TECHNICAL EVALUATION OF THE GREENHOUSE GAS EMISSIONS REDUCTION QUANTIFICATION FOR SAN LUIS OBISPO COUNCIL OF GOVERNMENTS' SB 375 2019 SUSTAINABLE COMMUNITIES STRATEGY

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CALIFORNIA
AIR RESOURCES BOARD

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Table of Contents

List of Tables

Background

The Sustainable Communities and Climate Protection Act (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) – as part of their regional transportation plans (RTP) – which contains land use, housing, and transportation strategies that, when implemented, can meet the per capita passenger vehicle GHG emissions reductions 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, when implemented, would meet the targets.

On June 5, 2019, the San Luis Obispo Council of Governments (SLOCOG), which serves as the MPO for the San Luis Obispo County region, adopted its 2019 SCS, known as the *2019 Regional Transportation Plan/Sustainable Communities Strategy*.[1] SLOCOG provided for CARB staff's review a complete submittal of the 2019 SCS and all necessary supporting information on December 20, 2019. SLOCOG's 2019 SCS estimates a 4.9 percent and an 11 percent decrease in GHG per capita emissions from light-duty passenger vehicles by 2020 and 2035, respectively, compared to 2005. The region's per capita GHG emissions reduction targets are 3 percent by 2020 and 11 percent by 2035, compared to 2005 levels, as adopted by the Board in 2018.[2] This report reflects CARB staff's technical evaluation of SLOCOG's 2019 SCS GHG quantification.

CARB Determination

ACCEPT

Based on a review of all available evidence, and in consideration of 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* (2011 Evaluation Guidelines),[3] CARB accepts SLOCOG's determination that the 2019 SCS plan would meet the targets of a 3 percent reduction in GHG per capita emissions from

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1 San Luis Obispo Council of Governments. *2019 Regional Transportation Plan/Sustainable Communities Strategy*. Available at: https://www.slocog.org/2019RTP

2 Board Resolution 18-12 (March 22, 2018) available at, https://ww2.arb.ca.gov/sites/default/files/2020-06/SB375_Final_Target_Staff_Report_%202018_Resolution_18-12.pdf

3 California Air Resources Board. *Description of Methodology for ARB Staff Review of Greenhouse Gas Reductions from Sustainable Communities Strategies Pursuant to SB 375* available at: https://ww3.arb.ca.gov/cc/sb375/scs_review_methodology.pdf light-duty passenger vehicles by 2020 and an 11 percent reduction by 2035, compared to 2005 levels, when fully implemented.

SLOCOG's 2019 SCS contains two new strategies[4] and uses similar quantification methods and the same tools as SLOCOG's first SCS,[5] which CARB staff reviewed and accepted as meeting the targets in June 2015. Therefore, this evaluation incorporates the analysis from CARB staff's review of the previous 2014 SCS[6] and adds analysis of changes SLOCOG made to the current 2019 SCS that have the potential to affect land use, transportation, and the SCS GHG emissions quantification.

CARB staff reviewed SLOCOG's 2019 SCS to verify that changes in the demographic assumptions, as well as the model and off-model methods used to calculate passenger travel-related GHG emissions reflected the latest information and planning practices.[7] CARB staff also reviewed the land use and transportation strategies included within the SCS to understand what, if any, of the 2019 SCS strategy commitments changed from SLOCOG's 2014 SCS commitments. In addition, CARB staff reviewed SLOCOG's reported regional land use and transportation performance indicators to confirm that they were trending in a direction that is consistent with forecasted GHG emissions and/or VMT reduction trends, as expressed in the empirical literature.

Based on these evaluations, CARB staff accepts SLOCOG's determination that its 2019 SCS would meet the targets when fully implemented. CARB staff's analysis and assessment of changes to SLOCOG's 2019 SCS and GHG quantification are documented in the "Changes from the Region's Previous SCS" section of this evaluation.

CARB staff have identified issues with SLOCOG's 2019 SCS submittal that SLOCOG will need to address in its upcoming third-round SCS development and documentation process based on the *Final Sustainable Communities Strategy Program and Evaluation*

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4 See Appendix A: SLOCOG's Strategy Table for a list of strategies included in the SCS and how they compare with the 2014 SCS.

5 San Luis Obispo Council of Governments. *2014 Regional Transportation Plan/Sustainable Communities Strategy.* Available at: https://www.slocog.org/programs/regional-planning/2014-rtpscs

6 California Air Resources Board. *Technical Evaluation of the Greenhouse Gas Emissions Reduction Quantification for San Luis Obispo Council of Governments SB 375 Sustainable Communities Strategy. June 2015.* CARB staff's acceptance and technical evaluation of SLOCOG's first SCS was completed in June 2015 and contains detailed information about the methods SLOCOG used to quantify GHG emissions.

7 CARB staff examined 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 evaluation document, which was the applicable guidance at the time the 2019 SCS was adopted, and entitled *Description of Methodology for ARB Staff Review of Greenhouse Gas Reductions from Sustainable Communities Strategies Pursuant to SB 375* available at: https://ww3.arb.ca.gov/cc/sb375/scs_review_methodology.pdf?_ga=2.170489767.625000283.1587148545-1978836225.1585935545

Guidelines[8] published by CARB in November 2019 (2019 Evaluation Guidelines). Specifically, SLOCOG's SCS submittal continues to lack data on a number of key performance indicators that further support its GHG emissions reduction calculations, and while its SCS includes a list of supporting actions for its strategies, the actions are missing key details and milestones that are needed to support full implementation of its SCS policies and programs. Although SLOCOG's SCS shows per capita VMT decreasing by 2035, it shows these benefits eroding in the 2045 horizon year of the plan with VMT per capita increasing.

These issues are problematic given SB 375 was intended to cause lasting GHG reductions through foundational changes to land use and transportation planning by MPOs. Erosion in future years of vehicle miles traveled (VMT) reductions anticipated under SB 375 undermines the purposes and goals of SB 375. They are also troubling given CARB staff's recent assessment of on-the-ground progress since regions began developing SCSs.[9] This assessment found that California was not on track to meet the GHG reductions expected under SB 375 and that continued and deeper VMT reductions are needed to achieve SB 375's goals. As a result, the San Luis Obispo region may not realize the forecasted GHG reductions in the SCS for 2035, if the plan is not fully implemented. California needs strong commitments to implement vehicle miles traveled (VMT) reduction strategies to meet the SB 375 GHG commitments and support the statewide effort to successfully mitigate the worst impacts of climate change. CARB staff's concerns and suggested remedies are documented in the "Recommendations" section of this evaluation.

Changes from the Region's Previous SCS

The 2019 SCS retains all of the same strategies and tools as the previous plan with some modifications, and adds two new strategies. The following sections summarize changes SLOCOG made from the 2014 SCS to the underlying 2019 SCS assumptions and strategies, quantification tools and methods, and resulting SCS performance indicator metrics, and CARB staff's assessment of the specified actions.

CARB staff examined SLOCOG's modeling inputs and assumptions, model responsiveness to variable changes, model calibration and validation results, and

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[8] California Air Resources Board. *Final Sustainable Communities Strategy Program and Evaluation Guidelines*. November 2019. Available at: https://ww2.arb.ca.gov/sites/default/files/2019-11/Final%20SCS%20Program%20and%20Evaluation%20Guidelines%20Report.pdf

[9] Prepared pursuant to Senate Bill (SB) 150 (Allen, Chapter 646, Statutes of 2017); California Air Resources Board. *2018 Progress Report: California's Sustainable Communities and Climate Protection Act*. November 2018. Available at: https://ww2.arb.ca.gov/sites/default/files/2018-11/Final2018Report_SB150_112618_02_Report.pdf.

performance indicators using the general method described in CARB staff's 2011 Evaluation Guidelines.

Land Use and Transportation Strategies

SLOCOG's 2019 SCS maintains a set of land use and transportation strategies that are similar to those adopted in its previous 2014 SCS, with updates to assumptions for land use and new investment in regional vanpool services. The 2019 SCS also incorporates updates to the region's growth forecast. CARB staff assessed SLOCOG's updates to its 2019 SCS forecast, land use, investment, and strategy inputs and found them all to be reasonable. Table 1 summarizes these changes and provides CARB staff's assessment based on consistency with best available information and practice.

Table 1. Summary of Demographic, Land Use, and Transportation Changes in SLOCOG's 2019 SCS Compared to the 2014 SCS

Action	CARB Staff's Assessment	Finding
Revised Regional Growth Forecast	Reasonable	SLOCOG revised population, housing, and employment growth estimates for its 2019 SCS. The forecasted population and housing units in the year 2035 are forecasted to decrease by approximately 2 and 3 percent, respectively, while forecasted employment is anticipated to increase by approximately 17 percent when compared to the 2014 SCS. The changes in population and housing are due, in part, to changes in the countywide forecast from local jurisdictions on planned development. The change in employment is based, in part, on updated employment trends and major land use projects not captured in past data.[10] Per the 2011 Evaluation Guidelines, CARB staff reviewed these revisions and found them to be consistent with the 2015 DOF forecast, which were the latest available at the time of plan development.

[10] Beacon Economics and SLOCOG Staff. *2050 Regional Growth Forecast for San Luis Obispo County.* June 2017. Available at: https://www.dropbox.com/s/gia0tlcyqs51a3w/2050RegionalGrowthForecast_01FullReport_RevDec2018.pdf?dl=0

Action	CARB Staff's Assessment	Finding
Updated Land Use Scenario	Reasonable	SLOCOG updated the SCS land use assumptions. Per the 2011 Evaluation Guidelines, CARB staff reviewed SLOCOG's land use update process and found that it appropriately adjusted for total growth based on the region's latest growth forecast, as well as adjusted assumptions for where growth would occur based on latest local planning assumptions in consultation with its members. Compared to the 2014 SCS, the 2019 SCS land use scenario incorporates a new jobs-housing balance strategy and assumes more of the region's anticipated housing growth in its "jobs-rich" subregion of Central County (46 percent of all new housing units) and more jobs in the "housing-rich" subregions of North County and South County (37 and 20 percent of all new employment, respectively).
Updated Revenue Forecasts and Transportation Investments	Reasonable	The 2019 SCS updates both transportation revenue forecasts and investments. Per the 2011 Evaluation Guidelines, CARB staff reviewed overall changes to SLOCOG's SCS transportation project investments and found them generally consistent with changes to forecasted resources. Compared to the 2014 SCS, total revenues increase from approximately \$2.1 billion to \$3.0 billion, or approximately 40 percent. The increase in funding is attributable to the difference in the revenue forecast period, as well as available funding provided by the Road Repair and Accountability Act of 2017 (SB 1). As a result, transportation investments are different from the previous plan with an increase in road maintenance investments, from 28 to 34 percent between plans whereas the investment in road expansion decreases from 34 to 32 percent between plans. The portion of total investments in transit and active transportation remain nearly the same between plans at approximately 26 percent and 6 percent, respectively.

Action	CARB Staff's Assessment	Finding
New Strategy: Vanpool	Reasonable	SLOCOG's 2019 SCS includes a new vanpool strategy to add 100 commuter vans to San Luis Obispo County by 2035 and commits $10 million toward program implementation. CARB staff reviewed SLOCOG's vanpool strategy and found it to be creditable toward its SB 375 targets, and that SLOCOG took the appropriate steps when developing a separate off-model methodology to quantify the GHG reduction benefits for this strategy.

Model Calculations

While SLOCOG used the same travel demand and land use modeling tools to evaluate its 2019 SCS as it used to evaluate its 2014 SCS, it made two changes to its approach for calculating the GHG emissions resulting from its SCS. These included adjusting GHG reductions for its new vanpool strategy, and adjusting its emissions modeling outputs to account for use of a newer version of CARB's EMFAC modeling tool. CARB staff assessed SLOCOG's methods and calculations for both adjustments and found them both to be sufficient for quantification of its GHG emissions reductions of its 2019 SCS. For the next SCS evaluation round, CARB staff recommends additional improvements to SLOCOG's vanpool quantification methodology. Table 2 summarizes these changes along with CARB staff's assessment and findings based on consistency with best available information and modeling practice.

Table 2. Key Changes in SLOCOG's 2019 SCS Modeling Compared to the 2014 SCS

Modeling Component	CARB Staff's Assessment	Finding
Adjustment for GHG Reductions from Vanpool Strategy	Somewhat Reasonable	SLOCOG developed and applied a new quantitative methodology outside of its travel demand model to estimate GHG reductions associated with the region's new vanpool strategy. SLOCOG estimates its vanpool program will reduce per capita GHG emissions by 1.8 percent in 2035. CARB staff reviewed and found SLOCOG's methodology and calculations to be sufficient, but should be improved to explicitly account for future utilization or market demand for this service in the region. See the "Recommendations" section for additional discussion.

Modeling Component	CARB Staff's Assessment	Finding
Adjustment to EMFAC Outputs	Reasonable	SLOCOG used EMFAC 2014 to estimate GHG emissions. CARB staff reviewed SLOCOG's emissions calculations and found that they appropriately followed the procedure demonstrated in CARB's memo titled *Methodology to Calculate CO2 Adjustment to EMFAC Output for SB 375 Target Demonstrations.*

Regional Land Use and Transportation Performance Indicators

To better understand whether SLOCOG's key modeled land use and transportation performance indicators are trending in a direction consistent with forecasted GHG emissions and/or VMT reduction trends, CARB staff re-analyzed several of these indicators against relationships expressed in the empirical literature. Depending on what regional data were available, CARB staff compared changes in the metrics across either 2005 and the target years of 2020 and 2035, or the RTP/SCS plan base year of 2015 and target years 2020 and 2035. CARB staff assessed three performance indicators and found that all trended in the direction that was supportive and consistent with forecasted GHG emissions reductions.

Table 3 shows a summary of SLOCOG's 2019 SCS land use performance indicators and Table 4 shows a summary of SLOCOG's 2019 SCS transportation performance indicators. Data for this analysis came from SLOCOG's SCS data table provided in Appendix B: Data Table.

Table 3. Summary of Land Use Performance Indicators

Performance Indicator	CARB Staff's Assessment	Finding
Housing Mix	Consistent with reducing VMT/ GHG	SLOCOG's 2019 SCS forecasts an increase in the proportion of total housing units that are multi-family to 19 percent in 2020 and 22 percent in 2035, compared to 18.5 percent in the 2015 model base year. Per the 2011 Evaluation Guidelines, CARB staff found this trend supportive and consistent with the relationship shown in the empirical literature that increasing the proportion of new development that is multi-family units increases residential density and accessibility to destinations, and helps reduce VMT and GHG emissions.

Performance Indicator	CARB Staff's Assessment	Finding
Jobs and Housing near Transit	Consistent with reducing VMT/GHG	SLOCOG's 2019 SCS forecasts an increase in jobs and housing units near transit. Compared to the 2015 model base year (67,731 housing units and 82,883 jobs), the 2019 SCS shows an increasing trend in the numbers of jobs and housing units within one-half mile of transit stations or stops in 2035 (78,964 housing units and 94,688 jobs). Per the 2011 Evaluation Guidelines, CARB staff found this trend supportive and consistent with the relationship shown in the empirical literature that increasing the proportion of new development near transit increases accessibility and helps reduce VMT and GHG emissions.

Table 4. Summary of Transportation Performance Indicators

Performance Indicator	CARB Staff Assessment	Finding
Per Capita Passenger VMT	Consistent with reducing VMT/GHG	SLOCOG's 2019 SCS shows a reduction of per capita VMT in 2035 compared to the 2005 baseline, from 20.5 to 19.9 miles per day. Per the 2011 Evaluation Guidelines, CARB staff found this trend supportive and consistent with the relationship shown in the empirical literature that per capita GHG emissions follow the same trend directionally as per capita VMT. CARB staff note that while per capita VMT decreases by 2035, the SCS also shows these benefits eroding in the 2045 horizon year of the plan, with VMT per capita increasing back to 20.3 miles per day by 2045. See the "Recommendations" section for additional discussion.

Recommendations

In reviewing SLOCOG's 2019 SCS submittal, CARB staff identified what new information SLOCOG will need to provide to CARB staff for its upcoming third-round SCS development and documentation process based on the 2019 Evaluation Guidelines[11] published in November 2019. The following sections provide information on what additional information will be needed in the MPO's third-round SCS evaluation submittal beyond what was shared with CARB staff in SLOCOG's second-round SCS. For a complete understanding of what is needed for the third-round SCS evaluation submittal, please refer to the 2019 Evaluation Guidelines.

Trend Analysis

CARB staff currently uses land use and transportation system performance indicator trends to assess whether an SCS supports GHG emissions reductions from passenger vehicles over time. This assessment will continue to be a part of CARB's third-round SCS evaluations. While SLOCOG's submittal included some performance indicators that were directionally supportive of certain strategies and estimated GHG reductions, data provided to evaluate the performance of key strategies in the SCS were limited.

SLOCOG will need to quantify and report changes from its next SCS plan base year to the SCS target years for the eight performance metrics identified below. CARB staff will use these for the Trend Analysis determination in the third round, which includes checking whether the reported directionality for the following RTP/SCS performance indicators are trending as expected.[12] The metrics not provided by SLOCOG for this evaluation are noted and italicized below.

1. *Household vehicle ownership: The average number of light-duty vehicles registered (i.e., LDA, LDT1, LDT2, and MDV vehicle categories) per household. (SLOCOG only provided this metric for the model base year and not for future years.)*

2. Mode split: The percentage of average daily trips by travel mode, including single-occupant vehicle, high-occupancy vehicle or carpool, transit, ride hailing or TNC, bike and walk.

3. *Travel time by mode: The regional average travel time (minutes) by trip purpose (e.g., for commute and non-commute trips), by travel mode. (SLOCOG did not provide this metric for non-auto modes.)*

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[11] California Air Resources Board. *Final Sustainable Communities Strategy Program and Evaluation Guidelines*. November 2019. Available at: https://ww2.arb.ca.gov/sites/default/files/2019-11/Final%20SCS%20Program%20and%20Evaluation%20Guidelines%20Report.pdf

[12] For expected directionality of performance indicators for the Trend Analysis, see the *Final Sustainable Communities Strategy Program and Evaluation Guidelines*, Table 4, Page 39. See the following link: https://ww2.arb.ca.gov/sites/default/files/2019-11/Final%20SCS%20Program%20and%20Evaluation%20Guidelines%20Report.pdf

4. *Transit ridership: The total number of one-way linked or unlinked average daily transit passenger trip boarding on public transportation per day. (SLOCOG did not provide this metric.)*

5. Average vehicle trip length: The regional average daily trip distance (miles/day) of driving.

6. *Seat utilization: The average daily percentage of occupied vehicle seats on the roadway network, including for passenger vehicles and transit buses. (SLOCOG did not provide this metric.)*

7. *Household VMT: The average daily light-duty vehicle VMT from each household within the MPO, excluding group quarters and visitors. (SLOCOG did not provide this metric.)*

8. GHG per capita: The average daily CO2 emissions within the MPO from light-duty vehicles per person.

Policy and Investment Analysis

For all third-round SCSs, CARB staff will focus on assessing whether SCS strategies for GHG emissions reduction are likely to be implemented, and are therefore reasonable for inclusion and credit toward target achievement. To assess this, MPOs need to provide clear descriptions of each SCS strategy with regard to applicable geographic scope, with specific locations if known; implementation timeframes; and what key supporting actions the MPO and its member agencies will undertake to support and track strategy implementation.[13]

Key supporting actions should correspond to each individual strategy, and in general, actions should be measurable. This can include identification of the region's specific investment commitments; policy and/or financial incentives; technical assistance; and if legislative action is needed, partnership activities to advance needed statutory changes. Each action should be clear about its scope, who will be involved, and anticipated timeline.

Chapter 3 of SLOCOG's 2019 SCS includes a list of actions to help implement its plan. CARB staff reviewed this list and could not clearly correlate which actions were intended to support implementation of which SCS strategy, as listed in SLOCOG's 2019 SCS policy matrix, see Appendix A: SLOCOG's Strategy Table. For the third-round SCS, SLOCOG should combine the policy matrix listed in Appendix A: SLOCOG's Strategy Table with the list of actions and specifically indicate which SCS strategy correlates to

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[13] For more information on the Policy Analysis, see the *Final Sustainable Communities Strategy Program and Evaluation Guidelines*, Pages 40-42. Available at: https://ww2.arb.ca.gov/sites/default/files/2019-11/Final%20SCS%20Program%20and%20Evaluation%20Guidelines%20Report.pdf

which action. Furthermore, many actions did not include enough detail for CARB staff to discern how the actions would support implementation of the strategies in a measureable way. For example, SLOCOG included the following action without any measurable information about specific actions SLOCOG would take to implement it: "Encourage local jurisdictions to consider approval of a wide range of housing types in housing-deficient communities and support expanded employment opportunities in housing-rich communities to improve the existing jobs-housing imbalance. (Ongoing)." For the third-round SCS, SLOCOG will need to identify whether it intends to utilize policy and/or financial incentives and/or other mechanisms to encourage growth in line with its assumptions, and show that this activity is planned to occur within the 2035 target timeframe.

CARB staff will also be evaluating how transportation investments are distributed throughout the region and whether these investments support or put at risk the GHG reduction benefits of the SCS. To assess this, SLOCOG needs to provide the complete list of transportation projects identified in the second- and third-round SCSs. Projects need to be tabulated by project type (road expansion, road maintenance, active transportation, transit, or other), cost, funding source (if known), project time period (e.g., base year through 2020, 2020 through 2035, or beyond 2035), and location including jurisdiction, intersections, and roadway segments (if available).

Tracking Implementation and Plan Adjustment

In the third-round SCS evaluation, CARB staff will look at how an MPO's previous SCS strategies and actions are performing, in compliance with SB 150, and what MPOs are doing in the third-round SCS, if the previous plans are not performing as expected, as directed by the Board.[14, 15] CARB's *2018 Progress Report: California's Sustainable Communities and Climate Protection Act*, prepared pursuant to SB 150, provides some information in this area based on the latest observed statewide data and trends. For the next SCS, MPOs need to compare available observed data to the development pattern and travel assumptions used in their previous SCSs to achieve their targets. If the observed data do not align with the plan assumptions, an MPO should document what priority adjustments and changes it is making in the third-round SCS to get the region on track to achieve its SB 375 targets.

SLOCOG needs to clearly document how they are using data to track implementation progress of its SCS, as well as justify any adjustments it makes to the underlying baseline assumptions. In particular, CARB staff encourages SLOCOG to gather more

[14] *Final Sustainable Communities Strategy Program and Evaluation Guidelines*, Page 37-38 and 43-44. Available at: https://ww2.arb.ca.gov/sites/default/files/2019-11/Final%20SCS%20Program%20and%20Evaluation%20Guidelines%20Report.pdf

[15] Gov. Code § 65080 (b)(2)(J)(iv); CARB Resolution 18-12 (Mar. 22, 2018), available at https://ww3.arb.ca.gov/board/res/2018/res18-12.pdf?_ga=2.82570705.658998873.1595222033-1647288959.1528825053

detailed transit and active transportation data to help better assess the effectiveness of the land use and transit service strategies in the SCS.

Analyze Induced Travel (Short-Term and Long-Term) Effects

Induced travel is the increase in VMT due to roadway capacity expansion. Roadway expansion projects can lead to increases in travel due to changes in the number of trips and trip distances (destination changes); shifts in travel modes, the time-of-day travel occurs, and routes; as well as changes in residence and workplace locations. Induced travel is important to analyze as it can affect VMT and GHG emissions.

CARB staff recommends SLOCOG explore methods for better analyzing the short- and long-term induced travel from roadway expansion projects in future SCS cycles. SLOCOG included roadway expansion projects in the 2019 SCS that can lead to short- and long-term induced travel in the region. Currently, long-term induced travel is not well accounted for by SLOCOG's travel demand model and may underestimate per capita GHG emissions. CARB staff has identified available tools to help SLOCOG evaluate the effects of induced travel.[16] Examples include, but are not limited to, University of California, Davis National Center for Sustainable Transportation's Induced Travel Calculator[17] and Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions.[18]

Improve Strategy Calculation Methods

SLOCOG included a vanpool strategy in its SCS that it quantified outside of its travel demand model. CARB staff reviewed SLOCOG's methodology and estimates of VMT and GHG emissions from this strategy in the year 2035 and found it to be somewhat reasonable. The current methodology does not fully consider the market demand for vanpool service in the region. Instead, it estimates trip frequencies based on funding assumptions. To improve the estimate of GHG emissions from this strategy in the SLOCOG regional context, it is important for the methodology to incorporate consideration of forecasted utilization based on local data that assess the region-specific demand for vanpooling. If SLOCOG continues to quantify this off-model strategy in future SCSs, it should initiate efforts to collect local data and monitor implementation, and update the assumptions used in its methodology to track with that data.

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[16] For more information on the Transportation Policy Analysis where induced travel is discussed, see the *Final Sustainable Communities Strategy Program and Evaluation Guidelines*, Pages 40-41. Available at: https://ww2.arb.ca.gov/sites/default/files/2019-11/Final%20SCS%20Program%20and%20Evaluation%20Guidelines%20Report.pdf

[17] Available at: https://ncst.ucdavis.edu/research/tools/

[18] Available at: https://www.arb.ca.gov/cc/sb375/policies/hwycapacity/highway_capacity_brief.pdf

For the vanpool program, SLOCOG should refer to the off-model evaluation framework described in the 2019 Evaluation Guidelines document.[19]

Quantification of Regional VMT and GHG

In this plan, SLOCOG calculates interregional VMT using the formula of II VMT (VMT associated with trips with internal origins and destinations) plus half of the total VMT of all trips with either the origin or destination external to the region (IX-XI). While this calculation method follows guidance provided at the beginning of the SB 375 program, the current program practice and expectation on this topic have since evolved. The current best practice followed by MPOs is to include II plus 100 percent IX-XI VMT that occurs within the MPO regional boundaries. For the third-round SCS, SLOCOG should use the formula of II plus IX/XI internal to the region to calculate regional VMT and GHG emissions.

In addition, SLOCOG should also start excluding group quarter population in its calculation of per capita VMT and GHG emissions. This is also current program practice followed by other MPOs, based on the understanding that group quarter population (e.g., nursing homes and correction facilities) have limited travel activity.

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[19] For more information on quantifying GHG emissions off model, see the *Final Sustainable Communities Strategy Program and Evaluation Guidelines*, Appendix E. Available at: https://ww2.arb.ca.gov/sites/default/files/2019-11/Final%20SCS%20Program%20and%20Evaluation%20Guidelines%20Appendices.pdf

Appendix A: SLOCOG's Strategy Table

SLOCOG submitted a summary strategy table to compare the key land use and transportation strategies between 2014 and 2019 SCSs. This table also illustrates how the individual strategies are accounted for using travel demand model or off-model analyses.

SCS Strategy	ON/OFF Model	Carryover from Last SCS or New?	Comments
Population and Employment distribution to improve Jobs / Housing imbalance within subregions	On	New	The 2019 RTP includes more housing in the "jobs-rich" subregions and more jobs in the "housing-rich" subregions.
Residential Growth distributed as 70% to "compact"	On	Carryover from last SCS w/ updates	The prior plan distributed new housing units to Target Development Areas (these were the most central areas in all cities and communities) based upon existing local plans. The 2019 Plan replaces the Target Development Areas designation with distribution of units to "compact" parcels based upon existing local plans.
Funding distribution based on a Balanced Intermodal Investment Strategy	On	Carryover from last SCS	For several RTPs, this has been a central strategy included to provide investments to all modes of travel, including expanding active transportation, ridesharing, and transit. (Note only roadway investments are accurately accounted for on model).
Vanpool direct investment	Off	New	Using Federal CMAQ funds, the 2019 Plan includes $10 million by 2035 to increase the number of vanpool vehicles in the region by 100.

Appendix B: Data Table

Modeling Parameters	2005	2015 Base Year	2020	2035 S2-Without Project [2]	2035 S3 Preferred Growth Scenario [1]	Plan Horizon Year 2045	Data Source(s)
DEMOGRAPHIC							
Population	259,213	265,780	273,215	297,514	307,569	312,688	SLOCOG RLUM
Group Quarters Population	n/a	12,428	13,903	18,840	20,703	20,703	SLOCOG RLUM
Households	n/a	100,870	103,271	111,408	115,375	117,818	SLOCOG RLUM
Persons Per Household	n/a	2.63	2.65	2.67	2.67	2.65	SLOCOG RLUM, varies by 11 Housing Types
Population Density (people per sq. mile)	n/a	80.8	83.0	90.4	93.5	95.0	SLOCOG RLUM
Auto Ownership Per Household	n/a	98.0%	n/a	n/a	n/a	n/a	Census ACS, Table B08141
Total Number of Jobs	n/a	115,190	117,278	129,698	131,572	136,044	SLOCOG RLUM
New Employment/Jobs	n/a	--	2,088	14,508	16,382	20,854	SLOCOG RLUM
Average Unemployment Rate (%)	n/a	4.7%	n/a	n/a	n/a	n/a	California Employment Development Department
Median Household Income (YOE $)	n/a	$60,691	n/a	n/a	n/a	n/a	Census ACS, Table B19013
Total College Enrollment	n/a	30,900	31,700	37,900	37,900	41,400	Sum and 2045 Est'd
Cal Poly-SLO Enrollment	n/a	20,900	21,000	25,000	25,000	n/a	Cal Poly Master Plan 2035
Cuesta College Enrollment	n/a	10,000	10,700	12,900	12,900	n/a	Cuesta College, SLOCOG estimated trend
LAND USE							
Total Acres within MPO (in 1,000s)	n/a	2,105	2,105	2,105	2,105	2,105	RLUM
Total Farmland Acres	n/a	1,585,780	n/a	n/a	n/a	n/a	FMMP (average of 2014, 2016)
Total Prime Farmland Acres	n/a	41,188	n/a	41,108	41,098	n/a	FMMP (average of 2016)

Modeling Parameters	2005	2015 Base Year	2020	2035 S2-Without Project [2]	2035 S3 Preferred Growth Scenario [1]	Plan Horizon Year 2045	Data Source(s)
Prime Farmland Converted to Urban or Built-Up Land (acres)	n/a	n/a	n/a	80.4	89.6	n/a	FMMP, 2016; SLOCOG RLUM
Average Acreage of Prime Farmland Converted to Urban or Built-Up Land Per Year (acres)	n/a	n/a	n/a	4.0	4.5	n/a	FMMP, 2016; SLOCOG RLUM
Total Developed Acres	n/a	724,407	725,330	726,810	726,938	728,068	sum commercial + Residential
Commercial developed acres	n/a	3,930	3,958	3,946	3,946	3,949	RLUM total acres non-vacant +'C'
Residential developed acres	n/a	720,478	721,373	722,865	722,992	724,119	RLUM total acres non-vacant + residential
SF Detached	n/a	33,880	34,202	35,318	35,143	36,264	SLOCOG RLUM
SF Attached	n/a	674	743	1,017	1,017	1,021	SLOCOG RLUM
Multi-Family Acres (including Accessory Dwelling Units)	n/a	21,568	21,608	21,693	52,269	52,271	SLOCOG RLUM
Multi-Family Acres (not including Accessory Dwelling Units)	n/a	2,082	2,120	2,201	2,524	2,526	SLOCOG RLUM
Mobile Home	n/a	8,674	8,674	8,674	8,674	8,674	SLOCOG RLUM
Rural Residential	n/a	675,169	675,633	675,654	675,634	675,634	SLOCOG RLUM
Total Residential Units	n/a	116,007	118,716	127,683	132,510	134,916	SLOCOG RLUM
SF Detached Units	n/a	68,114	69,501	73,297	72,721	74,911	SLOCOG RLUM
Large-Lot	n/a	48,611	49,861	53,178	52,602	54,789	SLOCOG RLUM
Small-Lot	n/a	19,503	19,640	20,119	20,119	20,122	SLOCOG RLUM
SF Attached Units	n/a	7,993	8,369	11,730	11,745	11,915	SLOCOG RLUM
Multi-Family Units (including Accessory Dwelling Units)	n/a	21,525	22,466	24,174	29,660	29,706	SLOCOG RLUM

Modeling Parameters	2005	2015 Base Year	2020	2035 S2-Without Project [2]	2035 S3 Preferred Growth Scenario [1]	Plan Horizon Year 2045	Data Source(s)
Multi-Family Units (not including Accessory Dwelling Units)	n/a	21,357	22,298	23,987	27,498	27,544	SLOCOG RLUM
On-Campus Student Housing	n/a	7,200	8,675	12,659	14,522	14,522	Cal Poly (Facilities Planning), SLOCOG RLUM
Mixed-Use Units[5]	n/a	n/a	n/a	n/a	n/a	n/a	
Other MF Residential	n/a	0	0	0	0	0	SLOCOG RLUM
Mobile Home Units	n/a	7,928	7,928	7,928	7,928	7,928	SLOCOG RLUM
Rural Residential Units	n/a	10,447	10,452	10,554	10,456	10,456	SLOCOG RLUM
Compact Housing Units	n/a	49,021	50,475	56,023	61,524	61,743	SLOCOG RLUM
Large Lot Housing Units	n/a	66,986	68,241	71,660	70,986	73,173	SLOCOG RLUM
Housing Vacancy Rate [6]	n/a	n/a	n/a	n/a	n/a	n/a	
Jobs-Housing Ratio (Countywide)	n/a	0.99	0.99	1.01	0.99	1.01	SLOCOG RLUM
Jobs-Housing Ratio (Central County)	n/a	2.14	2.07	2.04	1.88	1.86	SLOCOG RLUM
Jobs-Housing Ratio (North Coast)	n/a	0.44	0.44	0.45	0.47	0.48	SLOCOG RLUM
Jobs-Housing Ratio (North County)	n/a	0.87	0.87	0.89	0.89	0.93	SLOCOG RLUM
Jobs-Housing Ratio (South County)	n/a	0.66	0.66	0.68	0.69	0.69	SLOCOG RLUM
Average Density (dwelling units/acre)	n/a	0.16	0.16	0.18	0.18	0.19	SLOCOG RLUM
PROXIMITY TO TRANSIT							
Total housing units within 1/4-mile of transit stations and stops	n/a	44,639	47,878	55,916	58,906	59,216	SLOCOG RLUM

Modeling Parameters	2005	2015 Base Year	2020	2035 S2- Without Project [2]	2035 S3 Preferred Growth Scenario [1]	Plan Horizon Year 2045	Data Source(s)
Total housing units within 1/2-mile of transit stations and stops	n/a	67,731	69,307	75,586	78,964	79,657	SLOCOG RLUM
Total Employment within 1/4-mile of Transit Stations and Stops	n/a	72,870	72,117	87,209	87,491	90,308	SLOCOG RLUM
Total Employment within 1/2-mile of Transit Stations and Stops	n/a	82,883	84,371	94,239	94,688	97,871	SLOCOG RLUM
Average Distance to Transit (residential, miles)	n/a	1.05	1.06	1.07	1.05	1.05	SLOCOG RLUM
Average Distance to Transit (non-residential, miles)	n/a	0.44	0.65	0.69	0.63	0.62	SLOCOG RLUM
TRANSPORTATION SYSTEM							
Freeway and General Purpose Lanes -Mixed Flow, auxiliary, etc. (lane miles)	n/a	308	308	308	308	309	EMFAC Input Tool
Freeway Managed Lanes - HOV, HOT, Tolled, etc. (lane miles)	n/a	0	0	5	5	5	EMFAC Input Tool
Arterial/Expressway (lane miles)	n/a	673	673	691	691	692	EMFAC Input Tool
Collector and Local (lane miles)	n/a	7,087	7,087	7,098	7,098	7,098	EMFAC Input Tool
Transit Operation Miles (SLO Transit + RTA)	n/a	1,409,920	1,613,509	n/a	1,793,965	1,897,933	Work with Transit Providers
Bus Rapid Transit Bus Operation Miles	n/a	n/a	n/a	n/a	n/a	n/a	
Transit Total Daily Vehicle Service Hours (SLO Transit + RTA)	n/a	177	200	n/a	237	264	Work with Transit Providers

Modeling Parameters	2005	2015 Base Year	2020	2035 S2-Without Project [2]	2035 S3 Preferred Growth Scenario [1]	Plan Horizon Year 2045	Data Source(s)
Bike Lane (class I & II) miles	n/a	413	n/a	n/a	n/a	476	2019 RTP
TRIP DATA							
Number of Trips by Purpose							
Home-Based Work	n/a	164,566	168,451	181,719	186,549	190,507	RTM
Home-Based Other	n/a	353,310	361,736	402,187	409,702	422,606	RTM
Non-Home-Based	n/a	244,034	250,939	278,738	283,743	293,675	RTM
By Travel Mode							
Average Auto Trip Length (miles)	n/a	7.9	7.5	7.5	7.3	7.5	RTM
Average Peak Transit Trip Length (miles)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average Off-Peak Transit Trip Length (miles)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average Walk Trip Length (miles)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average Bike Trip Length (miles)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average Auto Travel Time (minutes)	n/a	12.1	11.9	11.8	11.5	11.6	RTM
Average Off-Peak Transit Travel Time (minutes)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average Peak Transit Travel Time (minutes)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average Walk Travel Time (minutes)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average Bike Travel Time (minutes)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
PERCENT PASSENGER TRAVEL MODE SHARE (Daily)							

Modeling Parameters	2005	2015 Base Year	2020	2035 S2-Without Project [2]	2035 S3 Preferred Growth Scenario [1]	Plan Horizon Year 2045	Data Source(s)
SOV	n/a	43.4%	43.3%	43.1%	43.2%	43.1%	RTM
HOV	n/a	51.3%	51.6%	51.7%	51.7%	51.7%	RTM
Transit	n/a	0.5%	0.3%	0.3%	0.3%	0.3%	RTM
Non-Motorized (bike/walk)	n/a	4.7%	4.8%	4.9%	4.9%	4.9%	RTM
PERCENT PASSENGER TRAVEL MODE SHARE (Peak Period)							
SOV	n/a	47.8%	47.6%	47.5%	47.5%	47.4%	RTM
HOV	n/a	52.2%	52.4%	52.5%	52.5%	52.6%	RTM
Transit	n/a	n/a	n/a	n/a	n/a	n/a	RTM
Non-Motorized (bike/walk)	n/a	n/a	n/a	n/a	n/a	n/a	RTM
VEHICLE MILES TRAVELED [3]							
Total VMT per weekday (all vehicle class) (miles)	7,837,225	8,172,183	8,017,992	8,885,609	8,824,650	9,243,880	EMFAC tool
Total VMT per weekday (IX, XI, XX adjusted, includes Centroids) (miles)	5,887,599	6,247,757	6,034,038	6,584,438	6,500,544	6,741,098	EMFAC tool
Total VMT per weekday for passenger vehicles (ARB vehicle classes LDA, LDT1, LDT2, and MDV)	5,319,984	5,603,660	5,536,952	6,203,571	6,124,530	6,363,078	EMFAC
Total II VMT per weekday for passenger vehicles (miles)	n/a	4,634,902	4,391,633	4,690,935	4,584,105	4,645,980	EMFAC tool
Total IX/XI VMT per weekday for passenger vehicles (miles)	n/a	3,225,709	3,284,809	3,787,005	3,832,877	4,190,235	EMFAC tool
Total XX VMT per weekday for passenger vehicles (miles)	n/a	311,572	341,550	407,669	407,668	407,665	EMFAC tool

Modeling Parameters	2005	2015 Base Year	2020	2035 S2-Without Project [2]	2035 S3 Preferred Growth Scenario [1]	Plan Horizon Year 2045	Data Source(s)
CONGESTED TRAVEL MEASURES							
Congested weekday VMT on freeways (miles, V/C ratios > 0.75)	n/a	95	84	129	123	152	RTM
Congested weekday VMT on all other roadways (miles, V/C ratios > 0.75)	n/a	33	32	41	48	43	RTM
CO2 EMISSIONS [4]							
Total CO2 emissions per weekday (all vehicle class) (tons)	n/a	3,415	3,360	3,756	3,735	3,910	EMFAC & RTM
Total SB375 CO2 emissions per weekday for passenger vehicles (ARB vehicle classes LDA, LDT1, LDT2, and MDV) (tons)	2,453	2,611	2,529	2,783	2,751	2,852	EMFAC
Total II CO2 emissions per weekday for passenger vehicles (tons)	n/a	1,937	1,840	1,983	1,940	1,965	EMFAC & RTM
Total IX/XI CO2 emissions per weekday for passenger vehicles (tons)	n/a	1,348	1,377	1,601	1,622	1,773	EMFAC & RTM
Total XX CO2 emissions per weekday for passenger vehicles (tons)	n/a	130	143	172	173	172	EMFAC & RTM
Total SB 375 CO2 (with EMFAC adjustment)	n/a	n/a	n/a	n/a	n/a	n/a	
Total CO2 (lbs) Minus Exempt CO2 / capita	18.9	19.6	18.5	18.7	17.9	18.2	EMFAC & RLUM

Modeling Parameters	2005	2015 Base Year	2020	2035 S2-Without Project [2]	2035 S3 Preferred Growth Scenario [1]	Plan Horizon Year 2045	Data Source(s)
% Change from 2005	n/a	3.8%	-2.2%	-1.2%	-5.5%	-3.6%	SLOCOG Technical Methodology
EMFAC Version Adjustment Factor	n/a	n/a	-2.70%	-3.70%	-3.70%	n/a	SLOCOG Technical Methodology
Off-Model Tool Adjustment Factor	n/a	n/a	n/a	-1.8%	-1.8%	-1.8%	SLOCOG Technical Methodology
Adjusted CO2 Per Capita % Reduction from 2005	n/a	n/a	-4.9%	-7%	-11%	-5%	SLOCOG Technical Methodology
INVESTMENT (millions) (YEAR of Expenditure in $)							
Total Plan Period Investment	n/a	n/a	n/a	n/a	n/a	3 Billion	2019 RTP
Highway Investment	n/a	n/a	n/a	n/a	n/a	821 Million	2019 RTP
Other Road Investment	n/a	n/a	n/a	n/a	n/a	140 Million	2019 RTP
Roadway Maintenance	n/a	n/a	n/a	n/a	n/a	1.04 Billion	2019 RTP
Rail Transit Capacity Expansion	n/a	n/a	n/a	n/a	n/a	N/A	N/A
BusTransit Capacity Expansion	n/a	n/a	n/a	n/a	n/a	665 Million	2019 RTP
Bus Transit Operations	n/a	n/a	n/a	n/a	n/a	110 Million	2019 RTP
Bike and Pedestrian Projects	n/a	n/a	n/a	n/a	n/a	188 Million	2019 RTP
Other: Maximizing System Efficiency (MSE)	n/a	n/a	n/a	n/a	n/a	77 Million	2019 RTP
TRANSPORTATION USER COSTS AND PRICING (YEAR of Expenditure in $)							
Vehicle Operating Costs (cents/mile)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Gasoline Price ($ per gallon)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Parking Price ($ per day)	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Modeling Parameters	2005	2015 Base Year	2020	2035 S2-Without Project [2]	2035 S3 Preferred Growth Scenario [1]	Plan Horizon Year 2045	Data Source(s)
Toll Price ($)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Congestion Price ($ per mile)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average Transit Fare Per Passenger Mile ($/mile)	n/a	n/a	n/a	n/a	n/a	n/a	n/a

[1] This scenario includes modeling of all planned and programmed projects in the RTP/SCS for the respective calendar year. This scenario is equivalent to the scenario chosen for the 2019 RTP/SCS.

[2] 2035 S2 Without Project scenario was generated by SLOCOG staff with similar growth characteristics as the 2014 RTP's SCS. The 2035 S2 Without Project scenario represents the 2035 S3 Preferred Growth Scenario without the new improved jobs-housing balance SCS strategy.

[3] Passenger vehicles includes (1) passenger cars (LDA), (2) light-duty trucks whose gross vehicle weight rating (GVWR) <6000 lbs and equivalent test weight (ETW) <= 3750 lbs (LDT1), (3) light-duty trucks whose GVWR <6000 lbs and ETW > 3751 lbs (LDT2), and (4) medium-duty vehicles whose GVWR is between 6000 and 8500 lbs (MDV). In the CARB vehicle category, these four categories of vehicles are referred to as LDA, LDT1, LDT2, and MDV, respectively.

[4] Data in this section are estimated using the EMFAC model. The associated EMFAC Input and Output files are provided separately to CARB. Information regarding EMFAC adjustment are provided separately to CARB. XX VMT and GHG were excluded to ensure consistency with EMFAC GHG reporting and SB 375 rules, which require that MPOs exclude XX trips from GHG calculations.

[5] The Land Use Model does not allow for calculations of Mixed-Use Residential Units.

[6] Housing Vacancy Rate varies throughout region.