2021 Energy Efficiency Potential and Goals Study – Attachment 5: COVID-19 Sensitivity Analysis

Prepared for:

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Submitted by:

Guidehouse Inc.
101 California Street, Suite 4100
San Francisco, CA 94111
Telephone (415) 399-2180

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guidehouse.com

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Contact Information

For more information contact: Amul Sathe, amul.sathe@guidehouse.com

Principal authors include:

- Amul Sathe
- Karen Maoz
- Tyler Capps
- Rebecca Legett
- Debyani Ghosh
- Divya Iyer
- Micah Turner
- Vania Fong
- Brian Chang
- Derek Nong
- Javi Luna

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Executive Summary

The 2021 Study completed August 2021[1] considers multiple scenarios to explore market response and how potential might change based on several alternative assumptions. This study also considered a sensitivity analysis to quantify impacts of the COVID-19 pandemic. The Guidehouse team presented the COVID scenarios in a workshop in January 2021.[2] The pandemic impacts on the California economy are far-reaching and not something the 2021 Study can ignore. The default scenario results presented are rooted in data developed pre-pandemic. The Guidehouse team developed separate COVID-19 sensitivity scenarios to estimate the impacts of the pandemic, which manifested in two ways in the model:

1. Building stock adjustments: Reducing commercial building stocks due to business closures and increasing number of households eligible for low income programs due to lowered household income.
2. Consumer decision factors: Adjustments that represent altered sensitivity of costs and barriers in consumer purchasing decision processes.

These impacts are not modeled as permanent shifts but rather as temporary deviations that assume full recovery to pre-pandemic levels by 2026. From the results of COVID-19 sensitivities' impacts on Scenario 2,

Table 0-1 provides the savings results with avoided cost vintages of 2020 and 2021 for one scenario, Scenario 2: TRC Reference, before and after applying COVID-19 sensitivities. The data provides the change in overall program savings potential (EE, fuel substitution, and BROs). The impact ranges from a 0.1% to a 1.6% decrease in potential in 2022 depending on the metric and vintage of avoided cost.

Table 0-1. Comparison After Adjusting for COVID-19 Impacts (Percent Difference by Metric Type) by Avoided Cost Vintage

Vintage	Metric Type	2022	2023	2024	2025
2020	GWh	-0.4%	-0.3%	-0.2%	-0.1%
	MW	-0.5%	-0.3%	-0.2%	-0.1%
	MMTherms	-0.5%	-0.3%	-0.2%	-0.1%
	TSB	-1.53%	-1.07%	-0.57%	-0.04%
2021	GWh	-0.1%	-0.1%	-0.1%	-0.1%
	MW	-0.3%	-0.2%	-0.1%	-0.0%
	MMTherms	-1.2%	-0.8%	-0.3%	-0.1%
	TSB	-1.26%	-0.84%	-0.41%	-0.04%

Note: Negative values signify a reduction in impact due to COVID-19

Source: Guidehouse

[1] Final 2021 Energy Efficiency Potential and Goals Study

[2] 2021 Energy Efficiency Potential and Goals Study - Top-Down Study and Addressing COVID Update

1. Introduction

Guidehouse and its partners, Tierra Resource Consultants, LLC and Jai J Mitchell Analytics (collectively known as the Guidehouse team), prepared the 2021 Potential and Goals Study or 2021 Study for the California Public Utilities Commission (CPUC).

This study develops estimates of energy and demand savings potential in the service territories of California's major investor-owned utilities (IOUs) during the post-2021 energy efficiency (EE) rolling portfolio planning cycle. This report includes results for Pacific Gas and Electric (PG&E), Southern California Edison (SCE), San Diego Gas & Electric (SDG&E), and Southern California Gas (SCG). A key component of the 2021 Study is the Potential and Goals Model (PG Model). This model provides a single platform to conduct robust quantitative scenario analysis to examine the complex interactions among various inputs and policy drivers for the full EE portfolio.

Background and Approach

The 2021 Study is a major update to the previous potential and goals study completed in 2019 (2019 Study[3]). During the 2 years since the 2019 Study was completed, several market and policy changes have taken place. These changes are reflected in the 2021 Study. The project kicked off in spring 2020 and was followed by a series of stakeholder workshops held through January 2021. These workshops helped to shape and guide the direction of the work presented in this report.

The 2021 Study forecast period spans from 2022 to 2032 and focuses on current and potential drivers of energy savings in IOU service areas.

Consistent with previous CPUC potential studies and common industry practice, the 2021 Study final output is an achievable potential analysis. Achievable potential is a calculation of EE savings based on specific incentive levels, program delivery methods, assumptions about existing CPUC policies, market influences, and barriers. This report describes the portion of the PG Study that performed COVID-19 pandemic sensitivity analysis to address the effects of the pandemic on achievable potential.

For the main report of the 2021 Study, please refer to the Final 2021 Energy Efficiency Potential and Goals Study published in August 2021.[4] This 2021 Study forecasts the potential energy savings from various EE programs as well as codes and standards (C&S) advocacy efforts for the following customer sectors: residential, commercial, agriculture, industrial, and mining.

This report documents the data sources for and results of the COVID-19 sensitivity scenarios for the 2021 Study.

Aside from this report, the following supporting deliverable are available to the public via the CPUC's website:[5]

- **2021 PG Measure Level Results Database (COVID-19 sensitivity):** A spreadsheet of technical, economic, and achievable potential for each measure in each sector, end use, and utility is available at https://pda.energydataweb.com. The database also

[3] Guidehouse (as Navigant). 2019 *Energy Efficiency Potential and Goals Study*. July 2019.
[4] https://pda.energydataweb.com/#!/documents/2531/view
[5] https://www.cpuc.ca.gov/General.aspx?id=6442464362

includes measure level C&S results, BROs results, and cost-effectiveness test results for the two COVID-19 sensitivity analysis.

The primary purpose of the 2021 Study is to provide the CPUC with information and analytical tools to engage in goal setting for the IOU EE portfolios. The study itself informs the CPUC's goal setting process but does not establish goals. The rest of this section discusses the 2021 COVID-19 sensitivity analysis methodology.

1.1 Impacts of COVID-19 Pandemic

The impacts of the COVID-19 pandemic on the California economy are far-reaching and not something this potential study can ignore. The default scenario runs described in this section are rooted in data developed pre-pandemic. Thus, the default forecasts inherently assume the pandemic did not affect the economy. A separate set of COVID-19 sensitivity scenarios were run for Scenarios 2 with both sets of vintages to estimate the effects of the pandemic on the future EE potential. The Guidehouse team presented the planned COVID-19 adjustments in the January 2021 stakeholder webinar and received feedback on this approach. The impacts of COVID-19 manifest themselves in two ways in the model:

- Building stock adjustments: Reductions to commercial and residential building stocks due to business closures and more households becoming eligible for Low Income programs due to lowered household income.
- Consumer decision factors: Adjustments to the consumer decision value factors that represent altered importance of barriers in their purchasing decision processes.

These impacts are not modeled as permanent shifts but rather as temporary deviations. It is impossible to tell when the pandemic will end and when the economy will recover. The Guidehouse team makes no claim that it can project this. However, for the purposes of modeling, the team assumes that consumer confidence and business closures start to recover in 2022 and takes 4 years to recover to pre-pandemic levels (in the year 2025).

1.1.1 Building Stock Adjustments

Adjustments are made to select building types in the model: restaurant, retail, low income residential, and non-low income residential. The Guidehouse team assumes 20% of restaurants have permanently closed, decreasing restaurant building stock by 20%. This assumption is based on a variety of data sources from which the team infers an average:

- A California Restaurant Association survey in August 2020 showed 30% of respondents were concerned they would be closing permanently soon.[6]
- A National Restaurant Association survey from November 2020 shows 17% of restaurants are closed (permanently or temporarily).[7]
- The U.S. Bureau of Labor Statistics shows restaurant sector employment is about 15% below pre-pandemic during Q4 2020.[8]

[6] https://www.calrest.org/news/thousands-california-restaurants-close-permanently

[7] https://restaurant.org/downloads/pdfs/advocacy/covid-19-restaurant-impact-survey-v-state-results.pdf

[8] https://data.bls.gov/timeseries/CES7072200001?amp%253bdata_tool=XGtable&output_view=data&include_graphs=true

- Data from Yelp in Q2 2020 indicated of all the restaurant closures, 60% are noted as permanent; the other 40% are noted as temporary.[9]

The team assumes 1.5% of retail space has permanently closed, decreasing retail building stock by 1.5%. This assumption is based on two data sources:

- The U.S. Bureau of Labor Statistics shows retail sector employment dropped 15% below normal in April 2020 but recovered and is just 3.5% below pre-pandemic levels during Q4 2020.[10]
- Data from Yelp in Q2 2020 says of all the stores and retail closures, 48% are noted as permanent; the other 52% are noted as temporary.[11]

The Guidehouse team assumes the eligible population of households for the ESA program that serves low income residential customers has increased on the order of 10%-20%. This assumption is based on the change in the number of enrollees in the California Alternate Rates for Energy program (CARE), as Table 1-1 shows.

Table 1-1. Change in CARE Enrollees

IOU	Sept,-Nov, 2019 Average Enrollees	Sept. - Nov. 2020 Average Enrollees	Percent Change
PG&E	1,382,144	1,566,949	13.4%
SCE	1,183,212	1,425,847	20.5%
SCG	1,603,584	1,744,436	8.8%
SDG&E	301,507	334,250	10.9%

Source: CPUC Low Income Oversight Board, ESA/CARE Monthly and Annual Reports (CARE Table 2).

The team assumes low income populations increase by the percent change values shown in Table 1-1. The team also assumes a corresponding decrease in the residential non-low income households that the PG Model targets for rebated equipment.

1.1.2 Consumer Decision Factor Adjustments

Similar to the building stock adjustments made to account for COVID-19 impacts, the Guidehouse team adjusted the parameters that influence a consumer's willingness to adopt. Specifically, the team adjusted a customer's overall sensitivity to decision-making factors (described in Section H.3.1 of the 2021 Study final report) to reflect the changed viewpoint and priorities of residential and commercial customers due to the pandemic.

The Market Adoption Study was fielded in summer 2020 and asked customers a set of questions that revealed their preference weightings at that time (during the pandemic). The study asked survey respondents to describe the overall impact of the COVID-19 pandemic on their finances. The team observed that the pandemic had a slightly negative impact on customer finances, with groups like restaurants, retailers, and schools experiencing the strongest negative impacts. Accordingly, the sensitivity of customers to the different characteristics of rebated measures was adjusted upward, reflecting that customers were generally more concerned about decision factors like upfront cost and installation hassle (technicians installing onsite) during the pandemic than they were before.

[9] https://www.yelpeconomicaverage.com/yea-q2-2020.html

[10] https://data.bls.gov/timeseries/CES4200000001?amp%253bdata_tool=XGtable&output_view=data&include_graphs=true

[11] https://www.yelpeconomicaverage.com/yea-q2-2020.html

Pre-pandemic values for customer preference weightings are used in all default scenarios in this study. COVID-19 sensitivity scenarios divert from this default and use the customer preference weightings as derived from survey responses conducted during the pandemic. Like the building stock adjustments, the Guidehouse team does not assume this is a permeant shift. Rather, customer sensitivity factors revert to their pre-pandemic levels on a linear ramp from 2021 to 2025. For this report, the COVID-19 scenarios use the 2020 and 2021 avoided cost vintages separately. Each COVID-19 sensitivity is compared to its equivalent Scenario 2: TRC Reference avoided cost vintage.

2. 2021 Study Results

Policymakers have used the results of past potential studies as a technical foundation to set savings goals for the next regulatory cycle. The 2021 Study is the basis for the CPUC's 2022 and beyond EE goal setting process. Based on limited available data and PG Model methodology, the impact of the COVID-19 pandemic on total portfolio savings is expected to be limited. Unless further data comes to light, the CPUC goal setting process is not expected to be significantly impacted.

2.1 COVID-19 Sensitivity Analysis

Table 2-1 and Table 2-2 provide the savings results with avoided cost vintages of 2020 and 2021 respectively for one scenario, Scenario 2: TRC Reference, before and after applying COVID-19 sensitivities. The data provides the change in overall program savings potential (EE, fuel substitution, and BROs). The impact is up to a 1.6% decrease in potential in 2022 depending on the metric and avoided cost vintage.

Table 2-1. Reference Scenario Goals Metric Comparison with and without COVID Sensitivity (Avoided Cost Vintage 2020)

Unit	Sensitivity	2022	2023	2024	2025
GWh	No COVID-19	580.68	620.58	665.68	704.46
	COVID-19	578.12	618.44	664.09	703.82
	% Difference	0.4%	0.3%	0.2%	0.1%
MW	No COVID-19	149.33	159.22	168.81	176.74
	COVID-19	148.62	158.67	168.43	176.63
	% Difference	0.5%	0.3%	0.2%	0.1%
MMTherms	No COVID-19	51.81	56.62	62.79	66.32
	COVID-19	51.10	56.12	62.53	66.36
	% Difference	1.4%	0.9%	0.4%	0.1%
TSB ($ Millions)	No COVID-19	$527.26	$595.99	$687.78	$768.10
	COVID-19	$519.19	$589.62	$683.88	$767.78
	% Difference	1.53%	1.07%	0.57%	0.04%

Source: Guidehouse

Table 2-2. Reference Scenario Goals Metric Comparison with and without COVID Sensitivity (Avoided Cost Vintage 2021)

Unit	Sensitivity	2022	2023	2024	2025
GWh	No COVID-19	487.42	515.40	545.92	577.71
	COVID-19	486.90	514.86	545.40	577.20
	% Difference	0.1%	0.1%	0.1%	0.1%
MW	No COVID-19	121.01	127.26	134.10	141.42
	COVID-19	120.68	127.00	133.93	141.36
	% Difference	0.3%	0.2%	0.1%	0.0%
MMTherms	No COVID-19	48.67	52.90	56.91	60.67
	COVID-19	48.09	52.50	56.72	60.73
	% Difference	1.2%	0.8%	0.3%	0.1%
TSB ($ Millions)	No COVID-19	$316.38	$351.11	$386.60	$430.76
	COVID-19	$312.40	$348.16	$385.03	$430.95
	% Difference	1.26%	0.84%	0.41%	0.04%

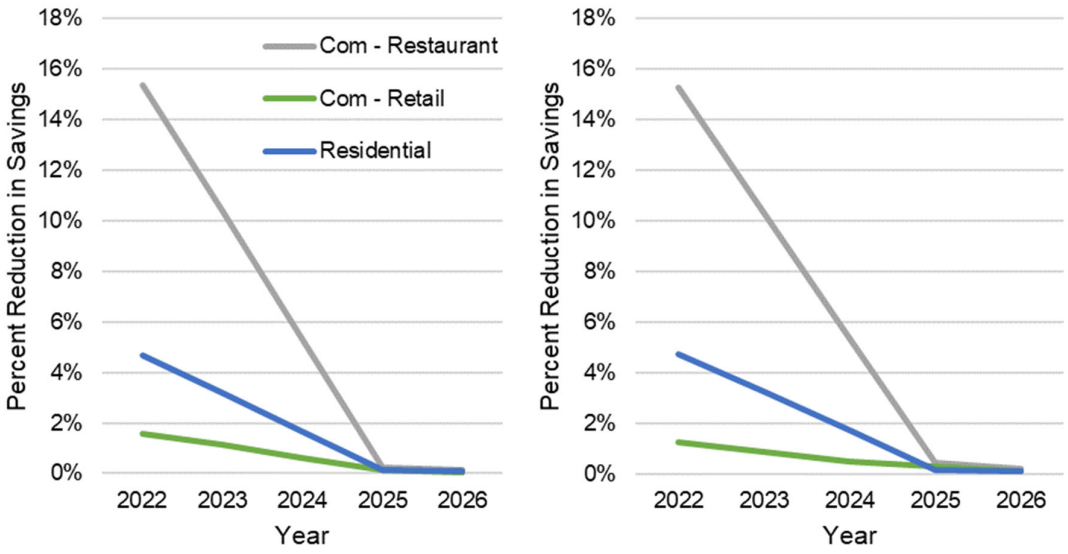
Source: Guidehouse

The residential sector impacts occur by reducing the household stock for the residential sector and reassigning the stock to the low income sector. There are no changes to the overall BROs program savings because both the low income and residential sectors are included in the analysis; therefore, the Guidehouse team removed BROs in the comparison analysis. For the commercial sectors, the stock for retail and restaurants changed.

Other impacts to adoption are included in the analysis based on the Market Adoption Study. These impacts are included in the savings analysis along with the stock changes.

Figure 2-1 shows the impacts on savings by affected customer group: residential, restaurants, and retail for avoided cost vintage 2020 and 2021, left to right respectively. The analysis assumed that there is a reduction in stock as of 2020, with a gradual return to pre-COVID levels by 2025. As can be seen in the figure the impact is similar in both 2020 and 2021 vintages with slight variations on the exact pathway to 2025 at which our model input assumptions return to pre-COVID levels.

Figure 2-1. Percent Reduction in Savings by Affected Customer Group Avoided Cost Vintage 2020 and 2021



Source: Guidehouse