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## MEMORANDUM

Date: August 5, 2022

To: Josh Litwin, California Public Utilities Commission

**Re:** Addendum to Process Evaluation of Disadvantaged Communities Green Tariff and Community Solar Green Tariff Programs: Bill Impacts of CPA's DAC-GT Program

The Disadvantaged Communities Green Tariff (DAC-GT) Program is part of a broader set of efforts based on the Green Tariff/Shared Renewables (GTSR) Program (GTSR) model that focus on low-income customers, with an added focus on customers that reside in DACs.<sup>1</sup> The DAC-GT program provides a 20 percent bill discount and 100 percent renewable grid-scale generation. At the start of this evaluation, the California Public Utilities Commission (CPUC) had approved nine Program Administrators (a mix of investor-owned utilities [IOUs] and community choice aggregators [CCAs]) and allocated a maximum amount of solar capacity based on their respective shares of eligible customers. The evaluation assessed program evaluability, developed program logic models and metrics, and assessed early progress of both programs.

Our analysis of PG&E customer billing data confirmed that bill savings were realized by PG&E customers (with a 19% electricity bill reduction on average) with no significant evidence of increased energy usage. This indicated that PG&E's implementation of the DAC-GT program is meeting the goal of protecting participants from the additional bill costs associated with adding clean energy to the grid. This memo provides the analysis of Clean Power Alliance (CPA), a CCA serving Los Angeles and Ventura County; which serves as an addendum to the final report.<sup>2</sup>

CPA's billing database only includes the CPA portion of the bill, which omits customer service and delivery charges from SCE. Enrolling in DAC GT has no impact on SCE's charges, and CPA is required to adjust their portion of the bill enough to bring the total bill charges down by 20 percent (per their agreement with SCE). That means that CPA's portion of the bill must drop by close to 50 percent to make the total bill cost to be reduced by 20 percent. This memo provides

<sup>&</sup>lt;sup>1</sup> California Environmental Protection Agency. 2017. "Designation of Disadvantaged Communities Pursuant to Legal Bill 535 (De León)." <u>https://calepa.ca.gov/wp-content/uploads/sites/6/2017/04/SB-535-Designation-Final.pdf</u>

<sup>&</sup>lt;sup>2</sup> Evergreen Economics and Brightline Group. *Process Evaluation of Disadvantaged Communities Green Tariff and Community Solar Green Tariff Programs: Final Report*. March 31, 2021.



the bill impacts of DAC-GT realized by CPA customers, based on analysis of billing data provided by SCE.

# **CPA/SCE Electric Bill Impacts**

Figure 1 uses the regression analyses to examine the average total monthly bill costs across the study period for both non-participants (green) and participants (blue). The lines show an expected seasonal pattern where bill costs rise in the winter with increases in heating and lighting and then rise again in the summer with increases in cooling. The three shaded areas show the baseline year (blue) when the participants and matched comparison group align in their monthly energy bills, four months of gradual enrollment in the CPA DAC-GT program (orange), and then a year of program impacts (green). Notably, the bill cost decreases for participants after program enrollment, while the bill cost rises slightly for the matched non-participants during this same period. The impact of DAC-GT is measured as the width of the gap, where participant bill costs diverge from the matched comparison group; the difference between the groups is largest during the summer and winter peaks.



#### Figure 1: CPA/SCE Change in Average Monthly Electric Bill Cost Over Time

Figure 2 and Table 1 provide the key results of the regression model for bill costs. The full regression output can be found in the Appendix. All of the bill cost savings estimates were



statistically significant, as confidence intervals do not overlap with zero. Thus, program participation had a significant impact in decreasing participant bill costs. Across the full sample, we estimate that the DAC-GT program is attributed with a statistically significant reduction in average bill costs of \$0.35 per day, or \$10.43 for a 30-day billing period. The DAC-GT program led to an average reduction in bill costs of 18 percent, with a 95 percent confidence interval of 14 to 22 percent; this estimate is not statistically significantly different than the program target of a 20 percent bill reduction.

We were also interested in estimating program impacts in the two most represented CEC Building Climate Zones in our sample: climate zones 6, 8 and 9. Climate zones are used to denote climate variations between regions, comparing the summer temperature ranges and numbers of heating and cooling degree days. Climate zone 6 lies along southern coast including Santa Barbara, Oxnard, and Long Beach. Climate zones 8 and 9 are further inland capturing Los Angeles, Anaheim, and Sana Ana. Zone 6 has lower temperatures, requiring more heating and less cooling, and zone 9 is the hottest with the highest cooling needs. Our estimates for climate zones 6, 8 and 9 show average daily bill cost reductions of \$0.29, \$0.39, and \$0.43, though the sample sizes were limited, and these estimates are not statistically significantly different from each other.





#### Figure 2: Program Bill Cost Impacts by Customer Segment

#### **Table 1: Program Bill Cost Impacts by Customer Segment**

Program Admin	Customer Segment	Daily Bill Cost Impacts (\$)	Daily Bill Cost Baseline	Bill Cost Impacts (%)
CPA/SCE	All Participants (n=239)	-\$0.35 ± 0.08	\$1.92	-18% ± 4%
	Climate Zone 6 (n=32)	-\$0.28 ± 0.14	\$1.43	-20% ± 10%
	Climate Zone 8 (n=116)	-\$0.40 ± 0.11	\$2.16	-19% ± 5%
	Climate Zone 9 (n=91)	-\$0.46 ± 0.11	\$1.73	-26% ± 12%

The average daily bill cost for participants prior to program enrollment was \$1.92, after controlling for weather, and season. For a 30-day billing period, this would translate to an



average monthly bill cost of \$57.60. Comparing the program savings to this baseline energy cost (before the program) indicates that the DAC-GT program enrollment is attributed with a monthly bill reduction of 18 percent. Note this estimate excludes customers that were enrolled in CARE during the study period, hence, the baseline energy bills already include the CARE discount, and the program impacts are the incremental impact of DAC-GT.

Forty percent of CPA participants and 25 percent of PG&E participants who took the survey reported struggling somewhat less or much less with their bills after participating in the DAC-GT program, though there are still participants who reported struggling more or having about the same ability to pay their bills. Ability to pay bills may be influenced by a number of factors that include change in energy use, loss of a job, and more people in the household, so these results cannot be isolated strictly as being due to DAC-GT program participation.



## Appendix: Additional Billing Analysis Detail (Appendix C)

This section provides detailed model output summaries from each of the regression models referenced in the body of the memo and details about the analysis, where the analysis of the CPA/SCE customers (in this memo) differed from PG&E (in the main report).

## PA Customer Information System (2.2.2)

Evergreen received a list of SCE customer account IDs from CPA, including 501 participant and 73,780 eligible non-participants as shown in Table 2. We submitted this list of IDs to SCE, along with a request for CIS, billing, and payment data. The largest source of sample attrition was the billing data request from SCE, where we received bills for 182 participants (36%) and 27,760 eligible non-participants (38%). We removed another 42 participants and 6,707 non-participants that were not enrolled in CARE as of January 1, 2020, because enrollment during the study period will have a significant impact on bills independent of their enrollment in the DAC-GT program. A larger sample size would be required to measure the incremental impacts of these two programs over such a short time period. We required a minimum of 9 months preand 9 months post-enrollment (less than the 12 months pre and post that were required for PG&E due to limitations in sample size) from each participant in the model to ensure that we had a minimal coverage of summer, winter, and shoulder seasons.

Sample Condition	Particip	ants	Non-Partic	cipants
Requested from SCE (i.e., on CPA list)	501	100%	73,780	100%
Billing Data Received from SCE	182	36%	27,760	38%
Enrolled in CARE before Jan 1, 2020	140	28%	21,053	29%
Match Comparison Sites (requiring alignment of 9+ months pre for a successful match)	139	28%	176	<1%
Drop Weak Matches (MSE>20)	135	27%	160	<1%
Require 9+ months post	120	24%	119	<1%

### Table 2: Summary of CPA/SCE Sample Attrition

The billing data were requested to estimate how the DAC-GT bill discount impacted customer bill costs and energy usage (kWh). The payment history that we requested would have been used to estimate the impact of the discount on customers' ability to pay their bills (i.e., avoid arrearages). Unfortunately, the payments data did not contain unique identifiers that could be tied to individual customer accounts, so we were unable to proceed with analysis of arrearages.



### Billing Data Processing Steps

As a first step in the analysis process, we created a comparison group of non-participants with similar energy bill costs as the participants (before program enrollment). This comparison group was intended to control for any significant changes in energy consumption due to factors other than program participation.

Figure 3 provides a comparison between the average daily electricity bill cost of the participants (green) and all eligible non-participants (blue) during the pre-program period, prior to matching (shown later, in Figure 4). There is a notable difference in energy usage across most months, with participants having lower energy usage than non-participants on average.



Figure 3: CPA/SCE Program Participants and All Eligible Non-Participant Bill Cost (Prior to Matching)

SCE did not provide dwelling type (detached residence or shared wall residence) in the CIS data, so we matched these non-participating customers based on how closely their energy costs aligned with each participant, selecting the best available customer for comparison (1:1 match).<sup>3</sup> Figure 4 shows the average bill cost prior to the enrollment in DAC-GT for participants

<sup>&</sup>lt;sup>3</sup> Matched customers from the comparison group based on selection that minimized the sum of squared errors in electricity consumption by calendar month.



(green) and their matched comparison (blue) during the baseline year prior to enrollment (shaded area). This figure demonstrates that we were able to find a group of eligible nonparticipants that closely resembled the DAC-GT participants. This comparison group was used to control for any significant changes in energy consumption over time that is caused by factors other than program participation, such as changes in energy usage from shifts in COVID-19related business closures and additional time spent at home.



Figure 4: CPA/SCE Participants and Matched Non-Participant Bill Costs (\$)

Table 3 shows summary statistics of interest including median daily bill cost and median daily usage for participants and a matched comparison group of eligible non-participants during the period prior to and during DAC-GT program enrollment. Notably, the median bill cost decreased for participants during the post-period (program enrollment), while the median bill cost rose for non-participants during the post-period. This suggests that the program discount is improving the affordability of participant energy bills, which should increase the likelihood of paying their bills on time.



Program Administrators	DAC-GT Participant	Pre or Post Program Period	Median Daily Bill Cost (\$)
	Darticipant	Pre	\$1.45
CPA/SCE	Participant	Post	\$1.34
(n=320)	Non-Participant	Pre	\$1.48
		Post	\$1.74

#### Table 3: CPA/SCE Billing Data Summary

### Energy Usage Data QC

Figure 5 shows the average energy usage prior to the enrollment in DAC-GT for participants (green) and their matched comparison (blue) during the baseline year prior to enrollment (shaded area). This figure demonstrates that we were able to find a group of eligible non-participants that closely resembled the DAC-GT participants. However, it also demonstrates a concerning trend in the underlying data, where energy usage fluctuates seasonally between 10 and 17 kWh in 2019 and 2019, before ramping up suddenly to over 50 kWh per day. This same trend was observed in both the participants and matched non-participants; hence, it is not caused by the DAC-GT program.



Figure 5: CPA/SCE Participants and Matched Non-Participant Energy Usage (kWh)



Figure 6 shows the average energy usage for participants (green) and all eligible nonparticipants (blue) during the study period, using the raw billing data received from SCE. There is a separate line for each distinct customer account, showing that the spike in energy usage is consistent across most accounts and this trend is not the result of a few outliers. The three shaded areas show the baseline year (blue), four months of gradual enrollment in the CPA DAC-GT program (orange), and then a year of program impacts for the participants (green). Across nearly all participants (green lines) and non-participants (blue lines), the billed energy usage doubles suddenly in early 2021 and continues to grow in 2022. This inflation in energy usage is not caused by DAC-GT, as it is seen in both groups. Evergreen confirmed with SCE that this spike in energy usage was related to an error where usage counted multiple times due to having to transition to a new database (from CSS to SAP) to fulfil our request. The energy usage kWh data was unreliable and not suitable for analysis. Our impact estimates for CPA/SCE focus on bill costs.



#### Figure 6: CPA/SCE Energy Usage Over Time, as Reported by SCE

With regards to energy usage, our regression model estimated a small and statistically insignificant increase in energy usage attributed to DAC-GT participation of 1.0 ± 3.5 percent per day for CPA/SCE participants; however, this estimate was not statistically significant. This is consistent with our analysis of the PG&E program participants, who had an increase of 0.028 kWh per day (equivalent to turning on a CFL bulb for two hours) that was not statistically

<sup>—</sup> Non-Participant — Participant



significant, despite a much larger sample size (n=22,092). Both estimates suggest that the DAC-GT program had little to no impact on energy usage for customers.

### Model Specification and Output

We relied on the same fixed effects billing regression model specification to estimate changes in bill costs and energy usage for PG&E and CPA/SCE. Variations of this model were explored, with fewer interaction terms and additional filters. The impact estimates did not vary significantly. We chose to use a consistent model for ease of interpretation. The regression model outputs for bill cost are provided in Table 4.



#### Table 4: CPA/SCE Electricity Consumption Fixed Effects Model Regression Output

Variable	Coefficient	Standard Error	P-value
Post	0.864	0.302	0.004
CDD	0.104	0.014	<0.001
HDD	0.082	0.015	<0.001
Month01	0.054	0.070	0.439
Month03	-0.461	0.063	<0.001
Month04	-0.592	0.083	<0.001
Month05	0.078	0.102	0.444
Month06	0.265	0.123	0.031
Month07	0.325	0.137	0.018
Month08	0.411	0.150	0.006
Month09	0.028	0.151	0.853
Month10	-0.222	0.128	0.084
Month11	0.003	0.075	0.971
Month12	0.151	0.068	0.027
Post*Part	-1.303	0.460	0.005
Post*CDD	0.039	0.024	0.098
Part*CDD	0.031	0.021	0.134
Post*HDD	-0.061	0.034	0.069
Part*HDD	0.012	0.022	0.594
Part*Month01	-0.031	0.099	0.754
Part*Month03	-0.014	0.088	0.871
Part*Month04	-0.015	0.119	0.902
Part*Month05	-0.003	0.146	0.985
Part*Month06	-0.153	0.176	0.385
Part*Month07	-0.175	0.197	0.373
Part*Month08	-0.198	0.217	0.361



Variable	Coefficient	Standard Error	P-value
Part*Month09	-0.178	0.218	0.415
Part*Month10	-0.093	0.183	0.613
Part*Month11	-0.010	0.107	0.923
Part*Month12	-0.017	0.097	0.861
Post*Month01	0.495	0.127	<0.001
Post*Month03	-0.523	0.138	<0.001
Post*Month04	-1.098	0.177	<0.001
Post*Month05	-0.685	0.225	0.002
Post*Month06	-0.392	0.275	0.154
Post*Month07	-0.349	0.277	0.207
Post*Month08	-0.591	0.279	0.034
Post*Month09	-0.588	0.268	0.028
Post*Month10	-0.603	0.219	0.006
Post*Month11	-0.056	0.160	0.727
Post*Month12	0.666	0.152	<0.001
Post*Part*CDD	0.071	0.035	0.039
Post*Part*HDD	0.081	0.052	0.119
Post*Part*Month01	0.072	0.181	0.692
Post*Part*Month03	0.438	0.201	0.029
Post*Part*Month04	0.403	0.267	0.132
Post*Part*Month05	0.704	0.340	0.039
Post*Part*Month06	0.711	0.417	0.088
Post*Part*Month07	0.377	0.426	0.375
Post*Part*Month08	0.479	0.430	0.266
Post*Part*Month09	0.597	0.412	0.148
Post*Part*Month10	0.562	0.332	0.091
Post*Part*Month11	0.338	0.237	0.153
Post*Part*Month12	-0.243	0.221	0.272