SCS, and has established a foundation for continued implementation of policies and programs reflected in both their 2012 and 2016 plans.

CHANGES FROM THE REGION'S PREVIOUS SCS GHG QUANTIFICATION

CARB focused its review on identifying and evaluating changes BCAG made between their current 2016 SCS and their previous 2012 SCS[2] with the potential to affect SCS GHG emissions quantification. This included review for changes made to the land use and transportation strategies included within the SCS, updates to the model and off-model methods used to calculate passenger travel-related GHG emissions, as well as any changes in expected regional land use and transportation performance indicators. Table 1 summarizes the changes in plan assumptions for demographics, land use, and transportation. Table 2 summarizes the changes in BCAG's model and off-model GHG emission calculations.

[1] https://www.arb.ca.gov/cc/sb375/scs_review_methodology.pdf

[2] CARB's acceptance and technical evaluation of BCAG's first SCS was completed in April 2013, and contains detailed information about the methods BCAG used to quantify GHG emissions. That information is still relevant for this technical evaluation and can be accessed at https://www.arb.ca.gov/cc/sb375/bcag_scs_tech_eval.pdf.

LAND USE AND TRANSPORTATION STRATEGIES

BCAG's 2016 SCS maintains the same set of land use and transportation strategies adopted in their previous 2012 SCS, carrying over the "Balanced" land use scenario. The "Balanced" scenario brings together local general plan update efforts, the regional blueprint, and habitat conservation planning in a way that balances the distribution of new growth across central, established, and new growth areas in the region, and incorporates infill and redevelopment strategies.

The 2016 SCS also incorporates minor updates to the region's forecasted population, employment, and housing growth, land use pattern, and transit network. Table 1 summarizes these changes, and where appropriate, CARB's assessment and findings based on consistency with best available information and practice.

Table 1. Summary of Demographic, Land Use, and Transportation Changes in BCAG's 2016 SCS Compared to the 2012 SCS

Action	CARB Assessment	Finding
Revised Population, Employment, and Housing Growth Forecast	Reasonable	The 2016 SCS reflects less growth in population than in the 2012 SCS, and minor reductions in housing and future employees compared to the previous SCS. Changes are less than 8 percent below what was assumed in the 2012 SCS and consistent with current DOF projections. See Appendix A for additional detail.
Revised Land Use Reflecting Updates to Local General Plans, Project Revisions, and New School Enrollment Data	Reasonable	Overall, the region's land use growth pattern remains unchanged from the 2012 SCS. The 2016 SCS reflects a consistent growth distribution pattern to the 2012 SCS, forecasting the majority of growth (55 percent) allocated to the Established areas followed by approximately 30 percent in the New Growth areas. See Appendix A for additional detail.
Integrates Butte Long Range Comprehensive Transit and Non-Motorized Plan	Somewhat Reasonable	The 2016 SCS incorporates new future transit funding assumptions and expansion of the Chico Transit Priority area that are reflective of the new plan. Project GHG emissions, however, are not incorporated. See section on Other Findings and Recommendations for additional detail.

MODEL AND OFF-MODEL CALCULATIONS

BCAG used the same modeling tools to evaluate its 2016 SCS and 2012 SCS, however, also made key changes to model inputs and assumptions that affect GHG emissions quantification. Table 2 summarizes these changes along with CARB's assessment and findings based on consistency with best available information and modeling practice.

Table 2. Key Changes in Modeling Processes of BCAG's 2016 SCS Compared to the 2012 SCS

Modeling Component	CARB Assessment	Finding
Auto Operating Cost (AOC)	Reasonable	BCAG introduced and accounted for AOCs for the model base year and future analysis years. The estimates and impact to model results are consistent with modeled sensitivity test results and comparison to existing studies. See Appendix A for more detail.
Land Use Allocation Model	Reasonable	BCAG made changes to better reflect the region's land use consistent with the latest information from local general plan updates and planned projects, updated information on regional office use square footage, and occupancies for residential and non-residential land uses.
Travel Demand Model	Reasonable	The model's roadway network was updated to be consistent with the 2016 Butte County GIS centerline file, the latest available roadway network data. The model was calibrated and validated with the latest observed traffic count, census, and land use data (2014 base year conditions).
EMFAC Model	Reasonable	BCAG used CARB's EMFAC adjustment methodology to estimate CO2 adjustments to EMFAC output.

REGIONAL LAND USE AND TRANSPORTATION PERFORMANCE INDICATORS

CARB also reanalyzed several land use and transportation modeled indicators against relationships expressed in the empirical literature between each metric, and vehicle miles traveled (VMT) and/or GHG emissions to understand whether changes were consistent with forecasted GHG emission reduction trends. Data for this analysis came from BCAG's modeling data table, see Appendix B. Supporting data and charts for performance indicators are provided in Appendix C.

Table 3. Performance Indicators

Performance Indicator	CARB Assessment	Finding
Land Use Indicators		
Residential Density	Consistent with reducing VMT and GHG	Compared to the 2012 SCS, BCAG's 2016 SCS indicates less of an increase in average residential density due to projections of less housing growth. Residential density is 1.5 housing units/developed acre by 2035, compared to 1.7 in the 2012 SCS. However, the change in residential density is still increasing from the model base year to 2035 at an average rate of 0.4 percent per year.
Transportation Indicators		
Mode Share Changes	Consistent with reducing VMT/GHG	By 2035, modeled auto mode share will decrease by 3 percent from 2014, and transit mode share will increase by 3 percent.
Daily Transit Ridership	Consistent with reducing VMT/GHG	Ridership is forecasted to increase from 5,889 boardings in 2014 to 7,359 by 2020, and to 9,685 by 2035.
Average Auto Trip Length	Consistent with reducing VMT/GHG	Modeled average auto trip length is forecasted to decrease from 7.6 miles in 2014 to 7.5 miles in 2035, a 4 percent decrease.
Per Capita Passenger Vehicle Miles Travelled	Somewhat Consistent with reducing VMT/GHG	Per capita VMT is forecasted to decrease from 18.5 miles per day in 2014 to 17.4 miles per day by 2020, and 17.6 miles per day by 2035. See section on Other Findings and Recommendations for additional detail.

IMPLEMENTATION OF BCAG'S FIRST SCS

BCAG's actions over the past four years demonstrate the region's commitment to implementing their first SCS, and establishing a foundation for continued implementation of policies and programs that are reflected in both the 2012 and 2016 plans.

BCAG and their member jurisdictions are implementing projects that help demonstrate mixed-use and walk, bike, transit friendly development that will support their Balanced scenario land use planning approach. The region is also securing funds for conservation of open space. In addition, the region is funding transportation projects that will enhance mobility options, as well as developing a number of local plans that will enhance their capacity to implement more local sustainability projects.

Encouraging Sustainable Land Use

The future land use pattern in the adopted 2012 and 2016 SCS is the Balanced scenario which shows a balanced share of new housing within the center, established, and growth areas. In order to achieve this, the SCS anticipates that infill, redevelopment, and mixed use development will be needed in certain parts of the region, along with protection and conservation of open space that is under development pressure. Within the last four years, the region has both broken ground on a supportive mixed-use, walk and bike friendly development in Chico, as well as been successful in obtaining funds to protect two at-risk parcels in the Chico and Oroville areas.

- The Meriam Park development in Chico broke ground in fall 2016. It is a 270 acre residential commercial mixed-use project and includes a central open space corridor connecting residential areas to bicycle, transit, and pedestrian facilities and regional recreational opportunities.

- Butte County has been successful at obtaining Greenhouse Gas Reduction Funds through the Sustainable Agricultural Lands Conservation (SALC) program. The program, administered by the Strategic Growth Council, provided funding for the conservation of approximately 4,000 acres of cattle ranch under high development pressure about two miles east of the Chico sphere of influence, and Wick's Corner, a 396 acre olive ranch near Oroville.

Wick's Corner
Photo Source:
California Department of Conservation

Enhancing Transportation Options

BCAG has delivered, or is nearing completion on a number of projects to implement their 2012 SCS. Projects include lane reduction and pedestrian safety improvements, as well as enhancements to their transit system. Some projects that highlight implementation successes of the SCS include:

- Paradise Skyway Corridor Lane Reduction and Pedestrian Safety encourages pedestrian and bicycle use by reducing lanes and vehicle conflicts and providing separation of vehicle traffic from bike and pedestrians. The project was funded with $1 million in Highway Safety Improvement Program funds.

Skyway Corridor in Paradise
Photo Source: Town of Paradise

- The Butte Regional Transit and Operations Center is currently under construction with occupancy expected in 2018. This $35 million facility will provide needed operational and maintenance support for Butte county transit and will also house BCAG staff.

- The Paradise Transit Center will enhance the safety and comfort for transit users in the Paradise area, and is currently in the preliminary engineering phase. This $550,000 project is being funded with Butte County's share of federal Congestion Mitigation and Air Quality funds.

Policy Guidance and Strategic Planning Documents

BCAG and its member jurisdictions have also prepared several regional and local policy documents that will support implementation of the 2012 SCS. The following efforts were completed or have been ongoing since 2012:

- Oroville Area Urban Greening Plan
- Chico Infill Development and Sustainable Design Project
- City of Oroville's Sustainable Code Update and Climate Action Plan
- City of Gridley Greenhouse Gas Reduction Plan, Development Code Update, and Infill Design Guidelines
- Butte County Long-Range Transit and Non-Motorized Plan
- Butte to Sacramento Commuter Bus Feasibility Study
- Complete Streets Plan for Highway 99 corridor in Gridley

- Complete Streets Plan for Highway 162 corridor in Chico
- Complete Streets Plan for Esplanade corridor in Chico

OTHER FINDINGS AND RECOMMENDATIONS

Integrates Butte Long Range Comprehensive Transit and Non-Motorized Plan and Off-Model Adjustments

During the development of the 2016 SCS, BCAG re-estimated and calibrated their Direct Ridership Forecasting models with the latest available ridership data. This allowed them to estimate additional GHG emission reductions associated with their new transit and non-motorized plan projects, however, this information was not incorporated into the 2016 SCS. CARB recommends that BCAG account for and document these GHG emission reductions in their next SCS.

Per Capita VMT

While the 2016 SCS per capita VMT trend supports BCAG's determination that they will meet their GHG emission reduction targets, CARB would normally expect per capita VMT to continuously decline between 2020 and 2035, in line with the continuous decline BCAG forecasts for per capita GHG emissions. CARB recommends BCAG work to show a consistent declining trend as part of their next SCS.

REFERENCES

Butte County Association of Governments (2016) 2016 Regional Transportation Plan & Sustainable Communities Strategy. Accessed in March 2017 from http://www.bcag.org/Planning/RTP--SCS/

Butte County Association of Governments (2014) Draft Long Term Regional Growth Forecasts 2014-2040. Accessed April 2017 from http://www.bcag.org/documents/demographics/pop_emp_projections/Growth_Forecasts_2014-2040_draft.pdf

Butte County Association of Governments (2015) Butte County Transit and Non-Motorized Plan. Accessed April 2017 from http://www.bcag.org/Planning/Transit--Non-Motorized-Transportation-Plan/index.html

Fehr & Peers (2017). Transit & Non-Motorized Plan Ridership Memorandum Prepared for BCAG. Email submitted to CARB in April 2017.

APPENDIX A: FURTHER DISCUSSION OF 2016 SCS CHANGES

Revised Population, Employment, and Housing Growth Forecast

The methodology used to prepare the Regional Growth Forecast (RGF) for BCAG's 2016 SCS utilizes a "top-down" approach, which is consistent with accepted practice. Using this methodology BCAG first takes Department of Finance (DOF) estimates of housing and population for the period 2015-2040 and calculates an average annual growth rate. BCAG used this information to establish control totals for housing units used in the medium growth scenario projections.

BCAG then revised its 2010 RGF using a 2014 baseline and long-range forecasts from DOF. BCAG calculated an average person per housing unit using DOF estimates of population and housing by jurisdiction and this factor is used with DOF housing estimates to calculate population. Employment forecasts are derived using a ratio of jobs per housing unit. BCAG calculated this ratio from California Department of Employment Development (EDD) jobs data for 2013 and DOF housing unit estimates for 2014 (2013 employment data was the latest available from EDD).

Table 4 below compares the estimates of population, housing, and employment used in the 2012 SCS and 2016 SCS against the most current DOF projections.

Table 4. Comparison of Population, Housing and Employment Estimates in the BCAG 2012 and 2016 SCS and DOF Population

	2016 SCS		2012 SCS		DOF	
	2020	2035	2020	2035	2020	2035
Population	240,476	306,598	257,266	332,459	241,521	305,039
Housing	97,766	123,937	108,095	139,686		
Employment*	81,988	103,948	87,214	112,279		

* Non-farm

Source: Butte County Long-Term Regional Growth Forecasts 2014-2040, Appendix 1

Revised Land Use Reflecting Updates to Local General Plans

The 2016 SCS reflects the impacts of slower growth with less growth allocated into the same growth pattern as the 2012 SCS. Table 5 compares the new housing growth percentage allocations for 2035 by area type for the 2012 SCS and 2016 SCS. Overall, the growth pattern effectively remains the same. The small difference in new housing growth projected for Established and New areas results from a small number of new units that have been built between the base year used for the 2012 SCS (2010) and the base year used for the 2016 SCS. In Established areas, there were 572 housing units built, while 8 units were built in New areas. The result is that the number of new units to be built in Established areas is slightly less, while the number to be built in New areas is essentially the same.

Table 5. Comparison of Percentages of New Growth by Area Type between the 2012 SCS and the 2016 SCS

Growth Area Type	2012 SCS	2016 SCS
Urban Center and Corridor	6%	6%
Established	56%	55%
New	29%	30%
Rural	6%	6%
Agricultural, Grazing and Forestry	3%	2%

Source: BCAG

Auto Operating Cost

This is the first SCS in which BCAG incorporated a non-flat rate of auto operating cost. Auto operating cost includes fuel price, maintenance costs, and tire replacement costs. BCAG derived the auto operating cost for the base year (2014) and plan horizon year (2040) from modeling assumptions in SACOG's 2016 MTP/SCS[3] and estimated the cost for interim years (i.e. 2020, 2035) using a linear interpolation. The methodology used to estimate auto operating cost and assumptions were similar to other California MPOs. Table 6 summarizes the auto operating cost of the base and future analysis years used in modeling processes for BCAG's 2016 SCS.

[3] http://www.sacog.org/metropolitan-transportation-plansustainable-communities-strategy

Table 6. Auto Operating Cost (cents/mile in 2010 dollars)

	2005	2014	2020	2035
Auto Operating Cost	N/A	24.6	25.6	29

Source: BCAG Model Development Report, Table 8.

Since this is the first time BCAG varied the auto operating cost in its modeling process, CARB requested BCAG perform a sensitivity test to examine the responsiveness of the model to the change in auto operating cost. BCAG performed five test scenarios, including a 50 percent decrease, 25 percent decrease, 25 percent increase, and 50 percent increase in auto operating cost from the base case. Table 7 summarizes the sensitivity test results. As auto operating cost increases, the model shows a decrease in VMT, and vice versa. CARB compared model results to the expected range of VMT change with respect to elasticities from the empirical literature. The modeled VMT for each of the tests changed in the expected direction are within the expected range. The calculated elasticity of VMT with respect to auto operating cost for BCAG's travel demand model is -0.15, which is within both the short-run and long-run ranges found in the empirical literature.

Table 7. Auto Operating Cost - Sensitivity Results

Test	Modeled VMT	Expected VMT (Short-Run)	Expect VMT (Long-Run)
25% Decrease from Base Case	6,850,725	6,614,952 - 6,892,629	6,787,473 - 7,081,581
50% Decrease from Base Case	7,072,753	6,657,672 - 7,213,025	7,002,714 - 7,590,929
Base Case (2035 with SCS)	**6,572,233**	--	--
25% Increase from Base Case	6,350,791	6,251,836 - 6,529,513	6,062,885 - 6,356,992
50% Increase from Base Case	6,071,537	5,931,440 - 6,486,794	5,553,537 - 6,141,751
Source: -0.026 (Small and Van Dender, 2010), -0.195 (Burt and Hoover, 2006), and -0.091 to -0.093 (Boilard, 2010) for short-run; -0.131 (Small and Van Dender, 2010), and -0.29 to -0.31 (Goodwin et al., 2004) for long-run.			

Adjustment to EMFAC Outputs

BCAG used different versions of CARB's EMFAC model in quantifying the GHG emissions for its 2012 and 2016 SCS. To allow an "apple to apples" comparison of the first and second round of SCSs, CARB developed a methodology to calculate CO2 adjustment to EMFAC outputs for SB 375 target demonstrations to allow MPOs to adjust the calculation of percent reduction in per capita CO2 emissions used to meet the

established targets when using a different version of EMFAC for the second SCS. This adjustment factor neutralizes the changes in fleet average emission rates between the version of EMFAC used for the 2012 SCS (EMFAC 2007) and the version used for the 2016 SCS (EMFAC 2014). The goal of the methodology is to hold each MPO to the same level of stringency in achieving their targets, regardless of the version of EMFAC used for its second SCS. BCAG followed the methodology and their CO2 per capita reductions results were adjusted accordingly.

APPENDIX B: DATA TABLE

Modeling Parameters	2005	2014 Base Year	2020	2035		Data Source(s)
			w/ projects	w/ projects	w/o projects	
DEMOGRAPHIC						
Total Population [1]	214,582	222,316	240,476	306,598	332,459	CA Dept of Finance and RTP/SCS Appendix 6-2
Total Number of Households [1]	85,478	89,052	97,766	123,937	139,689	
Persons Per Household	2.44	2.50	2.46	2.47	2.38	
Total Number of Jobs (Non-Farm) [2]	73,400	74,100	81,988	103,948	112,279	
LAND USE						
Total farmland acres (SB375) (CA GC Section 65080.01)	Not Available	236,386	Not Available	230,760	230,645	CA Dept of Conservation FMMP Map (2012) and RTP/SCS Appendix 6-5
Total developed acres	Not Available	70,398	75,066	88,426	93,972	RTP/SCS land use model outputs calculated at CARB request
Average residential density (dwelling units per developed acre)	Not Available	1.38	1.40	1.51	1.53	
Housing vacancy rate	6.34%	8.54%	7.00%	7.00%	3.00%	
Total Housing/Dwelling Units	91,666	97,379	105,125	133,266	143,948	CA Dept of Finance and RTP/SCS Appendix 6-2
Single-Family Housing Units	Not Available	75%	75%	74%	74%	RTP/SCS Table 4-5 and land use model
Multi-family Housing Units	Not Available	25%	25%	26%	26%	

Modeling Parameters	2005	2014 Base Year	2020	2035		Data Source(s)
			w/ projects	w/ projects	w/o projects	
Housing Units by Growth Area Type						
Urban Center and Corridor Areas	Not Available	8,561	8,921	10,704	11,135	RTP/SCS Table 4-3 and land use model
Established Areas	Not Available	74,211	79,864	94,151	100,131	
New Areas	Not Available	432	1,465	11,081	14,299	
Rural Areas	Not Available	7,810	8,311	10,144	10,753	
Agricultural, Grazing, & Forestry Areas	Not Available	6,365	6,565	7,185	7,629	
Region Total	Not Available	97,379	105,126	133,265	143,947	
Employment by Growth Area						
Urban Center and Corridor Areas	Not Available	29,125	31,514	37,092	40,275	RTP/SCS Table 4-4 and land use model
Established Areas	Not Available	40,511	45,510	58,283	61,108	
New Areas	Not Available	1,159	1,368	4,349	7,506	
Rural Areas	Not Available	1,979	2,227	2,734	1,852	
Agricultural, Grazing, and Forestry Areas	Not Available	1,325	1,368	1,491	1,539	
PROXIMITY TO TRANSIT						
Housing within 1/2 mile of fixed route transit	Not Available	73%	70%	69%	69%	RTP/SCS land use model outputs calculated at CARB request
Employment within 1/2 mile of fixed route transit	Not Available	86%	88%	85%	83%	
TPP Areas						
New Single-Family Housing within Chico TPP Area	Not Available	Not Available	Not Available	4%	4%	RTP/SCS Table 4-6
New Multi-Family Housing within Chico TPP Area	Not Available	Not Available	Not Available	15%	15%	
New Employment/Employees within Chico TPP Area	Not Available	Not Available	Not Available	19%	14%	

Modeling Parameters	2005	2014 Base Year	2020	2035		Data Source(s)
			w/ projects	w/ projects	w/o projects	
TRANSPORTATION SYSTEM						
Freeway and general purpose lanes -mixed flow (lane miles)	Not Available	87	89	89	89	RTP/SCS network data calculated at CARB request
Arterial/Expressway (lane miles)	Not Available	737	767	787	787	
Collector and Local (lane miles)	Not Available	6,217	6,219	6,229	6,224	
Regular Fixed Route Transit Operation (miles) [3]	Not Available	515	507	500	499	
Express Fixed Route Transit Operation (miles) [3]	Not Available	0	64	64	0	
Bike Lane (class I & II) miles	Not Available	82	115	159	88	
TRIP DATA						
Number of Trips by Purpose (modify based on the trip purposes used in the model)						
Home-Based Work	99,376	103,869	113,690	143,408	167,989	RTP/SCS travel model calculated at CARB request
Home-Based Other	266,401	276,553	302,780	382,061	449,070	
Non-Home-Based	160,557	161,163	177,530	216,931	246,792	
Home-Based School	36,754	37,975	42,094	54,468	64,550	
Home-Based College	36,156	39,134	42,246	52,556	50,755	
Home-Based Casino	9,783	10,298	11,050	13,670	15,653	
By Travel Mode						
Average Auto Trip Length (miles)	7.81	7.62	7.53	7.52	7.59	
Average Auto Travel Time (minutes)	13.88	13.34	13.48	12.90	13.36	
PERCENT PASSENGER TRAVEL MODE SHARE (Daily)						
Auto	Not Available	88.83%	87.89%	85.91%	88.46%	RTP/SCS travel model calculated at CARB request
All Other (Transit & Non-Motorized)	Not Available	11.17%	12.11%	14.09%	11.54%	

Modeling Parameters	2005	2014 Base Year	2020	2035		Data Source(s)
			w/ projects	w/ projects	w/o projects	
VEHICLE MILES TRAVELED						
Total VMT per weekday (all vehicle class)	4,871	4,901	5,273	6,572	7,381	RTP/SCS travel model " RTP/SCS travel model and EMFAC (year 2005 = EMFAC07, years 2014, 2020, and 2035 = EMFAC14)
Total II + IX/XI VMT per weekday (all vehicle class) (miles)	4,711	4,741	5,102	6,382	7,190	
Passenger Vehicles						
Total SB375 VMT per weekday for passenger vehicles (ARB vehicle classes LDA, LDT1, LDT2, and MDV) (miles)	4,101	3,910	4,312	5,567	6,442	
CONGESTED TRAVEL MEASURES						
Congested weekday VMT on freeways (miles, V/C ratios > 1.0)	0	0	0	42,373	53,118	RTP/SCS travel model calculated at CARB request
Congested weekday VMT on all other roadways (miles, V/C ratios > 1.0)	75,104	71,979	78,968	194,064	292,860	
CO2 EMISSIONS						
All Vehicles						
Total CO2 emissions per weekday (all vehicle class) (tons) [5]	2,350	2,374	2,447	2,940	3,303	
Total II + IX/XI trip CO2 emissions per weekday (all vehicle class) (tons)	2,273	2,297	2,368	2,855	3,218	
Passenger Vehicles						

Modeling Parameters	2005	2014 Base Year	2020	2035		Data Source(s)
			w/ projects	w/ projects	w/o projects	
Total SB375 CO2 emissions per weekday for passenger vehicles (ARB vehicle classes LDA, LDT1, LDT2, and MDV) (tons)	1,979	1,894	2,001	2,491	2,883	
Per Capita (SB 375)						
Total Pre-Adjusted SB 375 (lbs/day)	18.45	-	16.64	16.25	-	
Pre-Adjusted Reductions from year 2005	-	-	-9.77%	-11.92%	-	RTP/SCS travel model and EMFAC 2014
EMFAC Adjustment Factor (+ or - %)	-	-	3.82%	4.81%	-	
Final (Adjusted) Reductions from year 2005	-	-	-5.95%	-7.11%	-	
INVESTMENT (thousands) (YEAR of Expenditure in $)						
Total Plan Period Investment	Not Available	Not Available	Not Available	1,283,800	998,100	RTP/SCS Figure 4-8 and Chapter 13
Highway Capacity Expansion	Not Available	Not Available	Not Available	152,900	122,800	
Road and Highway Maintenance and Operations	Not Available	Not Available	Not Available	679,300	546,600	
Transit Capital	Not Available	Not Available	Not Available	32,900	51,600	
Transit Operations	Not Available	Not Available	Not Available	244,600	163,900	
Bike and Pedestrian Projects	Not Available	Not Available	Not Available	97,300	26,600	
Rail Projects	Not Available	Not Available	Not Available	2,100	1,400	
Aviation Projects	Not Available	Not Available	Not Available	45,600	67,300	
Planning Projects	Not Available	Not Available	Not Available	29,100	17,900	
TRANSPORTATION USER COSTS (2010 dollars)						

Modeling Parameters	2005	2014 Base Year	2020	2035		Data Source(s)
			w/ projects	w/ projects	w/o projects	
Vehicle Operating Costs (cents/mile)	Not Available	0.246	0.256	0.29	0.29	BCAG Model Development Report Table 8

[1] 2005 and 2014 data sources: State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2010-2014, with 2010 Benchmark. Sacramento, California, May 2014.

[2] 2005 and 2014 data sources: State of California, Employment Development Department, Butte County Industry Employment & Labor Force, September 2013 Benchmark.

[3] Transit miles are a measure of service coverage, not service intensity. Reported figures represent the combined mileage of routes, not including frequency.

[4] IX-XI VMT and CO2 were “split” at MPO boundary, per agreement with SACOG.

[5] CO2 emissions were prepared in EMFAC 2014 for the II + IX/XI row only. Total and XX rows are estimated based on the ratio of VMT to CO2 for each analysis year

Residential Density

Figure 1. Regional Residential Density

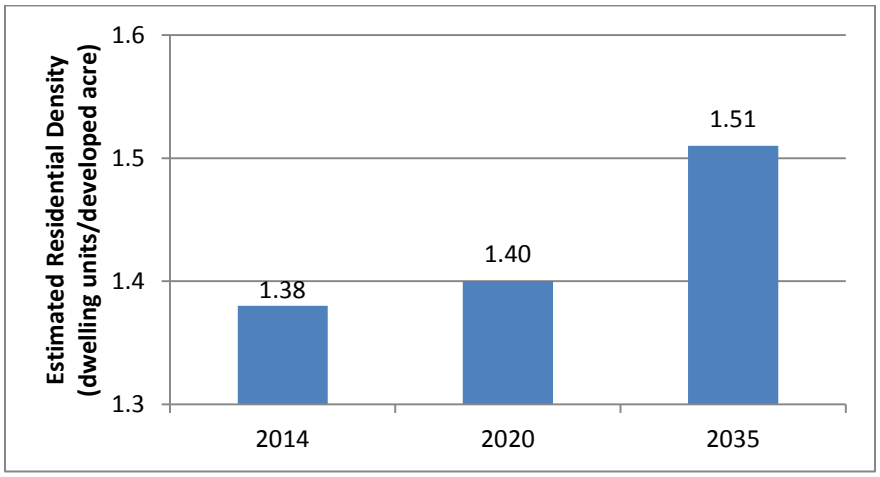
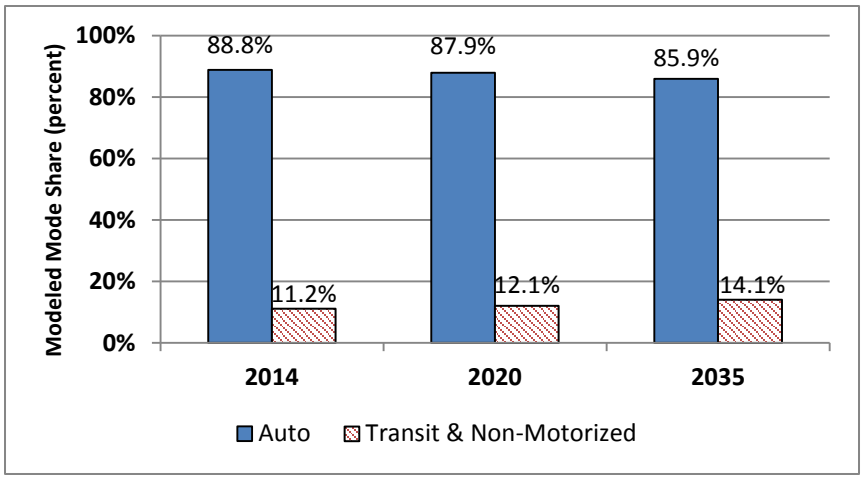


Table 8. Modeled Mode Share for Base and Future Analysis Years

Mode	2005	2014	2020	2035
Auto	Not Available	88.8%	87.9%	85.9%
All Other (Transit & Non-Motorized)	Not Available	11.2%	12.1%	14.1%

Mode Share

Figure 2. Modeled Mode Share (percent)



Transit Ridership

Table 9. Transit Ridership Forecast (boardings per day)

	2014	2020	2035	2040
Total Transit Ridership	5,889	7,359	9,685	9,927

Source: Fehr & Peers (2016). BCAG Transit & Non-Motorized Plan Ridership.

Auto Trip Length

Table 10. Average Auto Trip Length (miles)

	2005	2014	2020	2035
Auto Trip Length	7.81	7.62	7.53	7.52

Per Capita VMT

Figure 3. Per Capita VMT (miles/day)