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June 15, 2023

Ms. Carey Knecht, Chief  
Transportation Systems Planning Branch  
California Air Resources Board

Dear Ms. Knecht:

Pursuant to Section 65080(b)(2)(J)(i) of the Government Code, on June 15th, 2023, SACOG is submitting to CARB the documentation of the technical methodology (TM) intended for use in developing and analyzing the SACOG's 4th Sustainable Community Strategy (SCS4), also called 2025 Blueprint, which is set to be adopted in October of 2025. SACOG's activity-based travel demand model SACSIM23 will be used to quantify the GHG reductions from major land use and transportation strategies.

The 2025 Blueprint is the region's plan to achieve a more sustainable, equitable, and prosperous region in the future. The 2025 Blueprint will outline recommendations for public land use policy and transportation investment strategies for the Sacramento region for the next 20 to 30 years. This plan will lay out a set of strategies for an integrated, multimodal transportation system and regional development pattern that can create a more thriving region that works for all residents. The plan aims to connect housing to jobs, education, goods and services, and recreational opportunities while protecting and enhancing our region's natural and working landscapes. Additionally, Blueprint as the region's federal and state required policy document for long-range transportation and land use planning.

The contents of the attached technical methodology document are organized and developed following the guidance described in [Appendix A in the Final Sustainable Communities Strategy Program and Evaluation Guidelines November 2019](#). The requirements from the template are in color blue texts for convenience of CARB staff's review.

Please let us know if you need any clarification on this submittal, as you assess whether these proposed methods will yield an accurate estimate of greenhouse gas emissions.

Sincerely,

Yanmei Ou

Data and Analysis Manager  
Sacramento Area Council of Governments

Enclosures

cc: (via email)

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Winters  
Woodland  
Yolo County  
Yuba City  
Yuba County

**Technical Methodology to Estimate Greenhouse Gas Emissions for the  
2025 Blueprint  
(and 4<sup>th</sup> Sustainable Communities Strategy)**

**Submitted to the  
California Air Resources Board  
by the  
Sacramento Area Council of Government (SACOG)**

**June 15, 2023**

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## Introduction

*Purpose of Technical Methodology: include reference to Government Code § 65080(b)(2)(J)(i)*

*Applicable per capita GHG emission reduction targets set by CARB including past targets and past SCS GHG emission reduction achievement*

*Overview of analysis years, including year and purpose of modeling each specific year*

SACOG’s 2025 Blueprint is a long range plan linking land use and transportation, formerly called the federally required Metropolitan Transportation Plan (MTP) and the state-required Sustainable Communities Strategy (SCS). The 2025 Blueprint will be one, internally consistent plan that encompasses both the MTP and the SCS. This technical methodology document is required<sup>1</sup> for the SCS portion of the 2025 Blueprint. The SCS portion of the 2025 Blueprint is the fourth iteration of the SCS, and will be referred to as “SCS4” in the remainder of this document. The applicable GHG reduction targets for SCS4 were set by ARB for SACOG in 2018<sup>2</sup>. SACOG’s year 2020 target was set at 7 percent, and the year 2035 target was set at 19 percent, subject to SACOG’s ability, with state assistance, to identify substantive new programs, funding, or flexibility to achieve the higher target. Without additional programs, funding or flexibility, the year 2035 target would be 18 percent. Table 1 provides the key analysis years for SCS4 (2005, 2020, 2035). The 2025 Blueprint looks past SCS4, with a year 2050 horizon.

**Table 1. Key Analysis Years Considered in 2025 Blueprint**

Year	Purpose
2005	Base Year for SCS4 GHG emission reduction Target Setting
2020	Base Year for the MTP SCS4 GHG Emission Reduction Target year
2035	SCS4 GHG Emission Reduction Target year
2050	2025 Blueprint Horizon Year

For forecasting and modeling purposes for SCS4, “year 2020” means pre-COVID-19 pandemic conditions. Beginning in March 2020, COVID-19 restrictions and major changes in residents’ activities and travel patterns significantly reduced out-of-home activities and travel, and conditions for the remainder of 2020 were anomalous. Pre-pandemic year 2020 base year conditions were established using the best available data for early 2020 or late 2019, depending on the modeling or forecasting data needed.

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<sup>1</sup> California Government Code section 65080 (b) (2) (I) requires an MPO to submit a description of the technical methodology for evaluating greenhouse gas emissions prior to public engagement for the SCS.

<sup>2</sup> <https://ww2.arb.ca.gov/our-work/programs/sustainable-communities-program/regional-plan-targets> Targets were initially set by CARB in 2010. Targets for all MPOs were re-set in 2018.

*Overview of the RTP/SCS schedule, including the start date of public process for MPO scenario development*

SACOG staff started the work on the 2025 Blueprint update in 2021 and plan to adopt the plan in October 2025. For detailed schedules, please refer to [2025 Blueprint Extension - Sacramento Area Council of Governments \(sacog.org\)](#). Below are some of the highlights:

Technical Work:

- Base year update and model development, calibration and validation: June 2020-June 2022
- Pathway analysis: July 2023 – June 2024
- Preferred SCS scenario development: July 2023 – June 2024
- Project prioritization process development: January 2022 – June 2025

Public Outreach and Engagement:

- Local Council/Board tours: July 2022 – January 2023
- First public workshop: June 16, 2023
- Built Environment Poll: Conducted between October and December 2022 and released in May 2023. SACOG partnered with Valley Vision and the Institute of Social Research (ISR) at Sacramento State to conduct a scientifically administered public opinion poll to better understand the region’s attitude and priorities on transportation, housing, telework, perceptions of safety, and public health.
- Focus Groups: Conducted in the spring of 2023, final report expected to be released in August. The purpose of the focus groups is to gauge residents’ priorities with respect to four topic areas of housing, road pricing, perceptions of safety, and public health. A consultant conducted eight focus groups, half in English and half in Spanish. The focus group participants were a diverse mix of age, gender, ethnicity, and urban/suburban/rural geographical area.
- Community Based Organization Grant Program: Awarded in February 2023 and will end June 2023. SACOG has awarded grants ranging from \$1,000-\$5,000 for outreach and engagement support on the region’s long range transportation plan. The goal is to gather input and spread awareness, especially in underrepresented communities. In addition to helping share SACOG’s Blueprint survey, CBOs can tailor activities specifically to the communities they serve.
- Pop Up Workshops: March 2023 to July 2023. SACOG is visiting each jurisdiction in the region at local events to gather feedback from community members who may not attend formal workshops.

## Notable Changes in Regional Planning Context

*Significant or notable changes in the regional or local planning context (e.g., changes in projected revenue to the extent known and available; updates to local plans; annexations or significant project approvals; new information available)*

There have been a variety of changes to the regional and local planning context since the adoption of the preferred land use scenario in the 2020 MTP/SCS. Some of the more significant changes include, but are not limited to:

### Annexations:

- Eastview Specific Plan was annexed into Galt City Limits.
- Approximately 589 acres of the Panhandle was annexed into the City of Sacramento.
- A scaled down version of the Davis Innovation and Sustainability Campus annexation was put before the City of Davis voters a second time in 2022 and failed. The future of the site is in limbo.
- Yuba City completed the 220-acre annexation of the Bogue Stewart Master Plan in 2021.

### Significant Specific Plans, General Plan amendments/updates, and large development projects:

- The future of the 1,400 acre Elverta Specific Plan, first approved by Sacramento County in 2007, is in jeopardy due to financial feasibility and on and off-site infrastructure costs.
- The City of Elk Grove approved the Kammerer Road Urban Design Study and are in the process of completing the associated general plan amendments to create the Livable Employment Center Community Plan.

A number of greenfield specific plans that hadn't began construction as of the base year of the last plan cycle have started building, including:

- Rio Del Oro (Rancho Cordova), The Ranch (Rancho Cordova), Sun creek (Rancho Cordova), Folsom Ranch (Folsom), Northlake (Sacramento), Delta Shores (Sacramento), Southeast Planning Area (Elk Grove), Riolo Vineyards (Placer County), Placer Vineyards (Placer County), Creekview (Roseville), and Sierra Vista (Roseville).
- There have been a number of higher profile medical facility and life sciences projects that have been proposed, approved, or are under construction, including:
  - the UC Davis Aggie Square innovation hub at the UC Davis Sacramento Campus, the proposed North state Teaching Hospital at the former Sleep train arena site in Natomas, and other new facilities through Kaiser, Dignity, and UC Davis.
- The City of Sacramento is in the process of updating its general plan to move all density based restrictions to floor area ratio standards, opening up formerly single family neighborhoods to attached housing types like fourplexes, and further upzoning commercial corridors. On a similar

track, the City is exploring eliminating parking requirements citywide and potentially maximums in key commercial corridors.

- The City of Roseville approved the Commercial Corridors project plans in 2022, which changed zoning to allow for dense housing in three key commercial corridors.
- A number of jurisdictions adopted housing elements that included rezone programs to accommodate their regional housing needs allocation. These rezones largely were comprised of upzones to allow at least 30 units/acre.

There were a number of planning changes brought about by one time State funding for planning, including LEAP, REAP, SB 2 planning grants, and REAP 2.0 (Green Means Go). Many of these changes were oriented around changing allowed densities, development review processes, parking, fees, and form standards to facilitate more housing.

SACOG provided a variety of resources and technical assistance to support efforts to encourage local regulatory changes to facilitate most compact and sustainable development patterns. These included the Housing Policy Toolkit, The Commercial Corridors Policymakers Toolkit, and the Mind the Gap Housing Initiative<sup>3</sup>.

## **CARB Recommendations from 2020 MTP/SCS**

*Identification of the recommendations CARB provided in the previous SCS evaluation and an explanation of how those recommendations have been incorporated into the new SCS or if they will be addressed at a future time.*

In the evaluation document of SACOG's SCS3 (2020 MTP/SCS), CARB has provided 7 recommendations.

### ***Deprogram Capacity Expansion Projects and Prioritize Funding for Transportation Projects that Advance SCS Implementation and Goals Get GHG Reductions***

In the last 15 years, the share of regional discretionary transportation funding directed to roadway capacity has greatly fallen, as SACOG has both implemented a new Project Performance Assessment tool to measure performance across Blueprint goals/objectives and updated the regional funding round framework to likewise stress the performance and policy objectives of the MTP/SCS.

In 2008, over 40% of the regional discretionary transportation funding went to roadway expansion. In 2018, the first year SACOG used the Project Performance Assessment (PPA) tool, this number dropped to 17%, with 83% of the funding going to complete streets, active transportation, electrification, operations, and transit projects. Then, in 2021, the agency updated the regional funding round framework. The new framework eliminated roadway capacity projects from competing in the largest funding program or to be considered in multi-cycle awards. The most recent funding round framework

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<sup>3</sup> <https://www.sacog.org/toolkits>



(2023) built on the prior, increasing the share of funding available to the Maintenance and Modernization program category (which funds complete streets and active transportation investments). As a result, only 3% of the awarded funds in the most recent regional discretionary round went to roadway capacity (and this funding was for the design of pricing infrastructure for a managed lane project). SACOG will continue to scrutinize capacity expansion projects proposed for inclusion in SCS4, for multiple reasons: shifting funding from needed roadway maintenance and safety projects, or active modes projects; facilitating growth that undermines achievement of the mix of development envisioned in the 2025 Blueprint; or committing roadway capacity to new growth areas at a time when forecasted growth is slowing. SACOG's PPA tool will continue to be one technical asset used to accomplish this in SCS4 and future funding rounds. SACOG is also revisiting the funding process with the intent of aligning it with state policy (like CAPTI) and federal programs that further prioritize non-capacity projects.

#### ***Monitor Implementation of the Adopted Transportation Project List***

Some of the data provided as evidence for the response to the prior recommendation on capacity projects is also evidence of an increasing emphasis on monitoring of the transportation project list. While monitoring progress has been done at the agency in the past, to emphasize the importance SACOG has developed a new Regional Monitoring and Reporting Program. The program is a multi-disciplinary effort to track a wide variety of subject matters vital to the SCS implementation success including transportation, housing, economic and environmental metrics. The program will use region wide impartial and high-quality data sources. Goals of the program not only include tracking, but enhancing the monitoring data into quick and easy ways to visualize and convey the data for staff, member agencies, regional partners, and the public to better understand complex planning goals and implementation efforts. The effort to monitor and track implementation of transportation projects, especially those with funds controlled by SACOG, will continue in the future.

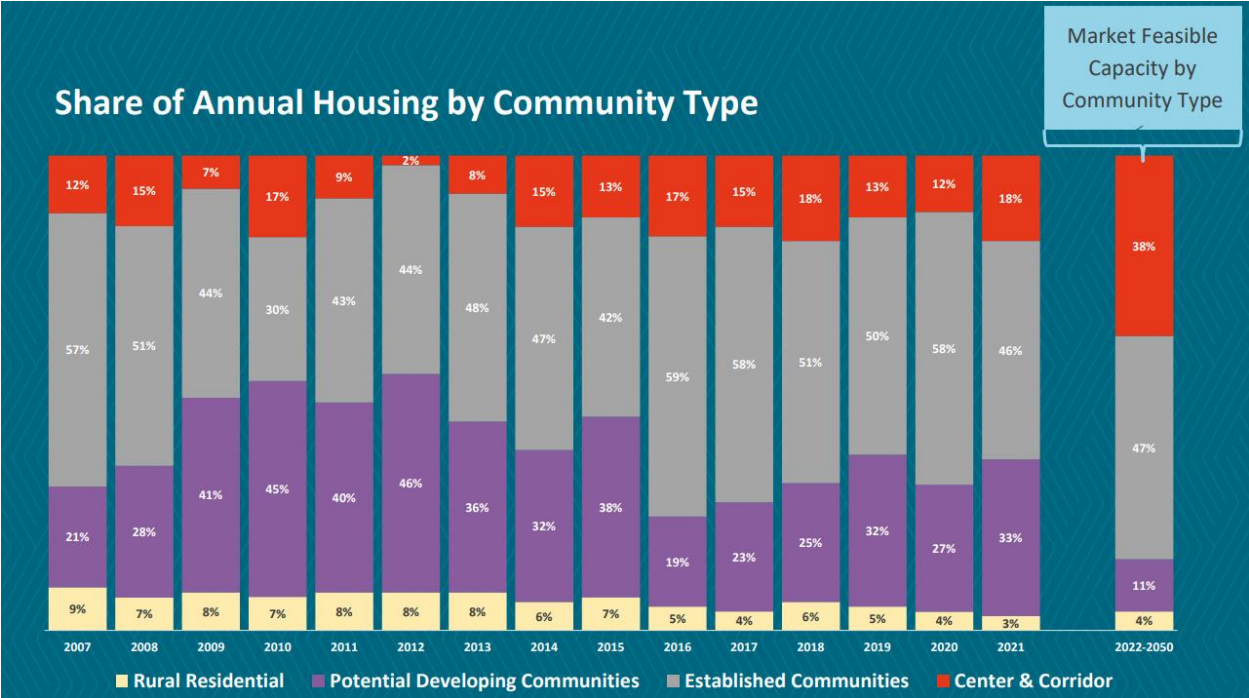
#### ***Accelerate Infill to Further SCS Implementation and Goals***

SACOG acknowledges that progress in reaching SCS goals on infill development has been, at best, spiky (see Figure 1). That issue was front-and-center in the "Pathways" phase of the 2025 Blueprint. Primary evidence of SACOG's commitment to these goals is the multi-year effort to establish, fund, and implement Green Means Go. Starting in 2018, SACOG worked with its member agencies to create GMG<sup>4</sup>. All 28 SACOG jurisdictions support the GMG, and 23 have formally adopted Green Zones: infill areas with potential for low-VMT, low-vehicle-emissions development. SACOG has worked with partners within the region, and across the state, to advocate for funding for GMG and other similar infill acceleration programs. After the adoption of SCS3 in 2020, SACOG dedicated all \$34M of its REAP2 allocation to funding 26 GMG projects in 13 jurisdictions. Some of the GMG awards went to near-term implementation projects. However, shifting the market for development in the region towards the SCS goals on infill development will take more time and effort, and SACOG's ability to influence development activity in the region will depend on the availability of funding over the long term.

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<sup>4</sup> <https://www.sacog.org/greenmeansgo>

**Figure 1. Dwelling Unit Growth by Community Type**



Source: SACOG, 2023. From 2025 Blueprint “Pathways” data.

**State and Regional Partnership on Pricing Pilot Options**

In partnership with Caltrans, Southern California Association of Governments (SCAG) and San Diego Association of Governments (SANDAG), the project of Pricing Pilot is under way already. This project will create a common design framework for variable pricing pilots that will be flexible to adapt to local needs and policy issues. Future pricing pilots that are launched using this framework will help:

- Create a better understanding and defined set of policy issues to be addressed in a pricing program design. E.g., How would an integrated mobility payment system, such as a mobility wallet, work for different drivers throughout different regions? What equity impacts need to be considered in a mobility payment system? What issues should be considered when examining transportation pricing in areas with varying levels of alternative modes available, such as rural and suburban communities?
- Promote efficient system management by piloting the integration of incentives with fees. E.g., Can subsidies for using transit, incentives to carpool and other transportation demand management (TDM) measures promote behavioral changes, and enhance the effect of pricing while also reducing adverse reactions to transportation pricing? Can these incentives add to VMT reductions, reduce impacts to low-income and rural communities, and help to achieve the State’s climate goals?

SACOG has been supporting Caltrans’ efforts to seek additional grants for implementation. Caltrans has submitted a grant application with SACOG and other Pricing Pilot’s partners’ support.

### ***Provide All Trend Analysis Metrics***

The only metric SACOG didn't provide the SCS3 is Transit Seat Utilization. SACOG intends to provide the metric in SCS4 submission provided sufficient analysis tools and research are readily available to confidently forecast transit seat utilization. Staff are actively researching both the best state of the practice monitoring and forecasting technics, as well as localized knowledge and experts for this metric. SACOG will continue to maintain time series data for other variables and issues related to SCS implementation more generally.

### ***Improve Modeling and Data***

To prepare for 2025 Blueprint and SCS4, all choice models in SACSIM travel model have been re-estimated and calibrated using SACOG 2018 household travel survey, local observed data, and 2019 Replica big data. New functionality was implemented to analyze the impacts of post-covid telework trends and policies. Transportation network company (TNC) mode is incorporated in the model and deadheading miles are also accounted. Autonomous vehicles are not incorporated due to lack of information or data to develop forecasting models.

### ***Analyze Induced Travel Demand***

Since the last adoption of SCS3 in 2020, SACOG staff explored moving from Envision Tomorrow Online to more of an integrated socioeconomic model. While the current approach to induced land use growth relies on manually applied growth shifts to areas where large transportation investments improve access, integrated socioeconomic models actually allocate land use growth in response to changes in access. The research into the potential for a socioeconomic model consisted of multiple interviews with potential software, like UrbanSIM, and conversations with existing and former users of said software at peer agencies, including Denver Regional Council of Governments, MTC/ABAG, and SANDAG. The results of those interviews were:

- Each MPO using an integrated model needed at least two dedicated professional staff to acquire and format needed economic data, and to maintain and run the model, in addition to significant contracts with outside consultants and data purchases.
- Standing up the model required significant up front data collection and validation.
- It would add significant cost relative to SACOG's existing land use modeling process and software. 2020 pricing was upwards of \$200,000 in start-up costs and \$24,000/year annual subscription.
- Only one MPO (MTC/ABAG) reported using the integrated model to prepare detailed land use forecasts for use in a statutorily required plan or program document, as opposed to non-statutory planning analyses.
- No MPO reported testing the integrated model to verify that it actually captured long term induced travel.

These findings resonated with SACOG’s own experience in developing and testing an integrated model (PECAS). Given these findings, and the fact that Caltrans and other state agencies have both endorsed, and in fact, recommend, the elasticity-based approaches for analyzing long term induced travel, SACOG staff will continue to do so for SCS4. SACOG will continue to improve the interactive process of matching land use forecasting and allocation with transportation investments to account for long-term induced demand in the plan, as described in Appendix E of SCS3, adopted in 2020.

## Overview of Existing Conditions

*Notable changes to the existing regional or local planning contexts that are likely to influence the RTP/SCS development process*

*Key issues in the region influencing RTP/SCS policy framework and discussions*

*(e.g., housing, economic development, emerging technologies) covid-19 pandemic*

Prior to public engagement and community outreach, SACOG staff prepares a “Regional Progress Report” summarizing key population, demographic, economic, housing and travel trends in the six-county SACOG region, and shares this report with the SACOG Board and the public. One purpose the RPR is to stimulate discussion of key issues facing the region that may influence the policy priorities for the upcoming update of the MTP and SCS. SACOG prepared the most recent RPR in 2020, and presented it to the SACOG Board in January 2021, in the midst of the COVID-19 pandemic. Where possible, data were assembled showing the impacts of the pandemic on the region. However, reliable data showing the impacts of the pandemic on the region were very limited. Highlights of the RPR (in addition to the issue of housing product mix not matching the mix envisioned in prior SCS’s raised above and depicted in Figure 1):

- In the Sacramento region, jobs returned more slowly from the Great Recession than the rest of the state, and the returning jobs were more in the health, education, leisure and hospitality, and professional services sectors. Health and education showed the biggest post-recession growth.
- Although population growth has slowed in recent years relative to growth in the early part of the 2000’s, the Sacramento region has maintained its growth rate more than the rest of the state, and at the start of the pandemic was the fastest growing region in the state.
- Underproduction of housing overall in the region, and especially for new housing in infill areas
- Biggest changes in travel are continuation of a long-term trend of declining carpooling as a commute mode, and increase in work-at-home.
  - The COVID pandemic accelerated the longer-term trend in work-at-home, as well as tele-medicine and tele-education.

- Through 2018, transit ridership and productivity continued to decline, even as service levels stabilized after the Great Recession cutbacks.
  - The COVID pandemic caused a significant decline in transit ridership, especially for commuters.
- After peaking in the early 2000's, regional VMT per capita dropped sharply through the Great Recession, and increased slowly as the region's economy recovered—but has never reached the level of the early 2000's (this pattern similar in other parts of the state).
  - The COVID pandemic initially cut traffic and VMT sharply as residents curtailed out-of-home activities, but all indications are that VMT has “recovered” to pre-pandemic levels.
  - Although the traffic levels have returned to pre-pandemic levels, the timing and directionality of traffic has changed—less peaked and more spread out over the day.

More detail on all of these trends, plus data tables and charts, are available in the SACOG Regional Progress Report<sup>5</sup>.

The growth and mobility challenges facing the region are complex due to the global pandemic, recent record setting drought and fire seasons, and the effects of a staggering statewide housing crisis. These challenges are daunting and are too often most acutely felt in historically disenfranchised communities. Finding pathways to create a thriving economy and healthy environment for all residents of the Sacramento region, as they relate to a regional planning effort, requires a holistic approach that examines the relationships between public sector land use decisions, transportation infrastructure and programs, prevailing market conditions, and public policy.

## Population and Employment Growth Forecasts

*Updated regional growth forecast information, to the extent known and available*

*(e.g., population, jobs, housing) compared to last RTP/SCS*

*Explanation of any changes to the regional growth forecast methodology*

SACOG completed a major update to its regional growth forecast for use in the 2025 Blueprint/SCS<sup>4</sup>. More detailed background on the forecasts is provided in a Growth Projection Technical Memo<sup>6</sup>.

To complete the projection update staff looked at past trends in the region, state and nation (often extending thirty or more years back, but with a primary focus on the last ten years), examined what

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<sup>5</sup> <https://www.sacog.org/post/2021-regional-progress-report>

<sup>6</sup> [attachment a. growth projections technical memo.pdf \(sacog.org\)](#)

demographic and economic trends have changed recently (with a focus on the past several years since the last plan update, and in this update, an in depth exploration of the past 2 years given the recent disruptions), drew on a suite of work and expert thinking about future conditions (such as material from the Bureau of Labor Statistics, the State Department of Finance, demographic and economic articles and publications, and projections conducted by our other peer regions) and, ultimately, created a projection series supported by the underlying demographic and economic data and expert panel. The update draws heavily on quantitative material (such as recent growth rates or projected changes in demographic trends) but uses an expert panel as a sounding board on the reasonableness of the results and assumptions.

The project's first expert panel, held on September 10th, 2021, focused on the assumptions and proposed approach to the projection update, and provided input on any long-term economic or demographic trends since SACOG's prior projections were completed (in late 2017). To produce a baseline jobs projection for the Sacramento region SACOG contracted with the Center for the Continuing Study of the California Economy (CCSCE). CCSCE worked closely with SACOG project staff to develop a draft jobs projection. SACOG staff developed the population and household baseline projections based on this job projection by employing largely the same technical methodology used in the prior projections update, with a few minor refinements based on new data around housing costs, labor force participation, and income.

The project team presented this draft baseline projection in a second session with the expert panel, held on November 5th, 2021. Based on the panel's expert feedback, staff made several refinements to the baseline projection, discussed in the projection's technical memo.

Overall, the updated growth projection sees a slower annual growth rate in this series compared to the prior plan update. The difference might seem *minimal*, but it would take 32 years more to double at the lower growth rate. This finding aligns with the projection update for other projection series that have extended to 2050, such as the Census and REMI national projections, the Department of Finance projections for California, and other metropolitan region's projections (such as SCAG or SANDAG).

The primary reason for a slower growth rate in the projection series update stems from extending the series' horizon year. Growth in the Sacramento region is heavily influenced by national trends in employment and population. Overall U.S. population and employment growth is expected to slow over the next several decades as the population ages and the number of children born (per capita) continues to decline. Thus simply extending the growth projections from 2040 to 2050 leads to a slower average annual growth rate across the nation, state, and region (i.e., fewer years in the relatively higher projected birth rates at the onset of the series and more years in the slower growth rates of 2040 to 2050).

While a slower annual average growth rate relative to the prior series, the updated growth projections for the 2025 Blueprint see the Sacramento region still growing faster than the state and nation. The SACOG growth projections start with a regional employment projection, completed by the Center for the Continuing Study of the California Economy. The projection sees an increasingly competitive economic position for the Sacramento region. The analysis focused on, among other inputs, the region's comprehensive economic development strategy (CEDS), the recent Brookings analysis for the region, and the [Prosperity Strategy](#)<sup>7</sup>, which all call attention to life sciences, food/agriculture and innovative mobility as areas of promise for the Sacramento region. The CCSCE team also saw growth opportunities in the broader professional services sectors and potential strategies to leverage state policy related to housing, climate change and other programs into regional employment. Overall the employment projection used a similar methodology compared to prior series, but incorporated the latest data and analysis.

The region's population projection also used a similar methodology from the last update, namely, using the Department of Finance's age/ethnicity and fertility rates to build a population estimate based on CCSCE's suggested jobs total. The SACOG economic/demographic population forecast in 2050 falls within a half percentage point of DOF's purely demographic forecast. Finally, the region's household projection drew on DOF's headship rates as well as historic housing permit numbers and housing cost levels. The household projection assumes substantial progress in the housing arena moving forward—the projection has the regional household rate exceeding the projected population and jobs growth rate out to 2050, as the region responds to pent up demand, provides more housing choice for a changing (and aging) demographic, and benefits from supportive policies at both the regional and state level (including Green Means Go). Yet this projection series added a small affordability check to future year headship rates in response to increasing barriers around housing affordability.

In short, the updated projection series largely employed the methodology used in the prior cycle, but incorporated the latest data and analysis. The key assumptions for this methodology are:

- Population growth is tied in large part to the region's projected job growth (especially in economic base industries), and household projections in turn are largely based on the age/ethnic composition of the forecasted population plus trends in household formation.
- Growth in the Sacramento region is heavily influenced by national trends in population and employment. Most notably, U.S. population growth will slow over the next several decades, which affects the Sacramento regional projection.
- Many changes will occur by 2050, some that are impossible to predict. However, some elements of the projection (such as age and demographic trends) have been much more stable through time.

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<sup>7</sup> [https://theprosperitstrategy.org/wp-content/uploads/2020/05/2020ProsperityStrategy\\_FINAL\\_May.pdf](https://theprosperitstrategy.org/wp-content/uploads/2020/05/2020ProsperityStrategy_FINAL_May.pdf)

Achieving the ultimate projection requires successful implementation of policies that enhance the attractiveness of the Sacramento region as a place to work and live. Last cycle, the SACOG board felt the prior Blueprint (MTP/SCS) had this combination of housing, mobility, quality of life, and economic prosperity policies to support a projection higher than the state and nation.

*Discussion of how the regional growth forecast will be integrated into the MPO's land use model*

The baseline regional growth forecast discussed above forms the foundation of the MTP/SCS land use model. The housing unit and job projections for 2035 and 2050 act as regional control totals that are then distributed down to the jurisdictions, community types, sub community types, and ultimately, parcels. This distribution takes into account a suite of regulatory, market, and performance factors. Also included in the factors affecting the allocation of growth to subareas are transportation improvements affecting accessibility of lands with growth capacity. The units, which account and jobs allocated to these different sub geographies always sum to the regional growth forecast projections for all land use pathways as well as the preferred pathway.

## **Quantification Approaches**

*Specify quantification approaches for each of the potential RTP/SCS strategies under consideration, to the extent known and available. Table 2 provides examples of quantification approaches associated with potential RTP/SCS strategies.*

SACOG will utilize the SACSIM activity-based travel demand model to quantify the impacts of major land use and transportation strategies, as it has for SCS's 1-3. Specifically, SACSIM23 will be used for SCS4. Each iteration of SACSIM has been improved to provide a better platform for analysis of key exogenous variables or policy strategies, and SACSIM23 is no different. SACSIM23 will be the primary analysis tool for quantification of VMT and GHG emissions outcomes for five key strategies. More details on SACSIM23 are provided in the "Travel Model" section below.

Table 2 also indicates four policy/programmatic strategies for which off-model methodologies will be used to quantify VMT and GHG emissions outcomes. The main strategy that was moved from the "Off-Model" methodologies to SACSIM23 is telecommute, which as both exogenous (trend) and policy/program aspects to it. More detail will be provided in the "Travel Model" and "Off Model Methodology" sections below.



**Table 2. RTP/SCS Strategy Quantification Approaches**

RTP/SCS Strategy	Quantification Approach
Targeted infill/increase density in transit priority areas	SACSIM23
New transit capital projects	“
Bike and pedestrian infrastructure	“
Regional express lane pricing	“
Telecommute trends and programs	“
Additional infrastructure for electric vehicle charging	Off-Model Methods
Transportation system management (TSM) and Intelligent Transportation Systems projects (ITS)	“
Employer-based transportation demand management strategies (TDM), and other demand reduction programs	“
Regional bike and car share programs	“

Source: SACOG, June 2023.

*Specify the assumptions and methods used to estimate interregional travel*

**Inter-regional Travel**

All interregional travel is predicted or estimated using External-Internal sub-model in SACOG’s travel demand model SACSIM. The core model DAYSIM simulates the activities of households located within the SACOG region, for their travel within the region. The activities simulated must also be located within the region, since the simulation uses employment and travel data available only within the region. DAYSIM also uses the predicted external trips from the External-Internal sub-model to adjust its own predictions to account for external travel, including regional residents who may work or do other activities outside the region, as well as the effect of outside residents who take jobs within the region. The processes in External-Internal sub-model are based on customary aggregate trip generation and distribution models, producing person- and vehicle-trip matrices, at a traffic analysis zone (TAZ) level, not parcel.

For details about the model, please refer to Chapter 3.3 from SACSIM travel model documentation<sup>8</sup>.

The primary inputs to this sub-model are the external production trips (source of travel demand located outside the region but with travel taking it into the SACOG region), and external attraction trips (from a

<sup>8</sup> <https://www.sacog.org/travel-model-documentation>

location outside the SACOG region, but visited by a SACOG residents for work, shopping etc.) at gateways which representing the areas outside of the SACOG region.

For 2025 Blueprint and SCS4, two more gateways, and some previously omitted major roadways, were added to capture the travels between SACOG region to Tahoe Basin to make a total of 29 gateways.

For the base year 2020, the external production/attraction trips are estimated based on Caltrans truck volume counts (to set commercial vehicle volumes), with the other trip purposes set as “residuals” which made up the difference between the observed vehicle volumes at each gateway and that portion of the vehicle volume accounted for by worker flows and commercial vehicles. Home-based school trips, escort and meal trips are such a small part of gateway travel that they are omitted in SACSIM.

For future year forecasts, SACOG will coordinate with neighboring MPOs on expected growth in gateway vehicle volumes. Growth and conversion factors will be used to translate the vehicle consensus, expected future vehicle volumes into SACSIM23 demands at gateways.

## **Emissions Modeling**

*Specify version of CARB’s mobile-source emission factor model that will be used for estimating GHG emissions (e.g., EMFAC2014) and mention of the version used in the previous RTP/SCS*

ARB’s EMFAC emissions modeling software will be used for estimates of passenger vehicle GHG emissions, adjusted to take out the impact of state programs like LCFS and Pavley I & II. The use of GHG emissions rates adjusted for state programs is part of the RTAC advice to ARB on the initial target setting and implementation. By taking out the effects of state programs from the GHG emission rates, the SB375 target focuses on “land use / transportation” factors reducing passenger vehicle travel and factors out state programs focused on fuel and fleet changes. Table 3 below shows the versions of EMFAC emissions software used for initial target-setting, the 2012 and 2016 MTP/SCSs, the target re-setting completed in 2018, and 2020 MTP/SCS. SACOG is proposing to use EMFAC2007 and EMFAC2011 for SCS4, to be consistent with SCSs 1-3.

**Table 3. EMFAC Versions Used for SB 375 Target Setting and Compliance**

SCS Task	2005	2020	2035	Notes
Initial target setting (2010)	EMFAC2007	EMFAC2007	EMFAC2007	
2012 MTP/SCS 1	EMFAC2007	EMFAC2007	EMFAC2007	
2016 MTP/SCS 2	EMFAC2007	EMFAC2011	EMFAC2011	ARB-provided adjustment process to compare BY 2007 to FY 2011 versions of EMFAC
Target re- setting (2018)	EMFAC2007/ EMFAC2014	EMFAC2014	EMFAC2014	2005 Base year GHG was not explicitly re-visited in target re-setting, though EMFAC2014 was used to establish likely auto operating costs.
2020 MTP/SCS 3	EMFAC2007	EMFAC2011	EMFAC2011	ARB-provided adjustment process to compare BY 2007 to FY 2011 versions of EMFAC
2025 Blueprint/ SCS 4 (Proposed)	EMFAC2007	EMFAC2011	EMFAC2011	ARB-provided adjustment process to compare BY 2007 to FY 2011 versions of EMFAC

## Land Use/Travel Demand Modeling Tools

*Description of all updates or improvements made to land use and travel demand models*

### Land Use Model

SACOG is using for SCS4 the same basic land use modeling process used for SCS3<sup>9</sup>. The main tool employed will be a customized version of Envision Tomorrow Online, which is hosted on the SACOG server. The regional growth projections serve as regional control totals that are then distributed down to the jurisdictions, community types, sub community types, and ultimately, parcels. This distribution takes into account a suite of regulatory, market, and performance factors. SACOG conducted a robust update to its buildout inventory to better understand the regulatory environment across the region in 2021 and 2022. As part of that effort, SACOG now has a comprehensive spatial dataset for allowed residential and non-residential uses from general plans, specific plans, and master plans across the

<sup>9</sup> [https://www.sacog.org/sites/main/files/file-attachments/appendix\\_c-\\_land\\_use\\_forecast\\_0.pdf?1573685678](https://www.sacog.org/sites/main/files/file-attachments/appendix_c-_land_use_forecast_0.pdf?1573685678)

region. That effort also included an exploration of what portion of that regulatory capacity is market feasible across the region. These factors will be key inputs into the 2025 Blueprint and SCS4. The first significant step in the preparing the land use forecast is the “Pathways” scenario analysis<sup>10</sup>.

## Travel Model

SACOG uses the Sacramento Activity-Based Travel Demand Simulation model (SACSIM) for analysis of travel demand associated with land use and transportation alternatives. SACSIM is a state-of-the-art regional travel demand model. It is unique in its use of parcel/point-level land use input data, and was the first activity-based, demand simulation models for a regional long range plan and emissions analysis, for its 2008 MTP. SACSIM was the subject of a rigorous peer review in 2008, underwritten by the USDOT “Travel Model Improvement Program”. During SACOG’s SCS3 updates, SACSIM was improved, through updating of the basic software modules used to run the model; addition of time periods to both highway and transit networks; upgrade of transit network software; improved treatment of transit fares; replacement of radial, fixed-distance proximity measures (e.g. number of jobs within ¼ mile) with proximity measures based on network distance, so proximity measures take account of network connectivity, and fixed barriers like freeways and rivers, etc. A very important improvement was implementing functionalities to evaluate transportation facility pricing as part of the SCS3. All of those improvements were rolled into SACSIM19.

Since the adoption of SCS3, the following improvements to SACSIM19 were completed, and will form the basis for SACSIM23, which will be finalized by the end of this calendar year:

- All the choice models in DAYSIM were re-estimated and calibrated using 2018 household travel survey data.
- Traffic Analysis Zone (TAZ) system was re-structured, to better align with Census Block geography and facilitate the use of Census data. Approximately 1000 TAZ’s were added to provide greater detail in aggregating parcel-level transportation demand for network assignment.
- SACSIM model geography was modified to correct an inconsistency in representation of the boundary between SACOG and TRPA jurisdictional areas, including modifying external gateways, TAZ boundaries, and roadway network.
- Roadway free flow speeds were updated based observed Inrix/NPMRDS speed data from 2019. Congested speeds from the same observed data source will be used for model validation.
- TNC mode is incorporated into SACSIM23 choice models, and a process to account for deadheading miles will be included.
- A telework module was added to the model to forecast the number of workers who have a designated work location other than home but work at home on a typical weekday, depending on the distance from home to work location and the type of job. The model was developed and

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<sup>10</sup> <https://www.sacog.org/announcement/2025-blueprint-pathway-land-use-evaluation>

calibrated based on SACOG 2018 Household Travel Survey and the latest available ACS data. Clearly the prevalence and stature of telework has changed significantly from the forced changes caused by the COVID-19 pandemic-related restrictions, to new expectations by workers of flexibility on telework afforded by employers, and emerging “hybrid” workplaces. How much of this is an enduring “trend”, and how much of this is fodder for new policies and programs related to SCS4 will be one technical methodology question moving forward. SACOG intends to use the telework submodel in SACSIM23, and sensitivity and reasonableness checking of that submodel, to assist planners and policy-makers in asserting how much impact on telework could come from local and regional policies. The model itself will be used to quantify the VMT and GHG outcomes from those changes to telework.

#### *Characterization of any new inputs or data sets used in the land use and travel demand models*

##### ***New Data for Land Use and Travel Modeling***

SACOG systematically updated its land use and transportation monitoring datasets and used these monitoring data to update the base year of its forecasting tools to Year 2020. Considering the interruptive and uncertain impacts of Covid-19 on travel, all data was from pre-pandemic period.

Housing, employment and school inventories were updated, using a range of data sources (Census data, building permits, commercially and publicly available employment datasets, aerial photos, county assessors’ data, and other sources). SACOG’s regional GIS street and bikeway centerline file, published transit schedules and maps, and aerial photos were used to update the highway and transit datasets for SACOG travel demand models to Year 2020. Traffic counts and transit passenger volume datasets were updated, and are used for validation of travel demand modeling tools. 2018 SACOG region household travel survey data and 2019-2020 Big data from Replica are also used to calibrate and validate the year 2020 travel model.

SACOG also used a Caltrans Planning Grant to procure a consultant and develop a revamped buildout inventory for the 2025 Blueprint Update. Because of this project SACOG now has a comprehensive understanding of what is allowed (in terms of both density and intensity) on every parcel across the region, including land use controls in general plans, specific plans, and master plans. In addition, the buildout inventory explored how this theoretical capacity could be throttled to reflect market realities and other zoning restrictions like setbacks and parking requirements.

## Sensitivity Testing

*Commitments to provide model sensitivity tests for RTP/SCS strategies under consideration (see Appendix B for full list of potential sensitivity tests)*

The sensitivity tests of SACSIM23 for 2025 Blueprint are conducted for the following factors/variables:

1. Land use-Related – Cross-sectional analysis will be conducted to analyze the correlations between the following factors to VMT, transit use etc.:
  - a. Regional accessibility (or “destinations”)
  - b. Mix of use (or “diversity”)
  - c. Proximity to transit (or “distance”)
  - d. Street pattern (or “design”)
  - e. Residential density
  - f. Employment density
2. Transit infrastructure and Active Transportation-Related – The following tests have been conducted:
  - a. Transit services (headway changes)
  - b. Add/remove transit lines
  - c. Improved access to transit
3. Local/Regional Pricing Related – The following tests have been conducted:
  - a. Transit fare
  - b. Off-street parking cost
  - c. Managed/Tolled Lane
  - d. Mileage-based fee/auto cost
4. New Mobility Related – As a newly added functionality to the model, the sensitivity of teleworking is tested. Other strategies such as increasing access to the regional electric vehicle charging network, promoting ride hailing and ridesharing, intelligent transportation systems, and transportation systems management programs, bike share etc. are not analyzed by travel model but using off-model methodologies.
5. Exogenous Variables – The following tests have been conducted:
  - a. Auto operating costs
  - b. Household income
6. Highway Infrastructure related – The following tests have been conducted:
  - a. Add/delete a lane
  - b. Change link speeds
  - c. Change link capacities

SACOG has hired a consultant to conduct the sensitivity tests. The work is set to be completed by the end of July 2023. The sensitivity test report will be shared upon completion.

## Treatment of Induced Demand from New Roadway Capacity

### *Discussion of whether and how the travel model accounts for short- and long-term effects of induced demand for new roadway capacity projects<sup>2</sup>*

As described in details in the section “Treatment of Travel Induced by Addition of New Roadway Capacity” page 59-64 in [Appendix E](#) of 2020 MTP/SCS plan document, SACOG’s travel demand model SACSIM itself captures the short-term induced travel by roadway expansion, such as: driving slightly out of one’s way in order to use a new facility, compared to prior routes; shifting trips made by walking, biking, transit, or some non-private-vehicle mode to a private vehicle; or making more trips using a vehicle compared to the prior condition. The model capability was assessed and verified by model sensitivity test of adding capacity.

Examples of long-term effects by roadway capacity projects include changes in long-term individual or household choices, or causing new growth and development in areas where options to driving are a few, or where the density and mix of uses require longer-than-average (regional) vehicle trips. For SACOG’s long range transportation plan, the long-term induced demands by roadway capacity projects are captured and accounted for with an interactive process of paring transportation investments with land use forecasting and allocation, and policies and strategies limiting roadway expansion. The past process and its validation were entailed in the section “Treatment of Travel Induced by Addition of New Roadway Capacity” page 59-64 in Appendix E of 2020 MTP/SCS plan document<sup>11</sup>. Since that document was published by SACOG, various guidelines and methodologies related to estimation of induced demand and VMT have also been published, such Caltrans’ guidance, and various methods published by agencies adopting VMT analysis procedures in response to the changes to CEQA on analysis to transportation impacts. SACOG’s approach may be adjusted to reflect some of these new published sources, but the basic approach will be the same as employed in SCS3.

There are significant improvements to the process to connect land use forecast and allocation to transportation investments in 2025 Blueprint and the 4<sup>th</sup> SCS updates. Below are outlines.

For each MTP/SCS (Blueprint) update, SACOG prepares a forecast of regional growth in population, employment, and households, and a spatial distribution of growth. The land use component of each MTP/SCS update is a set of assumptions around the amount, location, and nature of growth for the next two-plus decades. The land use and transportation assumptions work together in tandem to maximize benefits and minimize negative impacts across a set of equity, environmental, and economic goals. While many factors are considered, there is not a single mathematical formula or computer program used to create the land use forecast. The analytical process is iterative. Staff evaluate regulatory,

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<sup>11</sup> [https://www.sacog.org/sites/main/files/file-attachments/appendix\\_e\\_\\_\\_final.pdf?1573685716](https://www.sacog.org/sites/main/files/file-attachments/appendix_e___final.pdf?1573685716)

market, and policy factors to narrow in on an ambitious but achievable picture of how the region’s land use pattern could evolve.

To better understand how the land use and transportation decisions we make today will affect the future and to help identify strategies that can remain durable across a range of futures despite changing and disruptive uncertainties, SACOG is undertaking a scenario planning effort, referred to as Pathways, as part of the process for the Blueprint. Pathways will provide the analysis and metrics that will serve as a learning tool for unpacking the many complex and intersecting issues facing the region over the next three decades around housing and land use, transportation management, regional growth, environmental resources, economic development, systemic racial disparities, and climate change and resilience. For more information on the framing for these pathways, [click here](#).

### **List of Exogenous Variables and Assumptions for Use in Proposed MTP/SCS**

*At this time, the MPO should commit to its assumptions, to the extent known and available, for independent (exogenous) variables (see **Table 3**). MPOs should list the exogenous variables that are inputs to the travel demand model and not part of the RTP/SCS scenario development process, and document those variables in the submittal.*

Table 4 lists the variables which are assumed as exogenous and will be used in the incremental progress analysis. Five variables were included for the SCS3 incremental progress analysis. Telework was added to the list for SCS4, given this new submodel was added to SACSIM23. The approach used for this analysis will be similar to that used for SCS3: the SACSIM19 networks and input data files used for SCS3 will be converted for use in SACSIM23, and the six factors listed below will be normalized to the levels or values used in modeling SCS4.



**Table 4. List of Exogenous Variables for Incremental Progress Analysis**

Category of Variable (as applicable)	Variable Specification in Model	Example Assumption in 2035
Auto operating cost	Fuel and non-fuel related costs (maintenance, repair, and tire wear) exogenously set	Normalize SCS3 to SCS4 cost
Vehicle fleet efficiency	EMFAC2011	Same version EMFAC2011 will be used to compute GHG
Household income	Median Household Income in exogenously set in population file	Normalize SCS3 to SCS4 income
MPO travel demand model version	SACSIM19 used for SCS3 SACSIM23 to be used for SCS4	Run normalized SCS3 with SACSIM23
Telework	Included as a choice option in SACSIM23	Normalize SCS3 to include the “trend” part telework from SCS4
Inter-regional Travel	Exogenous gateways coordinated with neighboring MPO’s for SCS4	Model SCS3 with SCS4 gateway assumptions

## Auto cost

*Specify the assumptions used to derive the cost of travel (i.e. auto operating cost). Auto Operating Cost is derived from the cost of fuel and non-fuel related costs (maintenance, repair, and tire wear).*

For the initial target-setting, and for the SCS 1 and 2, SACOG and the other large MPOs in the state used a consistent approach for defining, estimating and forecasting auto operating costs (AOC) for purposes of regional travel demand modeling, which documented in the past submissions.

In the development of SCS 3 (SACOG's 2020 MTP/SCS), considering factors such as the passage of SB1, potential Road Use Charge by state, SACOG BOD's policy of supporting transition from motor vehicle fuel tax to a sustainable option as Mileage-based user fee, and "Rebound effects" of fuel efficiency etc., SACOG staff analyzed several scenarios as documented in SACOG's SCS 3 submissions. For the final SCS 3, SACOG computed AOC including the following components:

- Fuel cost per mile (excluding state/federal fuel tax), without considering rebound effects of fuel efficiency.
- Tire and maintenance cost per mile.
- State and Federal fuel tax.
- State Road Use Charge.
- SACOG Mileage Based User Fee.

Working with other four big-MPOs, a new approach for internal combustion engine (ICE) vehicle is developed to include the differential rebound effects observed by Gillingham<sup>1</sup> and others. The main findings of the research paper, which was written as a comment on an NPRM by US EPA:

- "rebound" is defined as the change in vehicle travel caused by a change in cost of vehicle travel stemming from a change in vehicle efficiency (MPG).
- Gillingham argues that prior research on this topic, which "landed" on a long term rebound effect of 0.2 (though research also shows a wide range) is TOO HIGH. The "real" effect is more like 0.08 to 0.14.
- Gillingham argues one of the reasons for this is that prior research has conflated, in some cases, the change in cost driven by change in cost of fuel (one key factor) with change in vehicle economy or MPG (another factor).
- Gillingham argues that by correctly accounting for these factors separately, it is revealed that the sensitivity to changes in fuel cost is MUCH higher than sensitivity to changes in MPG.

Travel models have very few options for reflecting this research, because auto operating cost (AOC) goes into the model as one value based on passenger vehicle fleet average, in cents per mile. In the calculation used for the 2012, 2016 and 2020 MTP/SCS's, changes to AOC caused by change to fuel price was counted no differently than changes to AOC caused by increasing MPG of the passenger vehicle fleet.

The past calculation of AOC treats all factors influencing cost of driving per mile equally. A penny reduced (or added) to AOC by changing cost of fuel is treated the same as a penny reduced (or added) through changing MPG.

The proposed new approach for internal combustion engine (ICE) vehicle is to split the MPG component of the formula into a base year component, and a “change” component, with the change component weighted differently. The calculation of AOC emulates the effect observed in the Gillingham research by down-weighting the change in MPG. In effect, the AOC is calculated as “perceived” value.

$$\text{AOC\_ICE (fy)} = \text{NFC(fy)} + \text{FuelCost(fy)} + \text{FuelTax(fy)}$$

Where:

$$\text{FuelCost(fy)} = \text{FuelPrice(fy)} / \text{FuelEfficiency(Perceived)}$$

$$\text{FuelEfficiency(Perceived)} = \text{MPG(by)} * (1 + R * (\text{MPG(fy)} - \text{MPG(by)}))$$

Where

AOC\_ICE(fy) = Perceived auto operating cost for ICE vehicles in future year (cents per mile)

NFC(fy) = Non-fuel cost in future year (cents per mile)

FuelCost(fy) = Perceived Fuel cost per mile in future year

FuelPrice(fy) = Price per gallon equivalent of fuel in future year (cents per gallon)

FuelEfficiency(Perceived) = Perceived fleet average miles per gallon in future years

R = fuel economy rebound effect factor, range from 0.08 to 0.14 based on literatures

MPG(fy) = Fleet average miles per gallon in future year from EMFACT2021 or more recent data

MPG(by) = Fleet average miles per gallon in base year from EMFACT2021 or more recent data

FuelTax(fy) = state and federal fuel tax in future years (cents per mile)

SACOG will use this new approach for ICE vehicles and compute fuel-equivalent charging cost and non-fuel costs of electric vehicles for future years separately.

The final auto cost for forecast the travel demand in future years is an average cost of ICEs and EVs which are weighted with VMT in EMFAC2021, plus variable mileage-based user fees.

## Per Capita GHG Emissions from Prior MTP/SCS

*Using the assumed values listed above in Table 5 for exogenous variables, the MPO should conduct travel demand modeling for the previous RTP/SCS using these input variables. This result will be used as the basis for comparison in the Incremental Progress reporting component as part of CARB staff's subsequent SCS Evaluation Process.*

This analysis will be conducted later. See discussion above and Table 5 for more details.

## Off-Model Methodology

*List all off-model strategies under consideration that may be used in the*

*RTP/SCS including proposed emissions calculation methods and assumptions*

*(See **Appendix E**) with clearly cited sources*

*Specify how the MPO will develop assumptions about an off-model RTP/SCS strategy, including:*

*Participation rate or program utilization*

*Expected effect on travel behavior and emissions and references/sources documented*

*Rationale for why GHG emission reductions should be considered surplus/additional (e.g., goes beyond existing State programs)*

*Region-specific data for off-model RTP/SCS strategy performance to date, adopted investment commitments, and project outcomes (e.g., existing program utilization)*

*In addition, MPO in its Technical Methodology submittal to CARB describe why a given strategy is not reflected in its travel demand modeling and why an off-model quantification approach is appropriate for a given strategy.*

*If an MPO includes an off-model strategy as part of its RTP/SCS, the MPO should continue to quantify the GHG emissions reduction benefits of that off-model strategy in all future RTP/SCSs. If the MPO is no longer implementing the off-model strategy, the MPO should document the termination of that off-model strategy in the Technical Methodology submittal. If the off-model strategy is now reflected in the travel demand modeling due to model upgrades or improved model sensitivity, the MPO should document plans to rely on the travel demand model output to quantify the GHG emissions reduction benefit of that strategy, and it will no longer be quantified off-model.*

Through the SB375 GHG reduction target-setting process, and the first SCS evaluations, each MPO in the state performed a self-assessment of modeling capabilities<sup>2</sup>. Through that process, SACOG identified several key exogenous and policy variables for which SACSIM is not reasonably sensitive. Where this determination was made, SACOG used the following 5 step process for the 2012, 2016 SCS and 2020 SCS to estimate an off-model adjustment, to be added to the SB375 GHG reduction calculation:

1. determine if the MTP/SCS includes a program which would implement the subject policy, or for exogenous factors, whether evidence exists of a change in the factor over the life of the MTP/SCS;

2. determine the most likely deployment level and geographic coverage of the program based on implementation of the MTP/SCS;
3. estimate through research a reasonable range of program or policy effects on passenger vehicle GHG generation (or failing that, on VMT), based on the documented effectiveness of similar programs elsewhere;
4. combining results of steps 2 and 3, estimate a range of likely program effects on GHG generation for the MTP/SCS;
5. combine all estimated program effects into one off-model adjustment, to be added to the modeled reduction calculated from SACSIM results.

This process was thoroughly documented in the attached SB 375 GHG reduction calculations, submitted to CARB as part of SACOG’s 2012, 2016 SCS and 2020 SCS technical reviews. SACOG proposes to use the same basic process, with updates where needed, for the 2025 Blueprint/SCS 4.

SACOG will calculate off-model adjustments from the following programs in largely the same manner as in SCS3. The actual SCS4 adjustments are expected to be very similar to those calculated for SCS3, except as noted:

- Transportation system management (TSM) and Intelligent Transportation Systems projects (ITS);
- Employer-based transportation demand management strategies (TDM), and other demand reduction programs (note: the portion of these programs represented by telework for participating employers is now included in SACSIM23, and a deduction from prior calculated adjustments will need to be made).
- Locally initiated programs to facilitate deployment of electric-vehicle-supportive infrastructure (e.g., charging stations), and to accelerate and increase market penetration of electric vehicles in the region (note: deployment level of GMG may increase the future deployment of this infrastructure for SCS4, compared to SCS3); and
- Bikeshare System

SACOG staff have just started to gather information and develop methodologies to quantify the effects of these programs and can’t provide details about exact calculations for this document.

## **Other Data Collection Efforts**

*• May include, but are not limited to:*

*Data collected from regional surveys on travel behavior*

*Compiled project information from local jurisdictions ◦ Census data ◦ Traffic counts*

- 2018 Household travel survey: SACOG conducted a regional household travel survey in 2018 through smart phone app, which collected travel data up to seven days, and Internet, which only collected travel data on a typical weekday. The collected data included travelers’ household and person profiles, vehicle information, and detailed tour and trip information. The data was used to estimate all choice models of Daysim which is the core of SACSIM.
- Replica Big data: Replica is a big data analytics platform which uses multiple data sources including location based service data to synthesize each traveler’s person and household profiles and his/her travel information for each day of a week. The detailed travel diary of all residents and visitors confers users the highest flexibility in how to use the data for various projects. The biggest advantage of Replica data is to track travel activities across and outside SACOG administrative boundaries. SACOG used Replica data to fine tune SB 743 screen map and calibrate Daysim for 2020 base year.
- Traffic counts (pre-pandemic 2020)
- Transit boarding and seat utilization (where available)
- 2020 Census, and ACS 2015-2019/2016-2020 5-year tables
- Transportation projects
- Speed data from NPMRDS

#### ***Note on the Technical Methodology***

*CARB understands MPOs are Board-driven agencies and RTP/SCS scenarios are developed through a robust public process. Upon submission of the Technical Methodology, CARB will receive the level of detail available at time of submission with more detail forthcoming as the Technical Methodology is developed through the RTP/SCS process. CARB staff will continue to work closely with the MPOs as preferred scenarios and assumptions are developed to ensure GHG emission reduction methodologies are clearly understood.*