Guidehouse

2027 Potential and Goals Study Workplan [DRAFT]

EM&V Group E Sectors

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1. Background and Overview

This document details the scope and workplan for the 2027 Potential and Goals Study ("the 2027 PG Study"). The 2027 PG Study is funded by the California Public Utilities Commission (CPUC) out of the EM&V for Group E Sectors contract.

To ensure continued success of California's annual ~$1 billion customer investment in energy efficiency (EE) programs, CPUC develops goals every two years to inform EE program planning efforts undertaken by Program Administrators (PAs), including the investor-owned utilities (IOUs).

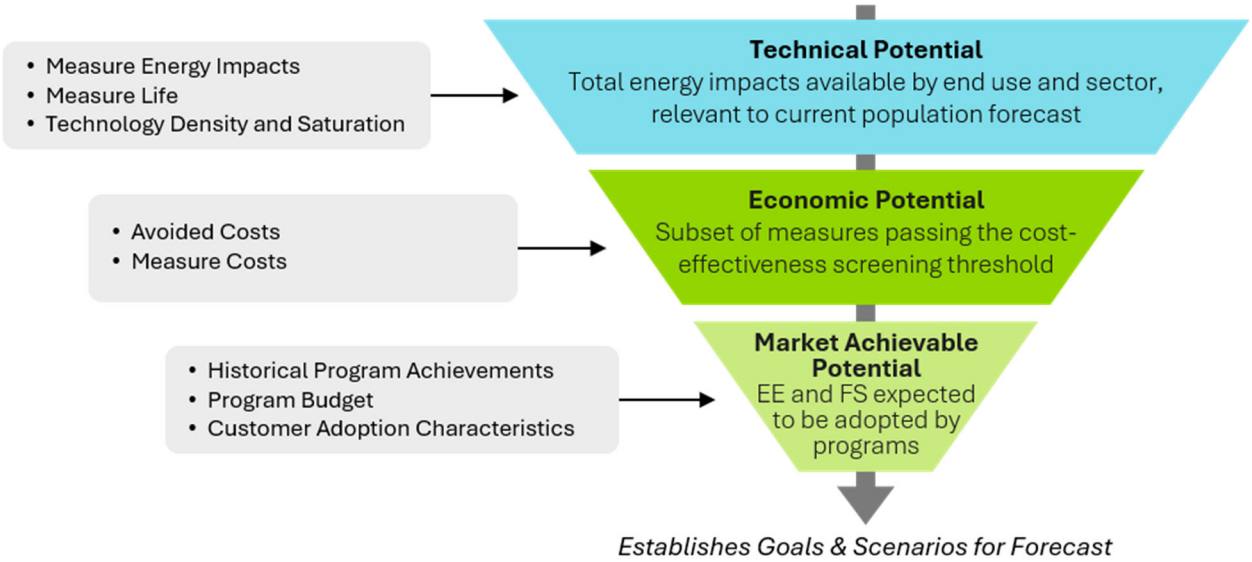
The objective of the 2027 PG Study project is to conduct a potential and goals (PG) study in support of the EE program goal-setting process and other forecasting and statutory activities.

1.1 Approach Overview

The 2027 PG Study will estimate technical, economic, and market achievable EE and fuel substitution (FS) potential for California IOU service territories across relevant sectors, building types, end uses, and measure categories. Potential will be quantified both on an energy savings basis and a total system benefit (TSB) basis given that TSB is the metric used by CPUC to set PA goals. The 2027 PG Study will build upon the analytical framework used in prior PG studies while incorporating updated market data, measure information, policy assumptions, and methodological enhancements identified during the study planning process.

Figure 1 presents the overall analytical framework that will be used to develop potential estimates and study forecasts.

Figure 1. General Approach to Potential Analysis



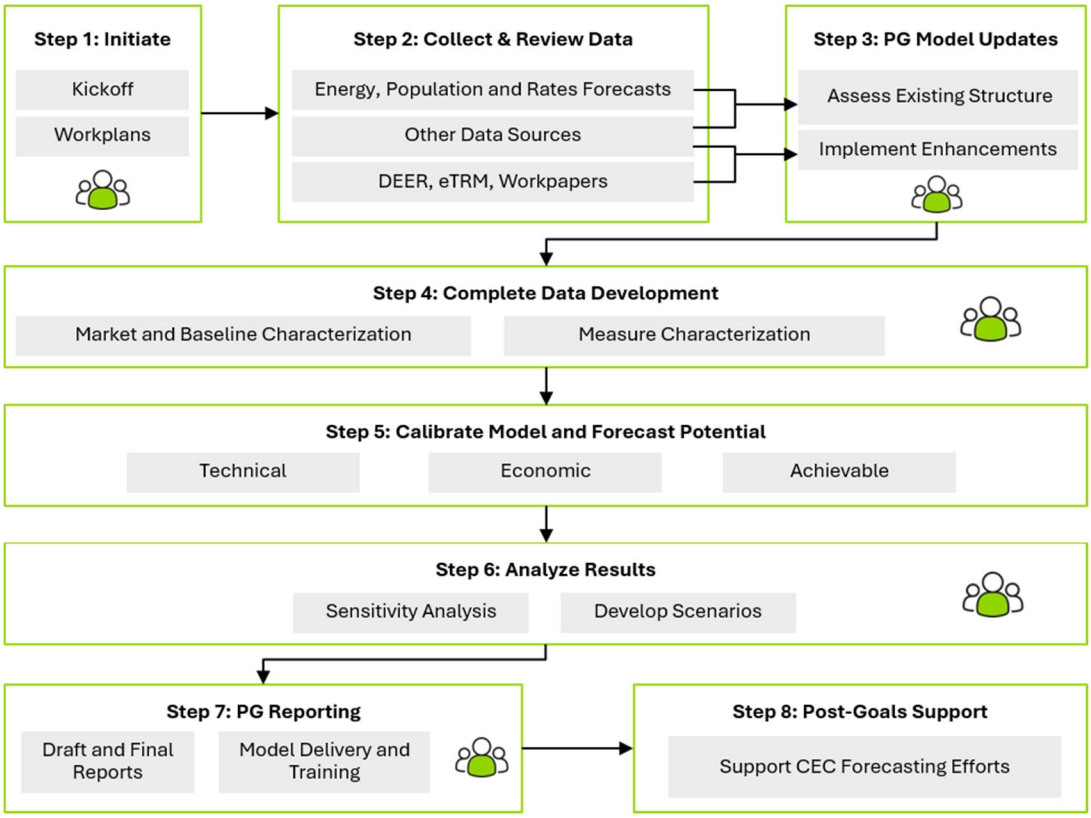
Source: Guidehouse

Consistent with prior studies, the analysis will apply a combination of bottom-up and top-down modeling approaches depending on the characteristics of the savings opportunity being evaluated. Bottom-up methods will be used where detailed end-use, technology, and measure-level data are available, including most residential, income-qualified, and commercial deemed measure opportunities. Top-down approaches will be applied to savings opportunities that are custom or programmatic in nature, including portions of the industrial, agricultural, and commercial sectors, as well as codes and standards (C&S); behavioral, retro-commissioning, operations (BROs); and strategic energy management (SEM) activities.

The approach is designed to 1) produce results that are consistent with the evidence of historic program achievements and market data, and 2) stretch beyond traditional program delivery mechanisms and past policy assumptions to examine future possibilities that are in line with current statutory activities. These include additional achievable energy efficiency (AAEE) and additional achievable fuel substitution (AAFS) under the California Energy Commission (CEC) bi-annual Integrated Energy Policy Report (IEPR) forecasting process, and doubling of efficiency aspirations under the Senate Bill 350 (SB350) legislation and target-setting process.

Figure 2 illustrates the process and flow of activities planned to execute the 2027 PG Study over its approximately two-year time horizon. Each aspect of the chart is further detailed below.

Figure 2. 2027 PG Study Process Overview



Source: Guidehouse

- **Step 1: Initiate**
  Launch the 2027 PG Study through a CPUC staff and contractor kickoff meeting, establish project governance and communication protocols, and develop a study workplan.

  Early stakeholder engagement will introduce the study objectives, review the proposed analytical framework, and gather input on the workplan, measure list, emerging issues and priorities, and potential study enhancements.

- **Step 2: Collect & Review Data**
  Compile and assess data resources developed since the 2025 PG Study, including updated forecasts, building stock characteristics, equipment saturation estimates, market indicators, policy assumptions, California Database for Energy Efficient Resources (DEER) and Electronic Technical Reference Manual (eTRM) data updates, ex ante measure development activities, findings from an assessment of gaps and emerging issues, PA data sources, measure workpapers, and other relevant market research and evaluation efforts.

- **Step 3: PG Model Updates**
  Evaluate the existing PG Study modeling framework to determine whether updates are needed to address evolving CPUC priorities, policy objectives, and planning requirements. This assessment will examine market segmentation, end-use and technology representation, treatment of market and policy drivers, and alignment with goals related to decarbonization, equity, demand flexibility, and coordination with statewide forecasting efforts. Recommended enhancements will be reviewed with CPUC staff prior to implementation and shared with stakeholders depending on significance.

- **Step 4: Complete Data Development**
  Develop and format model inputs required for the forecasting effort, including updates to DSMSim™ global input files, baseline assumptions, measure characteristics, and the EE measure library. Assumptions and data sources will be documented and reviewed through a series of topic-specific stakeholder workshops and webinars focused on key input areas such as measure lists and definitions, baseline development, and forecast assumptions.

- **Step 5: Calibrate Model and Forecast Potential**
  Develop technical, economic, and market potential forecasts using the DSMSim™ modeling platform. Forecast development will incorporate updated market conditions, program experience, historical study findings, policy drivers, budget considerations, and other factors affecting achievable potential. Preliminary results will be shared with CPUC staff and stakeholders for review and discussion throughout the forecast development process.

- **Step 6: Analyze Results**
  Conduct scenario and sensitivity analyses to evaluate the impact of uncertainty in key assumptions and future market conditions. Analyses may include variations in adoption rates, re-adoption behavior, market awareness, technology advancement, program delivery approaches, and policy pathways. Scenarios will be developed in collaboration with CPUC staff and stakeholders to address priority planning and policy questions.

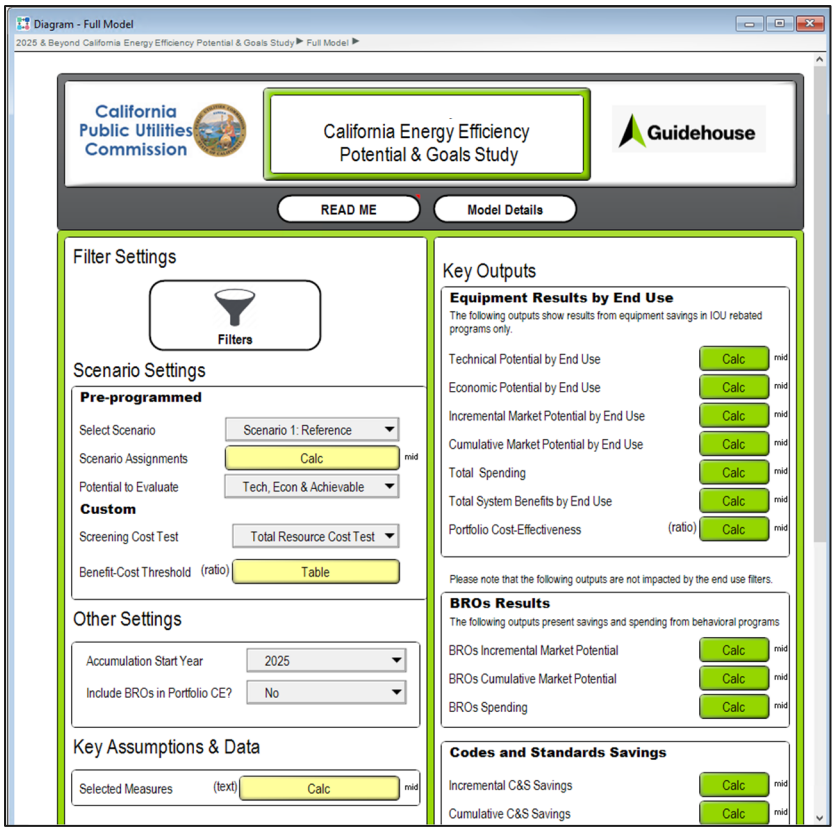
- **Step 7: PG Reporting**
  Prepare the 2027 PG Study report and associated public data products, including documentation of methods, assumptions, forecasts, and scenario results. Draft findings will undergo quality assurance (QA) and quality control (QC) review with a focus on identifying and communicating the root causes of any unexpected results, outliers, or anomalies, in addition to stakeholder review and CPUC staff review prior to finalization. Activities will also include delivery of model files, technical documentation, and knowledge-transfer sessions to support future use and interpretation of study outputs.
- **Step 8: Post-Goals Support**
  Support the application of 2027 PG Study results to CPUC goal-setting and other related planning activities. This phase includes development of forecast scenarios and analytical products needed to inform statewide planning efforts, including analyses supporting CEC forecasting activities including but not limited to AAEE, AAFS, and SB350.

1.2 PG Study Adoption Simulation Model

The CPUC's current PG Study model, last used in the 2025 PG Study, was developed by Guidehouse. CPUC has invested significantly in this model over the past 15+ years with input from stakeholders. Guidehouse will continue to leverage this model for the 2027 PG Study and is prepared to modify and update the model to meet emerging requirements.

The PG Study model is built using Analytica, a software platform developed by Guidehouse's Group E subcontracting partner, Lumina. Analytica is a software platform for data analytics, simulation, forecasting, and decision support, widely used for applications in energy, environment, and economics. **Figure 3** shows a screenshot of the model's graphical user interface. This interface contains several features that allow users to easily change inputs and scenario settings, run the model, and view outputs. See **Section 2.7 Results and Reporting** for additional details on the planned delivery of the 2027 PG Study model to CPUC and the public.

Figure 3. Graphical User Interface of the PG Study Model



Source: Guidehouse

Next, Section 2 of the Workplan provides detailed descriptions of the tasks to be completed as part of the 2027 PG Study.

2. Detailed Approach

This section details the planned 2027 PG Study approach for determining market achievable potential from EE and FS. This approach will be used to inform the CPUC goal-setting process for IOU-funded programs for the 2028-2039 period.

2.1 Overview of Tasks

Figure 4 shows the main tasks that will be carried out to execute the 2027 PG Study. Each task is detailed in its own subsection within **Section 2**.

Figure 4. Overview of PG Study Tasks

Technical Potential	• **Market Characterization:** Obtain data to inform total market size, saturation, energy sales, retail rates, avoided costs, etc. using secondary sources • **Measure Characterization:** Leveraging the 2025 PG study, develop and vet a list of measures, including BROs and fuel substitution measures; Characterize measures prioritizing CA-specific data sources into database for model use • **Technical Potential Calculation:** Use the existing PG model framework to calculate instantaneous and annualized technical potential accounting for competing measures
Economic Potential	• Select appropriate cost effectiveness measure screening tests • Use the existing PG model framework to calculate instantaneous and annualized economic potential
Achievable Potential	• Use the existing PG model framework to calculate and identify all potentially cost-effective and achievable electric and gas EE (and FS) impacts • Calibrate reference case using a combination of historic program activity and research on customer adoption factors • Develop scenarios to model/forecast impacts of policy levers • Provide support integrating results into IRP as appropriate • Disaggregate savings as needed: Locational impacts, RENs and CCAs, Disadvantaged communities.
Codes and Standards Potential	• Use the existing PG model framework which replicates the ISSM methods to forecast C&S savings • Interviews IOU program managers and CEC staff and review DOE public documents to identify the codes and standards for inclusion in the study • For the selected C&S, we will collect data and import to the ISSM framework and forecast savings
Income-Qualified Potential	• Characterize the IQ sector based on available secondary data • Identify applicable measures from Energy Savings Assistance program data and measures suggested by the CPUC, IOUs, and other stakeholders • Use the 2025 PG model framework as a starting point to calculate technical and market potential, while updating the adoption forecasting methodology using the results of the 2025 IQ Market Study.
Public Results and Models	• Develop draft deliverables and vet with stakeholder and CPUC staff • Revise deliverables based on feedback • Provide models and web-based Results Viewer in addition to the written report

Source: Guidehouse

2.2 Technical Potential

Technical potential is defined as the amount of energy savings that would be possible if the highest level of efficiency for all technically applicable opportunities to improve EE and FS were taken. To calculate technical potential, Guidehouse conducts three main analysis steps, which are further detailed in the following subsections:

- **Market Characterization**. This step defines the market size by segment and determines scaling parameters such as building stock and energy sales.
- **Measure Characterization**. This step identifies and defines specific EE and FS measures.
- **Technical Potential Calculation**. This step scales characterized measure parameters to the full market by segment and territory using the market characterization; the result is technical potential.

Regardless of the modeling approach (bottom-up or top-down) used for a particular sector or program category, these three steps are utilized to calculate technical potential. The specifics of each step, discussed below, may differ based on the modeling approach.

Market Characterization

Characterizing the market conditions (also referred to as the global inputs) refers to information about the size and characteristics of the population that forms the basis for the potential forecast. This task is primarily compiling existing data from California-specific data sources.

This task typically takes place prior to or concurrent with measure characterization. As part of this task, Guidehouse will research and identify the building types, end uses, and portion of energy sales to be included (i.e., are any customer groups/types to be excluded) in the study. Guidehouse will also collect and pre-process non-measure-specific data required for these segments.

Define Segments

Guidehouse will define segments and end uses within the residential, commercial, agricultural, industrial, and mining sectors to forecast savings potential for this study. We will exclude the streetlighting sector from the 2027 PG Study because of the high existing market saturation of LED lighting, which leaves little remaining potential. Potential for the income-qualified sector will also be considered separately, as discussed in section **2.6 Income-Qualified Potential**.

For the 2027 PG Study, Guidehouse will include the segments and end uses shown in **Table 1** and **Table 2,** which is consistent with the 2025 PG Study.

Table 1. 2027 PG Study Segments

Sector	Building Type	
Residential	Single Family	Multifamily
Income Qualified	Single Family	Multifamily
Commercial	College Grocery Health Lodging Office (Large) Office (Small)	Refrigerated Warehouse Restaurant Retail School Warehouse Other
Agricultural	Dairies, Fishing, Hunting Water Pumping	Irrigated Agriculture, Vineyards, Forestry, and Greenhouses
Industrial	Chemicals Electronics Fabricated Metals Food Industrial Machinery Lumber & Furniture Paper Petroleum	Plastics Primary Metals Printing and Publishing Stone-Glass-Clay Textiles Transportation Equipment All Other Industrial
Mining	Oil & Gas Extraction (Stripper Well)	Oil & Gas Extraction (Injection Well)
	Oil & Gas Extraction (Regular Well)	Oil & Gas Extraction (Steam Enhancement)

Source: Guidehouse

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Table 2. 2027 PG Study End Uses

End Use	Residential (Res)	Income Qualified (IQ)	Commercial (Com)	Agricultural (Ag)	Industrial (Ind)	Mining (Min)
Appliance and Plug Loads (AppPlug)	●	●	●			
Building Envelope (BldgEnv)	●	●	●			
Heating, Ventilation, and Air Conditioning (HVAC)	●	●	●	●	●	
Lighting	●	●	●	●	●	
Water Heating (WaterHeat)	●	●	●			
Whole Building (WholeBlg)	●	●	●			
Behavioral, Retro-Commissioning, and Operations (BROs)	●		●	●	●	
Commercial Refrigeration (ComRefrig)			●			
Data Center			●			
Food Service (FoodServ)			●			
Machine Drive (MachDr)				●	●	
Process Heat (ProcHeat)				●	●	
Process Refrigeration (ProcRefrig)				●	●	
Oil and Gas Extraction (OilGasExtract)						●

Source: Guidehouse

IDENTIFY, COLLECT AND PRE-PROCESS NON-MEASURE-SPECIFIC DATA

This step involves developing macro-level model inputs that apply to market segments or sectors rather than specific measures. **Table 3** details the global inputs that Guidehouse will develop for the 2027 PG Study. Using the 2025 PG Study global inputs as a starting point, Guidehouse will update these inputs using the most recent version of sources previously used and new sources as recommended by CPUC and other relevant stakeholders.

Table 3. PG Study Global Inputs

Global Input	Description	Anticipated Sources
Retail Rates *($/kWh, $/therm)*	Forecast of energy costs to customers	1. CEC 2025 IEPR and California Energy Demand (CED) forecast 2. CPUC Cost Effectiveness Tool (CET)
Sales **(Consumption) Forecasts** *(GWh, MW, and MM Therms)*	Forecast of energy sold to customers	
Building Stocks *(households, floor space, consumption)*	Forecast of building and sales growth	
Avoided Costs	Forecast of avoided energy and capacity costs to utility	CPUC CET
Historic Program Accomplishments	Historic program savings and spending, used as a critical input for calibration of potential	CPUC CEDARS Database CPUC Low Income Oversight Board Monthly and Annual Reports IOU Business Plans
Non-Incentive Program Costs		
Inflation Rate	Standard 2% assumption	CPUC IRP Model
Discount Rate	Utility after-tax Weighted Average Cost of Capital (WACC)	CPUC CET

Source: Guidehouse

MEASURE CHARACTERIZATION

The 2027 PG Study will maintain both bottom-up and top-down measure characterization and modeling approaches used in the 2025 PG Study as appropriate for different measure categories:

- **Bottom-up characterization:** Residential, income-qualified, and commercial deemed measures (primarily derived from DEER/eTRM measure packages)
- **Top-down characterization:** All industrial and agricultural sector potential, plus commercial custom measures and BROs

IDENTIFY MEASURES AND DEVELOP LIST

The first step in the measure characterization process is to select a list of representative technologies to include in the potential study. The 2027 PG Study will leverage the vetted measure characterization database developed for the 2025 PG Study as a starting point. The previous measure list included measures that offer potential for EE, FS (building electrification), and BROs measures. Guidehouse will review the eTRM and consult with CPUC and key stakeholders including the Group A EM&V team responsible for DEER and eTRM measure packages to determine whether any measures should be added to or removed from the measure list.

Upon completion of this in-depth measure review and identification process, Guidehouse will develop a list of recommended measures to present to CPUC and other stakeholders for review and comment. This recommendation will include a measure prioritization framework (described in the next section) that considers historic and forecast measure impacts (on a TSB basis) and defines the relative priority of pending measure package updates to be incorporated into the 2027 PG Study. The objective of the prioritization and stakeholder review process should be to create a concentrated final measure list inclusive of only technologies that are believed to have a significant impact on potential over the study period. Part of this review may consolidate or remove measures that have little to no potential or application, to streamline the process and reduce unnecessary complexity in the study.

Upon both internal and external review and finalization of the measure list, Guidehouse will begin the measure characterization process. Guidehouse will source consumption, cost, and other measure-specific data from California-specific data sources including but not limited to DEER (as contained in the California eTRM), IOU workpapers, IOU program data, EM&V results, emerging technologies programs, and industrial energy assessments. Where there is insufficient California data for any measures, Guidehouse will consult other TRMs, as well as its extensive database of potential studies performed in other jurisdictions across North America. **Table 4** shows the data source hierarchy for measure characterization, which is based on what was used in prior studies. Priority of sources may shift based on recency of source and CPUC staff direction. The Guidehouse Group A EM&V team will support the identification and prioritization of measure package updates.

Table 4. Hierarchy of Sources for Measure Characterization Data

Priority	Source Name	Description	Author	Year
1	California eTRM	According to the eTRM website, "the eTRM is a statewide repository of California's deemed measures, including supporting values and documentation." It includes DEER and non-DEER measures and aligns with the latest approved workpapers.	California Technical Forum	Continuously updated
2	IOU workpapers (with CPUC disposition) or other California studies	This category includes IOU workpapers for additional measure information not contained in the eTRM or for measures that have not yet been added to the eTRM. This category also refers to California-specific studies or evaluations such as California Market Transformation Administrator (CalMTA) reports or CEC Title 24 Impact Evaluations.	California IOUs or other Entities	Various
3	IOU program data	This category includes the CEDARS database for the California IOUs in cases where energy use information is not available from the previously listed sources.	CPUC, IOUs	Continuously updated

Priority	Source Name	Description	Author	Year
4	Non-California source examples	In cases where California-specific sources are not available for energy use information, non-California sources may be used.	Various	Various
	Guidehouse potential study database	This category includes Guidehouse's archive of characterized measure savings from potential studies and projects with other jurisdictions.	Guidehouse	Various

Source: Guidehouse

CHARACTERIZE TECHNOLOGIES (BOTTOM-UP APPROACH)

For residential and commercial rebate measures that will be modeled using a bottom-up approach, Guidehouse expects to source most measure data from California-specific sources, as identified in **Table 4,** and coordinate support from Guidehouse teams who maintain these sources under the Group A EM&V contract. However, we will source data elsewhere where California data is unavailable for specific measures.

From Guidehouse's experience, most potential is driven through a limited number of technologies or measures currently available in the market or expected to be in the market at some point within the planning horizon. Accordingly, Guidehouse applies a prioritized, bottom-up approach to measure characterization, allocating analytic effort in proportion to each measure's contribution to overall savings potential, while applying more limited resources to measures with marginal impact. Level of impact is determined by examining the measure-level results from the 2025 PG Study, considering PA claims in CEDARS, and through stakeholder input. Measures may also be classified as high impact if they fall under a particular area of policy focus such as FS. As part of the prioritization process, Guidehouse will coordinate with the Group A EM&V ex ante measure package team to understand the timing and nature of eTRM/DEER updates planned for PY2028.

Guidehouse will vet the classification of measures as high priority, medium priority, or low priority with CPUC. We will take the following analysis approach according to the measure priority:

- **High priority** measures will receive the greatest attention to incorporate as many DEER 2028/PY2028 measure package updates as feasible, which may include working with the Group A EM&V team to re-prioritize any pending measure updates as feasible within the measure characterization timeline.
- For **medium priority** measures, Guidehouse will at minimum update the characterization to use the latest approved measure package version that is available at the time of characterization. The expectation for medium priority measures is to use a newer measure package version than was used for the previous study if one exists; however, it is not generally expected that the PY2028 versions can be incorporated unless already reviewed and approved.
- For **low priority** measures, Guidehouse will review the existing description and data sources for the measure to verify continued applicability. If there are no significant changes to the associated measure package since the previous study, Guidehouse will generally use the measure characterization data from the previous study to streamline the analysis.

Guidehouse also notes that while incorporation of PY2028 measure package versions is generally not expected for medium- and low-priority measures, any cross-cutting DEER 2028 changes to shared parameters such as EUL or NTGR updates may still be incorporated for these measures. This will be another focus of the team's coordination with the Group A EM&V ex ante measure package team.

Next, Guidehouse will produce measure characterization data in a form that can be integrated into the PG model for the fields identified in **Table 5**.

Table 5. Key Fields for Measure Characterization

Items	Brief Description
Technology description	Sector End use Fuel type Climate zone Segment or building type Replacement type
Energy use	Energy use (electric and gas) Coincident peak demand Interactive effects
Technology costs	Equipment cost Installation cost Panel upgrade costs (for applicable FS technology groups)
Market information	Applicability by segment or building type Density (prevalence within building stock) associated with the technology group Saturation for individual technologies
Other items	Technology lifetime (Effective Useful Life (EUL) and Remaining Useful Life (RUL)) Net-to-gross (NTG) ratio Lifecycle refrigerant impacts EE-DR (Demand Response) co-benefits

Source: Guidehouse

For Guidehouse's technology-based bottom-up approach, these measure characterization fields are defined for both baseline and efficient technology levels, and savings are calculated as the difference in consumption between baseline and efficient levels.

The Guidehouse bottom-up measure characterization framework is designed to remain flexible and allow for the modeling of changing measure baselines, which is particularly relevant for FS measures where C&S policy on gas equipment is evolving. Policy that bans the sale of natural gas appliances in the future or the prohibition of incentives for upgrading gas equipment will directly affect how FS upgrades should be modeled in the PG Study.

The Guidehouse model has the ability to consider baseline changes resulting from known state or federal policy such as current or anticipated C&S or effects from policy decisions related to building electrification, gas incentive phaseouts, viable electric alternative (VEA) policy, or California Air Resources Board (CARB) zero-emission appliance standards (ZEAS), using alternate

measure baseline definitions or multiple scenarios dynamically over the forecast period. This flexibility allows CPUC to explore different possible futures where there is uncertainty about the effect of policies surrounding FS measures. The 2025 PG Study Base Scenario included gas-to-electric baseline changes in 2030 to account for the then-expected future impacts of ZEAS on FS technology group baselines. Guidehouse recognizes that as of August 2026, there is considerable uncertainty in the rollout and timing of these policies. Therefore, the planned approach for the 2027 PG Study is to model FS measures without any future baseline changes at least in the Base Scenario, while retaining the ability to consider FS baseline changes resulting from ZEAS or VEA impacts in additional scenarios.

Our approach will also provide a clear accounting of the dual-fuel impacts of FS measures (reducing natural gas use while increasing electric consumption). In addition to equipment and labor costs, FS characterization will include infrastructure enabling costs where relevant. Electrical panel upgrades and related infrastructure costs will be represented as separate measure variants with market applicability (density) adjustments made to reflect the frequency at which infrastructure upgrades are expected to be required for FS upgrades. This approach allows the model to distinguish between projects that require upgrades and those that do not, which is critical for realistically estimating market achievable potential due to impacts on measure cost and cost-effectiveness. The FS measure characterization process will also incorporate refrigerant avoided cost measure inputs. These have been included in the PG model since 2023 and are relevant for FS measures that involve introduction of equipment (i.e., heat pumps) that use refrigerants.

Industrial, Agricultural, and Commercial Custom (Top-Down Approach)

The bottom-up measure characterization approach previously described is well-suited for prescriptive technologies with standardized applications, deemed savings, and clearly defined unit costs. However, a substantial share of EE potential—particularly in the industrial, agricultural, and large commercial sectors—is realized through customized projects whose costs, savings, and implementation pathways are inherently site-specific. These opportunities typically involve process improvements, system-level optimizations, operational changes, or integrated solutions that cannot be reliably represented using bottom-up, technology-level adoption models.

Guidehouse has observed that claimed and verified impacts from custom and SEM within the industrial and agricultural sectors have grown in recent years (2025 savings are nearly 15% higher than 2024 savings), and a significant proportion of total EE program TSB is generated from these two measure types.

Therefore, for the 2025 PG Study, Guidehouse introduced a top-down, market-informed approach to characterize customized technologies for the industrial, agricultural, and commercial sectors. For the 2027 PG Study, we will continue and build on this top-down approach to best reflect both the evolving composition of IOU portfolios and the empirical performance of custom programs in recent years. This framework anchors potential estimates directly in observed program outcomes, market participation trends, and sector-level energy consumption rather than attempting to forecast hundreds of heterogeneous project types with a bottom-up measure approach.

With a top-down approach, savings for the industrial and agricultural sectors and commercial custom technologies and projects will be estimated using sector- and program-category-level (custom, Normalized Metered Energy Consumption [NMEC], and SEM) representations that capture the full range of custom activities. Custom refers to both capital and non-capital projects

that may occur within custom, SEM, NMEC, retro-commissioning, and process improvements programs. Guidehouse will calculate savings estimates as a percentage of total sector or subsector energy consumption, derived from recent IOU program data and calibrated to historical net achievements.

Market achievable potential[1] for customized technologies is calculated using a combination of:

- **Sector-level energy consumption**, a global input drawn from the CEC forecast and aligned with IOU service territories
- **Savings rate multipliers**, calculated from recent program years to represent the fraction of sector consumption historically reduced through custom program types, including SEM, NMEC, and custom
- **Applicability and participation assumptions**, reflecting where custom programs are feasible within each sector (these assumptions will be reviewed with CPUC staff to ensure that recent updates to the custom program guidance are incorporated)
- **Penetration trendlines**, informed by observed growth or decline in customized project activity and adjusted through stakeholder input and market study findings[2]

This top-down methodology explicitly includes steps to avoid double counting with prescriptive measures by ensuring that calibration is based only on non-prescriptive achievements. It also allows the model to naturally incorporate the impacts of emerging and innovative solutions once they begin to materialize through custom program delivery, without requiring speculative assumptions about technology readiness or diffusion pathways. As a result, emerging technologies are reflected in the forecast only to the extent that they are demonstrated in program data and market activity.

BROs Measures (Top-Down Approach)

In the 2027 PG Study, Guidehouse plans to consider the following high-impact BROs measures:

- Home Energy Reports (HERs)
- Universal Audit Tool (UAT)
- Real-Time Feedback (RTF) – Web-Based or In-Home Display
- Business Energy Reports (BERs)
- Building Benchmarking
- Building Operator Certification (BOC)

[1] With a top-down approach directly calibrated to historical achievements, technical and economic potential are less relevant compared with bottom-up approaches where technical potential scaling and cost-effectiveness screens are done at a detailed measure level. The methodology described here directly results in the calculation of calibrated market achievable potential.

[2] The measure characterization will check if the stakeholder input and actual program trends are aligned. If there is a misalignment, the study team may investigate to determine if there is a need for additional stakeholder input.

Guidehouse will work with CPUC and stakeholders to identify whether any modifications to this BROs measure list should be considered based on existing programs, planned programs, and reasonable and achievable interventions that could be introduced in the future.

For each BROs program, Guidehouse will define a set of participation forecast scenarios based on data such as existing levels of program participation, either for the California IOUs for existing programs or the program from which data was drawn and applied to California IOU territories. Participation levels are a function of either customer adoption for opt-in programs or the number of customers that the utility wants to engage for opt-out programs. Engagement strategies for opt-out programs typically target high-value customers first as these customers tend to result in the highest savings. Engagement often happens in waves and utilities may design the program as a means of experimenting with the effectiveness of different program elements. Key assumptions include:

- A typical participation goal for the first year of implementation (or initial program saturation for existing programs)
- The percentage of residential, commercial, and industrial customers enrolled per year following the launch of the program
- The growth rate in participation over 5, 10, 15, and 20 years

In addition to a participation forecast, Guidehouse will define unit energy savings factors (typically expressed as a percentage of baseline whole building energy consumption) and unit energy cost factors to characterize each BROs program. These factors will be based on actual California IOU impact evaluations for existing programs or from other sources for which data is available and applied to California IOU territories.

Technical Potential Calculation

Technical potential is defined as the amount of energy savings (or TSB) that would be possible if the highest level of efficiency for all technically applicable opportunities to improve EE were taken, including retrofit measures, replace-on-burnout (ROB) measures, and new construction measures. Guidehouse's PG model considers the following in forecasting technical potential:

- Technical potential assumes all eligible customers within a technology group adopt the highest level of efficiency available within the technology group, regardless of cost effectiveness.
- Technical potential represents the savings from converting all equipment that is at or below code to the highest level of efficiency within a technology group. Technical potential captures cross-measure interactive effects.
- Total technical potential is a sum of all individual technical potential within each technology group excluding whole building packages and BROs. Whole building packages are excluded from the technical potential as including them would be duplicative with potential from individual end use-specific measures. Technical potential for BROs or other top-down savings can be derived by setting a participation rate or penetration rate equal to 100% of the eligible population.

Technical potential can be reported as both instantaneous and annualized potential, distinguished as follows:

- **Instantaneous:** Potential that is unconstrained by stock turnover in existing buildings in any given year.[3] This potential is the theoretical maximum savings possible from converting all equipment that is at or below code to the highest level of efficiency within a technology group.
- **Annualized:** Potential that is constrained by stock turnover in existing buildings in any given year. This potential is the theoretical maximum savings possible from converting all equipment that is at or below code to the highest level of efficiency within a technology group upon burnout of the baseline technology.

The calculation of technical potential differs depending on the assumed measure replacement type, since technical potential is calculated on a per-measure basis and includes estimates of savings per unit, measure density (e.g., quantity of measures per home), and total building stock in each service territory. The replacement types that will be considered are described below.

EXISTING BUILDINGS

Guidehouse will calculate technical potential for the following replacement types in existing buildings:

- **Normal replacement (NR) (i.e., replace-on-burnout [ROB])**: New equipment needs to be installed to replace equipment that has reached the end of its useful life, has failed, or is no longer functional. Upon failure, normal replacement equipment is generally not repaired by the customer and is instead replaced with a new piece of equipment. Appliance standards are applicable to some types of normal replacement equipment and apply to all new purchases.
- **Retrofit (RET)** – add-on equipment: New equipment installed onto an existing system, either as an additional, integrated component or to replace a component of the existing system. In either case, the primary purpose of the add-on measure is to improve the overall efficiency of the system. These measures cannot operate on their own as standalone equipment and are not required to operate the existing equipment or building. Codes or standards may be applicable to some types of add-on measures by setting minimum efficiency levels of newly installed equipment, but the codes or standards do not require the measure to be installed.

The following equation shows the formula for calculating technical potential in existing buildings for measures utilizing a bottom-up characterization approach:

$$\textit{Technical Potential}_{\textit{EXISTING BUILDINGS}} = \textit{Existing Building Stock}_{\textit{YEAR}}\ \textit{(e.g., buildings}^{4}\textit{)} \times \textit{Measure Density (e.g., widgets/building)} \times \textit{Savings}_{\textit{YEAR}}\ \textit{(e.g., m}^{3}\textit{/widget)} \times \textit{Technical Suitability (dimensionless)}$$

[3] This potential includes buildings newly constructed in the same year.
[4] Units for building stock and measure densities may vary by measure and customer segment (e.g., 1,000 square meters [or feet] of building space, number of residential homes, customer-segment consumption/sales).

New Construction Buildings

In a newly constructed building, equipment that is installed is always relative to code. New building stock is added to keep up with forecast growth in total building stock and to replace existing stock that is demolished each year. Demolished (sometimes called replacement) stock is calculated as a percentage of existing stock in each year. The following equation shows the formula for calculating technical potential in new buildings for measures utilizing a bottom-up characterization approach:

$$\textit{Technical Potential}_{\textit{NEW BUILDINGS}} = \textit{New Building Stock}_{\textit{YEAR}}\ \textit{(e.g., buildings}^{4}\textit{)} \times \textit{Measure Density (e.g., widgets/building)} \times \textit{Savings}_{\textit{YEAR}}\ \textit{(e.g., m}^{3}\textit{/widget)} \times \textit{Technical Suitability (dimensionless)}$$

Technology Groups

Guidehouse's bottom-up modeling approach recognizes that some efficient technologies will compete against each other in the calculation of potential. The study defines competition as efficient measures competing for the same installation (e.g., SEER 18 AC versus SEER 22 AC) as opposed to competing for the same savings (e.g., window A/C versus split-system A/C) or for the same budget (e.g., lighting versus water heating). For instance, condensing water heaters and tankless water heaters would belong to the same competition group because a consumer would install one or the other. General characteristics of competing technologies used to define the competition groups proposed for this study include:

- Competing efficient technologies share the same baseline technology characteristics, including baseline technology densities, costs, and consumption.
- The total (baseline plus efficient) maximum densities of competing efficient technologies are the same.
- Installation of competing technologies is mutually exclusive (i.e., installing one precludes installation of the others for that application).
- Competing technologies share the same replacement type.

Table 6 shows an example of a competition group that sees different insulation efficiency levels competing for the same installation.

Table 6. Example of Technologies within a Technology Group

Competition Group	Technology	Description
Floor Insulation Retrofit	R0 Floor Insulation	Average Below Code Efficiency Level
	R19 Floor Insulation	Code Efficiency Level
	R30 Floor Insulation	High Efficiency Level

Source: Guidehouse

To address the overlapping nature of measures within a competition group, Guidehouse's analysis will only select one measure per competition group to include in the summation of technical potential across measures (i.e., at the end-use, customer segment, sector, service territory, or total level). The measure with the largest savings potential in each competition group is used for calculating total technical potential of the competition group. This approach eliminates double

counting from the reported technical potential, though the technical potential for each individual measure is still calculated and reported.

A defining feature of the Guidehouse approach is that FS measures compete directly with efficient gas measures within the same group. For example, a heat pump space-heating option competes against high-efficiency gas furnaces rather than being treated as an isolated electrification opportunity. This competition reflects observed customer decision-making by modeling electrification as a substitution choice evaluated alongside gas efficiency options, rather than as an independent overlay applied in isolation.

Table 7 shows an example where gas EE measures compete with FS measures, including a measure with DR benefits. In this instance, the customer would choose to install either an efficient gas water heater or an efficient electric water heater instead of a baseline gas water heater.

Table 7. Example of Technology Group Including FS

Technology Group	Technology	Description
Small Gas Water Heaters (WH)	Baseline Gas Storage WH	Code Efficiency Level
	Condensing Gas Storage WH	Efficient Gas EE Level
	Tankless Gas WH	Efficient Gas EE Level
	Heat Pump Water Heater (HPWH)	Efficient Electric FS Level

Source: Guidehouse

2.3 Economic Potential

Using the results of the technical potential analysis, economic potential will be calculated as the total EE potential available when limited to only cost-effective measures. All components of economic potential are a subset of technical potential. The following additional considerations for calculating technical potential will be factored into the calculation of economic potential for sectors using bottom-up forecasting methods:

- Economic potential assumes all eligible customers within a technology group adopt the highest cost-effective level of efficiency available within the technology group. The most efficient technology within the group may not be cost effective.
- The cost-effectiveness tests in the proposed PG model can factor in additional benefits such as non-energy benefits, benefits from DR-enabled measures, or the negative benefits of increased electric load from FS measures.
- Various cost-effectiveness screens can be applied; thus, economic potential can vary by scenario. The model can assess cost effectiveness based on up to five Standard Practice Manual perspectives, which have historically included the following:
    - Total Resource Cost (TRC) Test
    - Program Administrator Cost (PAC) Test
    - Ratepayer Impact Measure (RIM) Test
    - Participant Cost Test (PCT)
    - Societal Cost Test (SCT)

- The model is also capable of defining custom cost-effectiveness tests based on the needs of CPUC staff. Various cost-effectiveness thresholds can also be set. For example, if the model is set to require individual measures to have a test result of 1.0, those with a result of 0.99 are excluded from the economic potential. This threshold can be set to any value, though typically it is limited to a range of 0.85 to 1.25.

  Consistent with previous studies, Guidehouse expects economic potential in the 2027 PG Study to be defined using a 1.0 TRC threshold. Alternative thresholds or cost tests may be considered in different achievable potential scenarios as determined by CPUC input to the scenario development process.

- Whole building packages are excluded from the economic potential as including them would be duplicative with potential from individually characterized measures that are specific to individual end uses.

Our model will calculate economic potential leveraging CPUC's avoided cost data and the CET equations. Many analysis steps and simplifying assumptions will be conducted to compress the full avoided cost dataset into a manageable form for use in the PG model. This compression includes averaging avoided cost load shapes across building types and selecting representative load shapes to assign to each end use.

Total System Benefit Metric

The 2027 PG Study will represent the results of technical, economic, and achievable potential in terms of TSB. TSB represents the present value of the total lifetime net benefit that a measure provides to the electric and natural gas systems. In the context of the 2027 PG Study, TSB is a metric that quantifies the relative value of each measure compared, independent of its measure cost, program cost, or fuel type. While TSB is not a measure of cost-effectiveness itself, it is calculated (in units of $) from key components of the TRC and PAC cost-effectiveness tests.

$$Total\ System\ Benefit = Net\ Avoided\ Cost\ Benefits\ (Energy\ and\ Capacity) - Increased\ Supply\ Cost$$

TSB in the technical potential context will represent the aggregate combined value of the individual measures within each competition group with the highest TSB. TSB in the economic potential context will represent the total TSB of individual cost-effective measures within each competition group that have the largest modeled TSB. Consistent with the prior two PG studies, the 2027 PG Study will present TSB ($) as the primary achievable potential output to align with its use as the primary metric used by CPUC staff to establish IOU goals and track IOU program achievements.

2.4 Achievable Potential

This section demonstrates Guidehouse's approach to calculating market achievable potential, which is fundamentally more complex than the calculation of technical or economic potential. This section covers the following:

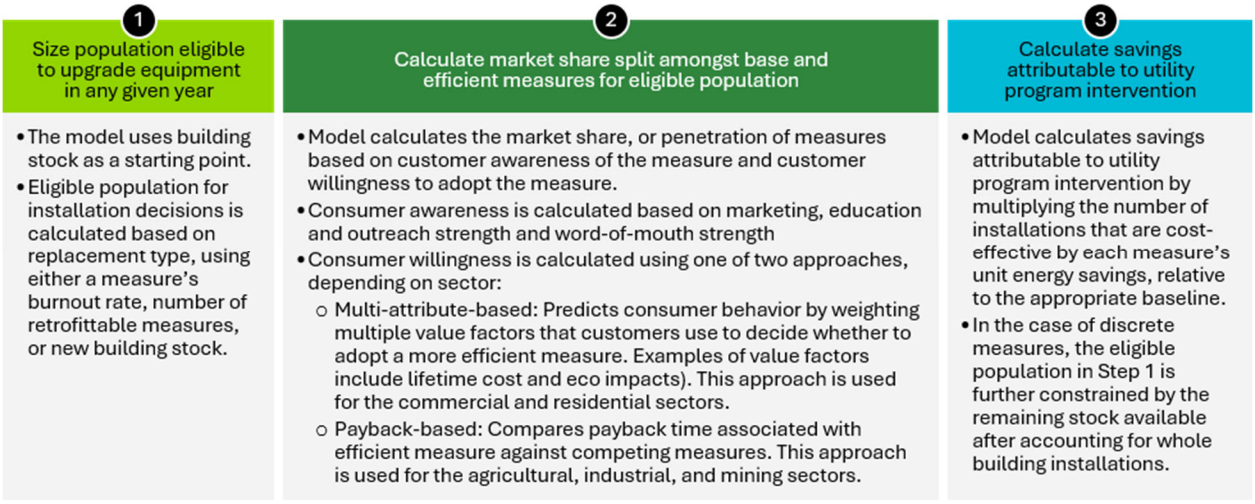
- Market Potential Modeling Approach
- Calibration to Historic Program Achievements

- NTG Ratios and Free Ridership
- Cumulative Savings
- Scenario Analysis

Market Potential Modeling Approach

Guidehouse will develop granular market potential results at a level of granularity matching the market and measure characterization approaches described previously. For bottom-up modeling approaches, Guidehouse's PG model employs a stock-turnover-based Bass diffusion algorithm to simulate market adoption and program intervention. **Figure 5** provides a high-level summary of the algorithm for simulating bottom-up market adoption in the Guidehouse PG Study model.

Figure 5. Bottom-Up Market Adoption Modeling Framework



Source: Guidehouse

For top-down approaches used for custom/sector modeling and BROs, Guidehouse will apply the calculation at the market segment level using the following equation.

$$Incremental\ Market\ Achievable\ Potential = Population \times Applicability\ Factor \times Unit\ Energy\ Savings \times Savings\ Rate\ Multiplier \times Annual\ Sector\ Consumpion \times Penetration\ Rate$$

Where:

- **Population** is a global input represented as the total energy consumption by subsector.
- **Applicability Factor** represents eligibility and other program-specific variables applied at the subsector level.
- **Unit Energy Savings** represent the percentage of savings expected from customers adopting technologies at the subsector level.
- **Savings Rate Multiplier** represents the percentage of net savings expected from customers adopting technologies at the total sector consumption level.

- **Annual Sector Consumption** represents the total energy consumption by total sector for the industrial and agriculture sectors.
- **Penetration Rate** represents annual new participation and varies over time; it can also vary by scenario for emerging technologies. Penetration rate is applied at the market sector level.

Calibration to Historic Program Achievements

Calibration is a critical component of estimating market achievable potential, ensuring that modeled adoption and savings trajectories reflect observed program performance, real-world market conditions, and customer behavior, rather than purely theoretical uptake. By anchoring forward-looking projections to empirical evidence, calibration improves the credibility of market achievable potential estimates and generates modeled outcomes that are both policy-relevant and operationally realistic across utilities, sectors, and end uses.

Guidehouse implements calibration through a structured back-casting approach that leverages multiple years of historical program performance data. Historically, model calibration has been performed using energy savings and program spending to tune key parameters so that simulated adoption and impacts align with realized program outcomes at the utility, sector, and end-use levels, while preserving the forward-looking nature of the forecasting framework. Beginning with the 2025 study cycle, calibration is performed to TSB, consistent with the adoption of TSB as the primary metric under Decisions D.21-05-031 and D.21-09-037.

Calibration adjustments are implemented through a limited and transparent set of levers. These levers can include relative technology attractiveness within competing measure groups, stock turnover rates to better reflect real-world equipment replacement dynamics beyond nominal effective useful lives, and selective adoption modifiers where needed to improve alignment with historical outcomes.

Calibration relies primarily on CEDARS program data, supplemented by IOU portfolio tracking information and CPUC-approved reporting on TSB, savings, expenditures, and related metrics. Guidehouse will work with the CPUC staff to review and validate the historical achievements to be used for calibration. Guidehouse's approach maintains continuity with prior CPUC-accepted calibration methods while remaining flexible to incorporate updated data, evolving program designs, and any new CPUC direction related to calibration targets, equity considerations, or segmentation.

Net-to-Gross Ratios and Free Ridership

Guidehouse's PG model is set up to calculate both gross and net savings attributable to IOU programs, with net savings serving as the basis for calculating TSB. Guidehouse will source NTG ratios from appropriate, updated sources such as DEER support tables contained in the eTRM. Guidehouse will discuss the appropriate sources with experts on the Group A and Group D teams, CPUC, and other relevant stakeholders.

Cumulative Savings

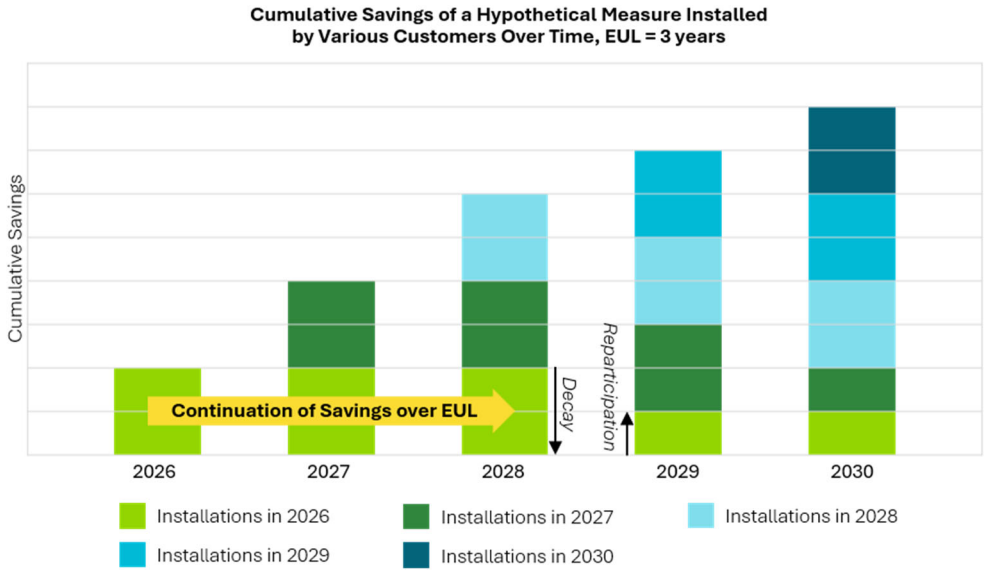
Guidehouse's PG model calculates both incremental and cumulative savings. Currently, the model is set up to calculate cumulative savings as the total savings from program efforts or measures installed since a start year that are still active in each forecast year. Active savings are not a simple

sum of previous year incremental savings but instead factor in the decay of savings as measures reach the end of their useful lives and the timing effects of C&S that become effective after measure installation. The start year for calculating cumulative savings is a flexible input in the model and will be defined for the 2027 PG Study based on CPUC direction.

Unlike annual savings, cumulative savings include savings from re-participants. Incremental savings only consider first-time adopters. Sustained savings from re-adoptions need to be counted in cumulative savings for the demand forecast. For the 2025 PG Study, the model assumed that re-participants re-adopt measures at the same rate as new participants. Going forward, Guidehouse's PG model is flexible enough to modify the definition and methodology for calculating decay and cumulative savings.

Cumulative savings have primarily been used by CEC to update their demand forecast (through the AAEE and AAFS modifiers) and for informing SB350 targets. For the purposes of AAEE and AAFS, the model includes savings from re-participants in the cumulative savings calculation. The calculation of cumulative savings is illustrated in **Figure 6**.

Figure 6. Cumulative Savings Illustration



Source: Guidehouse

Scenario Analysis

The 2027 PG Study will develop combinations of economic and market achievable assessments to produce up to four scenarios of potential for goal-setting purposes. In previous studies, Guidehouse identified the variables presented in **Table 8** as candidate parameters to vary across scenarios.

Guidehouse

Table 8. Scenario Setting Variables (Illustrative)

Lever	Description	Potential Impact Applicability	
		Economic	Market
Cost-effectiveness test	Different cost effectiveness screening tests or thresholds yield different amounts of economic potential and cause the market achievable potential model to incentivize different sets of measures. The cost effectiveness screening test threshold only applies to rebate programs.	✓	✓
Cost-effectiveness measure screening threshold		✓	✓
Incentive levels	Varying incentive levels (at a percentage of incremental measure cost) will change the cost effectiveness of measures and their value proposition to customers.	✓	✓
Marketing, education, and outreach	Varying marketing and outreach levels impact the rate at which technologies are adopted by customers.		✓
BROs program assumptions	Enrollment in BROs programs is an input vector. Guidehouse can assume a reference or aggressive rollout of BROs programs.		✓
Financing programs	IOU financing programs help reduce the cost burden associated with efficient measure adoption.		✓
Policy assumptions	Varying timelines or impact assumptions for policy affect modeled potential, such as baseline changes resulting from CARB ZEAS, gas incentive phase out, VEA, or tax credits.	✓	✓

Source: Guidehouse

Guidehouse will work with CPUC staff to define the reference (or base) scenario for the 2027 PG Study (i.e., screening test, avoided cost data). Guidehouse will calibrate the model using the settings in these reference scenarios and model alternate pathways for up to three additional scenarios, for a total of four. The three additional scenarios will be determined in conjunction with CPUC staff to make sure the results are most useful for policy decision-making. Scenario parameters will be shared with stakeholders for review and comment via a scenarios webinar prior to developing final achievable potential results.

2.5 Codes and Standards Potential

C&S impacts on EE potential are modeled in two ways:

- C&S impacts the code baseline for IOU rebated measures characterized using a bottom-up approach; as C&S becomes more stringent in the future, above-code savings claimable by IOU programs decreases.

- IOUs can claim a portion of savings from C&S that come into effect through the IOU C&S advocacy programs. This component has historically been considered the C&S potential.

C&S potential refers to the forecast savings from current C&S, planned C&S, and a set of C&S that are reasonably expected to come into effect. This savings is most comparable to a market achievable potential. C&S potential does not include an estimate of technical or economic potential. A C&S technical potential would imply C&S are set to their maximum efficiency levels and 100% of customers would comply with them (i.e., every building is Zero Net Energy, every air conditioner is SEER 20+). C&S technical potential would completely subsume a utility rebate program technical potential. For this reason, C&S technical potential is neither useful nor something we would calculate. Economic potential is calculated as a subset of technical potential; the same reasoning informs why we will not calculate C&S economic potential.

Our study will calculate the C&S achievable potential in multiple formats, each for a different use:

- Net C&S savings are the total energy savings estimated to be achieved from the updates to C&S since 2006. Net savings calculations account for naturally occurring market adoption (NOMAD) of code-compliant equipment and are used to inform demand forecasting, procurement planning, and tracking against greenhouse gas targets. These savings inform the CEC forecast (for AAEE and SB350 purposes).
- Net IOU C&S program savings identify the portion of the Net C&S savings that can be attributed to the advocacy work of the IOUs' C&S programs. This result is used to inform the IOU program goals.

Net IOU C&S program savings will be calculated using the same methodology as that used by the CPUC Integrated Standards Savings Model (ISSM). ISSM is regularly used by the CPUC in its impact evaluations of IOU C&S programs. The ISSM methodology is relatively unchanged over the past several years. As we conduct the analysis, we will verify with CPUC staff and stakeholders the appropriate method and data to use to allocate statewide C&S savings to individual IOU territories. Allocation methods include using average energy sales by IOU or IOU C&S program spending. If CPUC staff and stakeholders prefer an alternative allocation approach, we plan to accommodate.

Over the past few cycles of the PG Study, we have observed CEC staff are the primary users of the C&S savings forecast. While CPUC sets C&S goals and the PAs use the results to plan their activities, by and large CEC staff make the most detailed use of C&S savings forecasts originating from the PG Study. As a result, Guidehouse will closely coordinate with CEC staff from the Energy Assessments Division and Energy Efficiency Division to better understand and accommodate their needs.

Modeling Method to Develop Savings Estimates

Our model methodology for C&S savings is based on the ISSM[5] developed and used by the CPUC staff in C&S program evaluation. ISSM follows the evaluation methods outlined in the California Evaluation Protocol.[6] For previous PG studies, Guidehouse replicated the methodology of ISSM in

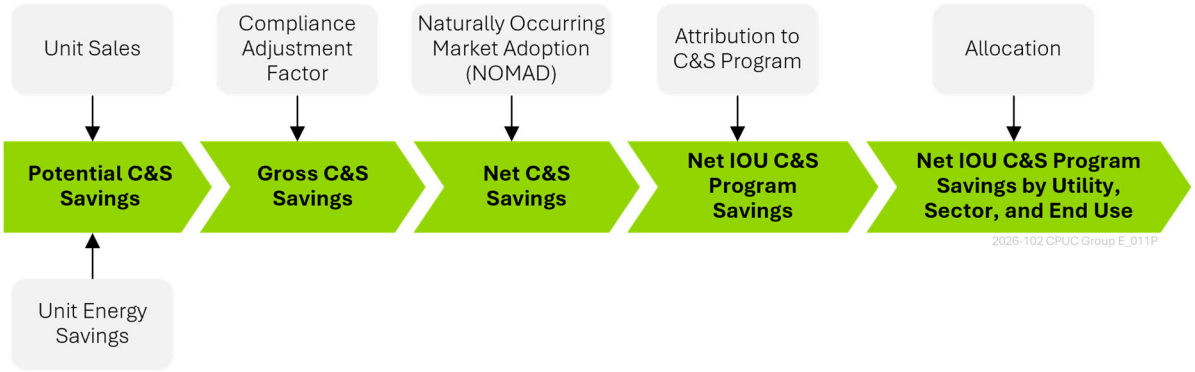
[5] Cadmus and DNV GL, *Integrated Standards Savings Model (ISSM),* 2017.
[6] State of California Public Utilities Commission, "California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals," April 2006, https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/c/5212-caenergyefficiencyevaluationprotocols.doc.

the Analytica platform. Guidehouse plans to continue to use the existing ISSM-based C&S model and update it to reflect any methodological changes in the latest CPUC-approved ISSM.

The core process of calculating C&S potential is illustrated in **Figure 7**. Key components of the calculation listed in **Figure 7** include:

- **Unit Sales:** The assumed baseline units sold each year for each measure, representing the expected population of code-compliant or standard-compliant equipment adopted
- **Unit Energy Savings:** The energy savings (in kWh, kW, or therms) relative to the previous code or standard for the new compliant equipment
- **Compliance Adjustment Factor (CAF):** The baseline assumption for the rate at which the population complies with codes or standards
- **NOMAD:** The fraction of the population that would naturally adopt the code-compliant or standard-compliant measure in the absence of any code or standard
- **IOU Attribution:** The portion of gross C&S savings in California that can be claimed by IOU code support programs
- **Allocation Factors:** The fraction of the statewide C&S savings that occur in each IOU territory; additional allocation factors assumed by Guidehouse break down the savings into sectors and end uses

Figure 7. C&S Savings Calculation Methodology



Source: Guidehouse

Incremental savings for C&S are the new savings generated in each year after the code compliance date due to upgrading older equipment or activity in the new construction market. Cumulative savings for C&S is the simple summation of incremental savings over time up until the entire market has turned over. This calculation is markedly different from calculating cumulative savings for rebate programs, which requires an estimate of decay (i.e., measures reverting to baseline after the EUL). In the realm of C&S, the baseline is the previous code or standard, thus there is no reversion to the baseline because consumers cannot purchase equipment at the old code or standard level.

Scoping Potential Standards and Data Collection

The California IOUs implement their C&S program as one step in a cyclical process that involves supporting emerging technologies, incorporating demonstrated technologies in their standard demand-side management (DSM) programs, supporting C&S for demonstrated technologies so that the entire market is transformed, and then identifying advances in technologies that can be tested through their emerging technology efforts. The IOUs have developed a process of working very closely with CEC to identify candidate standards that they will develop and support in the adoption process. They meet regularly to scope out opportunities for new C&S and create strategies for pursuing adoption.

The Guidehouse team will start with a list of C&S to include in the 2027 PG Study leveraging those included in the 2025 PG Study. We will then work with IOU program managers and contractors, CEC staff, and CPUC staff and consultants to scope out a list of additional standards to be included. This process will include a data request to IOU C&S program managers. The ability to include new C&S depends largely on the availability of necessary input data. **Table 9** summarizes Guidehouse's planned approach and sources of information.

Table 9. Developing Potential C&S for Analysis

Potential C&S	Information Sources
C&S in effect that have been evaluated	Past CPUC evaluations will be used to develop the list of C&S to consider. These evaluations will also contain data in the ISSM input format for our team to leverage. We expect little need to collaborate with external team members other than confirming the latest evaluation data is being used.
C&S in effect that have not been evaluated	IOU C&S claims will be used to develop this list of C&S to consider. Our team will consult the IOU program managers and their contractors to obtain the list; it is possible these claims will have been submitted to CPUC staff. We expect these claims to contain data in the ISSM input format for our team to leverage.
Future C&S	We propose to work closely with the C&S PAs, CEC staff, CPUC Staff, and knowledgeable consultants to monitor code and standard development and adoption plans. We will supplement this effort with interviews with key parties in other states and regions who have insights into the future of C&S. Our experience working with DOE staff is that they will be unlikely to divulge information to CPUC beyond what is already publicly documented. Thus, while the RFP suggests interviewing DOE staff, we propose it is not a good use of project funds and rather we rely upon public information on federal standards.

Source: Guidehouse

After compiling information from all these sources, we will develop a list of C&S that California might consider in the near and longer term. Our team will estimate the probability and timing of adoption and will select the standards with the highest probability of being adopted over a specified timeframe. We will then focus our research on this list to develop the technical details required in the savings PG analysis.

Produce Savings Results

As mentioned earlier, ISSM requires several inputs to calculate gross and net savings estimates for individual standards. We will use available data sources to develop estimates of annual unit energy savings for each appliance standard and code change and combined code changes in Title 24.

Where gaps exist, we will research current appliance market sales and projections, construction projections, and trends to develop market size estimates over the forecast period. We will combine the unit savings and market size estimates to calculate the potential savings from each standard over the forecast period.

Future C&S will require estimated compliance factors. For building codes, we use historical data at the building level by building type based on the proportion of projected energy savings achieved. For the appliance standards, we will review historical compliance rates for similar standards.

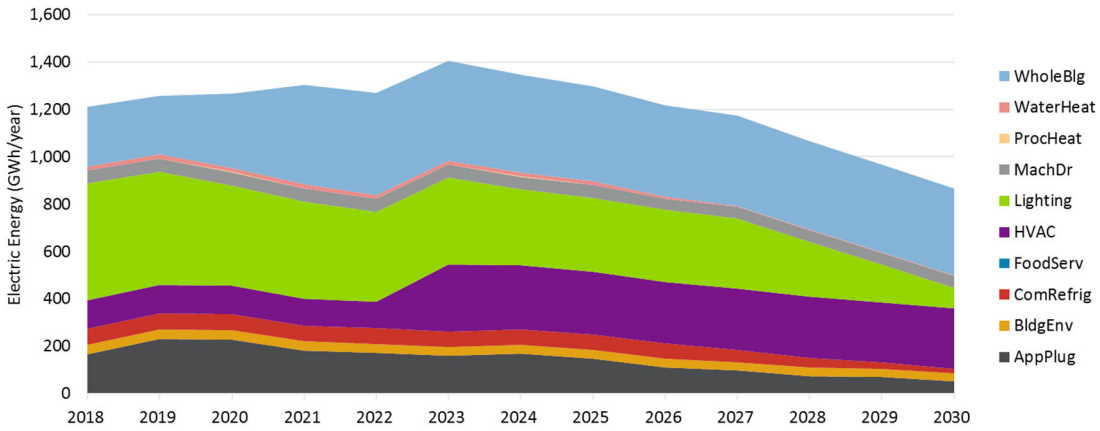
NOMAD factors will also need to be estimated for future C&S. We propose using estimates from prior evaluations in most cases with adjustments to shift the start year as appropriate. For those standards that differ significantly from prior ones, we will conduct a Delphi process using knowledgeable experts to develop original estimates.

Once all input values are generated, savings results will be produced with the following granularity:

- Yearly Incremental and Cumulative Savings
- Net Attributable Savings
- Sector
- C&S Measure
- Net Savings
- IOU
- End Use
- Applicable Hourly Load Shapes

Model inputs and assumptions will be documented and made available for public discussion. Summary results and a database of detailed results will also be produced for public discussion. **Figure 8** shows an example of past summary graphs.

Figure 8. C&S Example Outputs - Incremental Electric Savings



Source: Guidehouse

2.6 Income-Qualified Potential

The Guidehouse team will forecast potential from the Income-Qualified (IQ) sector and programs such as the IOUs' Energy Savings Assistance (ESA) programs. The ESA programs provide no-cost weatherization measures and other EE and FS measures to IQ customers to alleviate their energy

burden while improving health, comfort, and safety. The ESA program also includes EE education and referrals to other IQ programs.

In recent PG studies, potential from the IQ sector has been estimated through a bottom-up approach that is separate from residential and commercial rebate measures. Given the unique nature of the ESA program, where measures are provided at no cost to the customer, there is no relevant consideration of rebates, incentives, or customer payback. Treating IQ potential as a separate component of the overall potential study also allows for differentiated and focused coordination with IQ and ESA stakeholders and timelines.

Similar to previous study cycles, for the 2027 PG Study, the Guidehouse team will work with CPUC staff and stakeholders to define a measure list specific to the IQ sector. Guidehouse will then use a simplified forecasting approach, leveraging its existing rebate program model to forecast technical and market achievable potential from EE and FS measures eligible to be installed through ESA. While economic potential will not be calculated at the measure level, screens will be applied to remove measures from market achievable potential that do not meet minimum ESA cost-effectiveness test thresholds as reported by the IOUs.

For the 2027 PG Study, Guidehouse plans to incorporate methodological improvements using recommendations from the 2026 IQ Market Study completed under the previous Guidehouse Group E contract. The IQ Market Study focused on identifying potential improvements for adoption forecasting for market achievable potential.

Therefore, Guidehouse's proposed approach for estimating IQ potential for the 2027 PG Study is to continue with the validated framework from previous studies as well as implement adoption forecasting improvements using final recommendations from the IQ Market Study as directed by CPUC.

As with previous PG Study cycles, Guidehouse will conduct the 2027 IQ potential assessment separately from the other core PG Study assessments (of market-rate residential, commercial, industrial, agricultural, C&S, and BROs potential), and will provide a detailed workplan for the 2027 IQ PG Study, which will be provided separately to CPUC and stakeholders for review.

2.7 Results and Reporting

Guidehouse will prepare a draft report for internal and external review once 2027 PG Study draft results have been vetted. As has been done in the past, Guidehouse expects to publish this draft report, along with draft results and the draft model, publicly through the appropriate CPUC channels. We will respond to feedback from external stakeholders and provide a final report.

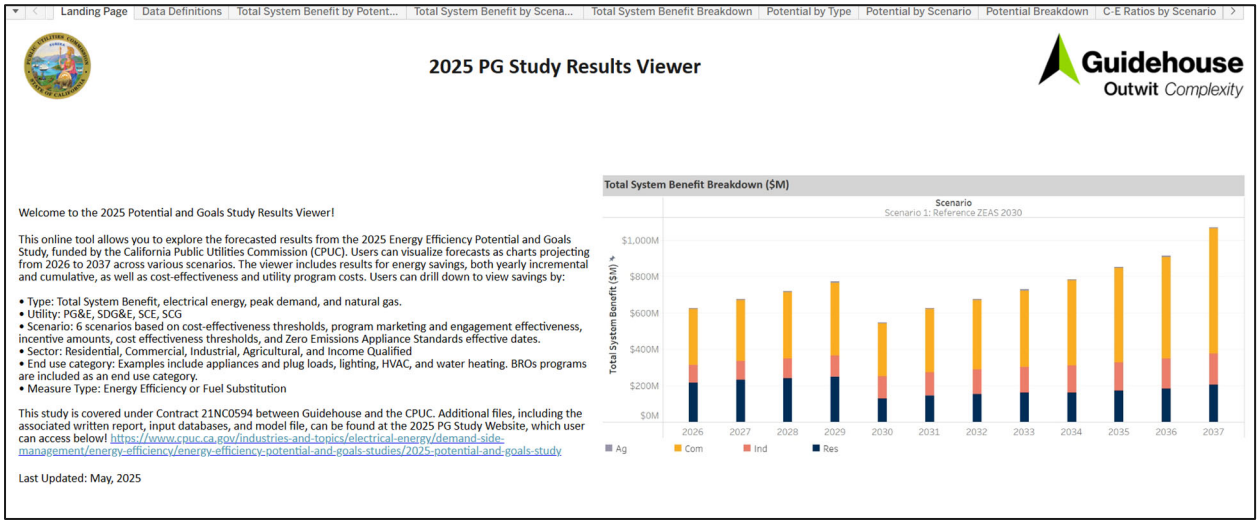
Guidehouse will use the following approach to engage stakeholders on draft results:

- Provide an overview of the study scope with emphasis on what was in scope and out of scope.
- Provide concise information on the methodology of the study.
- Clearly state assumptions and areas of uncertainty.
- Provide summary results and discuss the implications and conclusions of these results.

- Orient stakeholders with tools and databases to empower them to dive deeper into the results.
- Ask pointed questions that encourage stakeholders to provide meaningful feedback.

In addition to the written report, Guidehouse will provide an accessible model file and a database of results. For the 2027 PG Study, Guidehouse will provide results via an online results viewer built in Tableau in addition to an Excel-based results viewer. Both results viewers will be publicly available and enable users to view and compare outputs across all scenarios, for each utility, and with drilldowns by sector, end use, and measure type (e.g., EE or FS). **Figure 9** shows a screenshot of the dashboard Guidehouse developed for the 2025 PG Study.[7]

Figure 9. 2025 PG Study Results Dashboard



Source: Guidehouse

The model will be delivered to CPUC staff as an executable file that does not require a license to run. Users might need to install a free version of the Analytica Player software. This approach is consistent with our delivery of models to CPUC in the past. Furthermore, Guidehouse will provide training to CPUC staff, and if needed, to a public audience, on how to use the model.

For the 2027 PG Study, training will be adapted to the needs of CPUC staff and can consist of the following:

- Documents detailing the modeling methodology and approach
- User guides describing how to import/export data, run the model, navigate underlying model logic, change settings, and review results
- Training exercises (structured similarly to practice problems) that provide trainees with an opportunity to assess their comprehension and aid in knowledge retention
- Topic-specific recorded webinars

[7] The 2025 PG Study dashboard is available at: 2025 CPUC PG Results Viewer (06-09 Release) | Tableau Public

- Training sessions
- Reasonable technical support post-model delivery up until the contract end period

2.8 Schedule, Dependencies, and Stakeholder Engagement

Table 10 lists the overall schedule for the 2027 PG Study. The exact timing for interim milestones and tasks may shift without affecting the final deliverable deadlines. This schedule assumes that key data inputs will be available by the required cutoff dates that **Table 11** shows.

Table 10. 2027 PG Study Schedule

Task	Milestone/Deliverable	Start Date	Planned Completion Date
Technical Potential	Collect Global Inputs	8/3/2026	10/2/2026
	Develop Initial Measure List and Prioritization	8/3/2026	8/28/2026
	Stakeholder Review of Measure List	9/7/2026	9/25/2026
	Characterize Measures	8/3/2026	10/16/2026
	Develop Technical Potential	10/5/2026	11/6/2026
Economic Potential	Determine C-E tests to consider	-	11/2/2026
	Develop Economic Potential	11/9/2026	12/5/2026
Achievable Potential	Develop Base Scenario Achievable Potential	12/7/2026	1/22/2027
	Develop Scenario Parameters	-	1/15/2027
	Produce Scenario Results	1/25/2027	2/26/2027
C&S Potential	Develop List of Potential C&S	8/10/2026	9/4/2026
	Vet C&S List with stakeholders	9/7/2026	9/30/2026
	Forecast C&S Savings	10/5/2026	12/4/2026
Results and Reporting	Draft Report	3/1/2027	4/2/2027
	Stakeholder Review	4/5/2027	4/30/2027
	Final Report	5/3/2027	5/28/2027

Source: Guidehouse

Critical to executing the above schedule is the timely receipt of key input data. **Table 11** identifies key data input timelines for the 2027 PG Study. These are identified as those for which subsequent tasks have established dependencies, and where delays in receiving or generating final values may impact the overall study timeline. Guidehouse is committed to working with CPUC staff and stakeholders to ensure both the reliability and timeliness of the study's delivered final results to inform critical CPUC decisions.

Table 11. Key Data Input Timeline Dependencies

Data Input	Planned/ Expected Timing	Dependency
Policy decisions such as VEA, C&S baselines, and CARB zero emissions appliance standards	10/5/2026	Cutoff date for making any framework and modeling modifications prior to potential calculations

Data Input	Planned/ Expected Timing	Dependency
Measure data updates to eTRM/DEER deemed measure packages (Guidehouse is the contractor for Group A responsible for deemed measures)	10/5/2026	Cutoff date to allow for timely completion of technical potential analysis
Updated avoided costs, including quarterly combos needed for PG Study	11/2/2026	Required for economic potential analysis
Decision on cost-effectiveness tests to consider	11/2/2026	Required for economic potential analysis
Record-level historic claims data from CEDARS for use in calibration	11/2/2026	Required for processing prior to achievable potential analysis

Source: Guidehouse

Throughout the 2027 PG Study, Guidehouse plans to engage with stakeholders to collect feedback on key topics. **Table 12** lays out our current plan for stakeholder engagement. Additional opportunities for engagement with stakeholders may be considered; feedback on this matter may be sought via discussion and written feedback from stakeholders.

Table 12. Planned Stakeholder Engagement for 2027 PG Study

Stakeholder Engagement	Planned Timing
Workplan Webinar	Early September 2026
Stakeholder Input on Measure List and Prioritization	September 2026
Stakeholder Input on Scenarios	Mid-December 2026
Draft Report Public Release	Early April 2027
Draft Results Webinar	Early April 2027
Stakeholder Input on Draft Results	April 2027
Stakeholder Input on IQ Workplan	TBD

Source: Guidehouse

3. Post-PG Study Support

This section describes post-study activities that will largely occur after conclusion of the core 2027 PG Study. Specific schedule and deliverables for each task will depend on their overall priority, availability of supporting data and inputs, stakeholder impact, and funding. Guidehouse will work closely with CPUC staff to determine each task's specific details, outputs, and delivery timeline.

3.1 Additional Achievable EE and FS Scenarios

CEC provides a long-term forecast of energy consumption as part of the IEPR; this forecast is referred to as the California Energy Demand (CED) forecast. The CED forecast is updated on a regular basis. In the process of updating the CED, CEC first issues a baseline forecast that includes historic EE and FS program and C&S impacts. It also includes some level of future EE and FS impacts: those that have been committed. Committed impacts reflect savings from initiatives that have been approved, finalized, and funded, whether already implemented or not.

There are additional impacts from initiatives that are neither finalized nor funded but are reasonably expected to occur through either the IOU programs or C&S. These impacts are referred to as achievable, and the portion of these that correspond to IOU activities modeled in the PG Study are typically sourced from the PG Study scenarios. Often, a portion of the impacts that are quantified in the PG Study are already incorporated in the CED baseline forecast, and CEC staff need to estimate the portion of savings from the CPUC PG Study that are not accounted for in the baseline forecast. Any remaining non-overlapping savings are then appropriate to include in CEC's demand forecast modifiers that represent future scenarios of savings from EE and FS, which are referred to as the AAEE or AAFS forecasts. From here, we will refer to these forecasts collectively as the AA Scenarios.

Guidehouse has been supporting CPUC and CEC in the development of IOU AA Scenarios since 2012. The AA Scenarios will be primarily built around variables that are available in the PG model. However, CEC may request the use of scenario variables that were not used for the CPUC-directed core PG Study scenarios. As such, initial coordination among Guidehouse, CEC, and CPUC staff is key to building in any necessary variables requested by CEC staff.

Variables that influence savings generally fall into two categories:

- **Internally influenced:** Policies and program decisions that are under control of CPUC, IOUs, and other PAs collectively
- **Externally influenced:** Variables that are not controllable by any involved party such as economic and demographic conditions

For the 2027 PG Study, Guidehouse will follow a similar collaborative process with CPUC and CEC staff to develop the AA Scenarios, including the following steps:

1. Hold a series of kickoff and coordination meetings with CPUC, CEC, and Guidehouse staff.

2. Confirm the economic/demographic settings used in the CED low/mid/high forecasts and seek feedback from CEC on whether these will continue to play a role in AA Scenarios going forward.
3. Present CEC with a list of internally influenced variables available in the PG model as well as results from a sensitivity test to inform CEC staff of the sensitivity to each variable.
4. Collect initial guidance from CEC staff on the intent of the scenarios, such as policy drivers and sensitivity to internally or externally influenced variables.
5. Guidehouse drafts a framework of scenario variable settings for each of the scenarios (at least six in total) based on initial guidance from CEC staff.
6. Review the draft scenario framework with CEC staff and collaboratively edit/update to finalize scenario settings. This process may require CEC to present draft scenarios to California Independent System Operator (CAISO, a historic user of the AAEE results) and confer with the Joint Agency Steering Committee (JASC). Guidehouse is prepared to support these discussions as needed.
7. Provide guidance on hourly impacts (leveraging load shapes) and locational impact at the climate zone and forecast zone level, as needed.
8. Produce scenario results at the level of detail/granularity as requested by CEC and deliver databases of relevant outputs.

The AA Scenarios update for the 2027 PG Study is expected to occur primarily in Q3 and Q4 of 2027 upon conclusion of the core PG Study and goal-setting results.

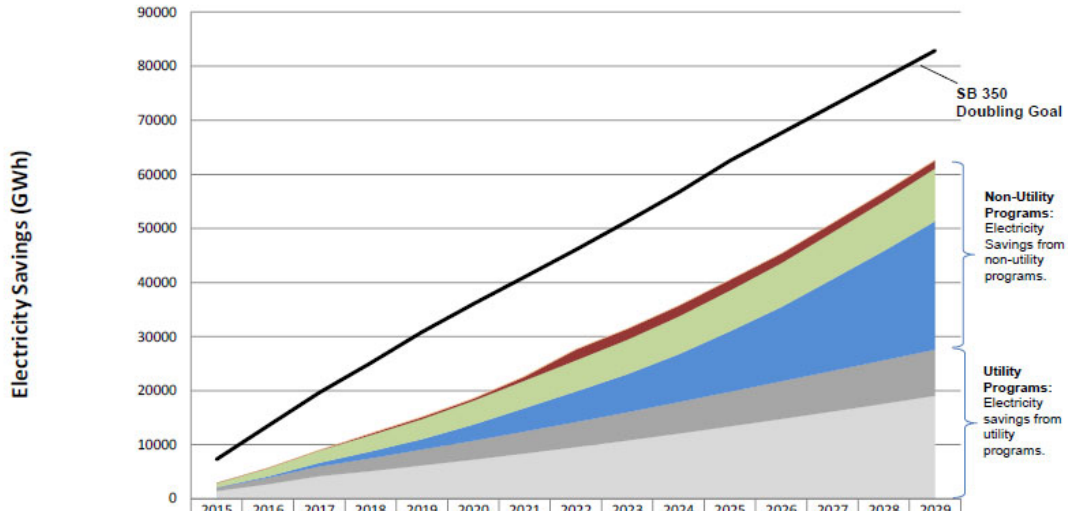
3.2 SB350 IOU Territory Targets Update

SB350, the Clean Energy and Pollution Reduction Act of 2015, requires CEC to establish annual targets that will achieve a cumulative doubling of statewide EE savings and demand reductions in electricity and natural gas final end uses. This doubling target is relative to CEC's 2015 mid-case of the AAEE forecast.

In 2017, CEC published its first report (referred to here as the SB350 Report) to establish proposed statewide doubling targets that must be achieved by 2030.[8] It proposed sub-targets for the portion of projected EE savings that can be achieved through IOU programs, POU programs and non-utility programs funded through government, private, and utility ratepayer sources (see **Figure 10**).

[8] Jones, Melissa, Michael Jaske, Michael Kenney, Brian Samuelson, Cynthia Rogers, Elena Giyenko, and Manjit Ahuja. 2017. *Senate Bill 350: Doubling Energy Efficiency Savings by 2030*. California Energy Commission. Publication Number: CEC-400-2017-010-CMF.

Figure 10. Proposed SB350 Doubling Targets (Electricity)



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Agriculture & Industry	2	33	58	95	118	121	116	109	94	83	76	75	82	99	127
Behavioral & Market Trans.	32	39	47	296	366	375	732	2002	1998	1986	1963	1762	1693	1617	1492
Financing	757	1513	2270	2994	3704	4401	5074	5736	6360	6967	7536	8099	8653	9202	9748
Codes & Standards	93	243	673	1280	1899	2980	4325	5655	7037	8841	11172	13729	16948	20215	23746
POU Programs	596	1190	1790	2360	2945	3501	4069	4645	5232	5822	6406	6977	7520	8042	8540
IOU Programs	1427	2685	4179	5112	6169	7230	8373	9550	10768	12052	13385	14748	16145	17580	19050
SB 350 Doubling Goal	7,286	13,46	19,60	25,10	30,81	36,01	41,03	46,04	51,28	56,66	62,51	67,60	72,69	77,78	82,87

Source: CEC, 2017

This task involves updating the IOU sub-target to inform CEC as it moves forward with updating data reported in the SB350 Report. As part of the 2017 PG Study, Guidehouse provided the forecast of IOU program savings to CEC and its contractors that informed the IOU sub-targets in the 2017 SB350 Report. In subsequent PG studies, Guidehouse provided updated IOU program savings forecasts to CEC to update its tracking of SB350 savings.

Guidehouse expects to follow a similar process for the 2027 PG Study as in past studies. This includes:

- Holding a series of kickoff and coordination meetings with CPUC, CEC, and Guidehouse staff.
- Conducting the analysis including baseline adjustments and attribution adjustments to remove double counting of impacts from C&S, BROs, FS, and financing programs.
- Delivering databases of relevant outputs.
- Supporting stakeholder engagement activities.

The SB350 update for the 2027 PG Study is expected to occur primarily in Q3 and Q4 of 2027 upon conclusion of the core PG Study and goal-setting results.