



## Silicon Valley Power FY 2021-2022 Commercial Rebate Programs

**EVALUATION REPORT DRAFT**

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## Executive Summary

Silicon Valley Power (SVP) engaged Cadmus to conduct an impact evaluation of its 2021–2022 Commercial Rebate programs and examine the persistence and impacts of measures installed through the Energy Efficiency Grant Program for Small Businesses (Small Business Grant program), which supported smaller customers during the COVID-19 pandemic. Cadmus estimated gross annual energy savings and peak demand reductions for business programs by reviewing project documentation and interviewing participants. For the Small Business Grant program, Cadmus completed phone surveys with a census of participants.

Based on evaluation results, Cadmus determined a 88.1% overall energy savings realization rate and a 207.9% demand reduction realization rate, as shown in Table 1 and Table 2, respectively.

Primary factors contributing to variations in realization rates included lack of demand reduction reporting, issues with data entry in calculators and program data, evaluation adjustments to installed equipment hours of use (HOU) and from custom calculations, and updated measurement and verification (M&V) data.

**Table 1. Summary of 2021–2022 Commercial Rebate Programs: Evaluated Energy Savings**

Rebate Program	Total Number of Projects	Total Reported Savings <sup>c</sup> (kWh/year)	Evaluated Savings (kWh/year)	Energy Savings Realization Rate (%)	Precision <sup>a</sup>
Controls	1	2,622,923	2,601,930	99.2%	0.0% <sup>b</sup>
Data Center	10	16,461,476	13,728,460	83.4%	0.0% <sup>b</sup>
Lighting	81	3,068,673	3,144,429	102.5%	3.2%
Small Business Grant–Food Service	3	3,250	3,249	100.0%	0.0% <sup>b</sup>
Small Business Grant–HVAC	3	1,632	1,656	103.0%	0.0% <sup>b</sup>
Small Business Grant–Lighting	31	190,221	199,478	104.9%	0.0% <sup>b</sup>
<b>Total</b>	<b>129</b>	<b>22,348,175</b>	<b>19,679,202</b>	<b>88.1%</b>	<b>0.5%</b>

a Program-level and overall precision is calculated at 90% confidence.

b Precision is 0% because a census of projects was evaluated.

c SVP's total report savings were 23,565,898 kWh: 1,217,723 kWh in savings were attributed to the following programs, which were not evaluated: Exterior Lighting, Specialized Commercial and Industrial Operation Optimization Program (SCOOP), Air Conditioning/HVAC and Heat Pump, Customer Directed Rebate, Food Service Equipment, and Grant Program for Nonprofits.

**Table 2. Summary of 2021–2022 Commercial Rebate Programs: Evaluated Demand Reduction<sup>a</sup>**

Rebate Program	Total Number of Projects	Total Reported Demand Reduction <sup>d</sup> (kW)	Evaluated Demand Reduction (kW)	Demand Reduction Realization Rate (%)	Precision <sup>b</sup>
Controls	1	24.05	-21.25	-88.3%	0.0% <sup>c</sup>
Data Center	10	654.10	2020.58	308.9%	0.0% <sup>c</sup>
Lighting	81	548.30	598.36	109.1%	6.6%
Small Business Grant–Food Service	3	0.12	0.34	290.0%	0.0% <sup>c</sup>
Small Business Grant–HVAC	3	2.76	0.58	21.1%	0.0% <sup>c</sup>
Small Business Grant– Lighting	31	48.60	57.96	119.3%	0.0% <sup>c</sup>
<b>Total</b>	<b>129</b>	<b>1,277.93</b>	<b>2,656.58</b>	<b>207.9%</b>	<b>1.5%</b>

a SVP's peak demand reduction period is defined as 2 p.m. to 6 p.m., Monday through Friday, June through September.

b Program-level and overall precision is calculated at 90% confidence.

c Precision is 0% because a census of projects was evaluated.

d SVP's total report savings were 1,413 kW: 135 kW in savings were attributed to the following programs, which were not evaluated: Exterior Lighting, SCOOP, Air Conditioning/HVAC and Heat Pump, Customer Directed Rebate, Food Service Equipment, and Grant Program for Nonprofits.

Cadmus found that Small Business Grant participants are satisfied with their experiences and pleased with the equipment offered through the program. The Small Business Grant acts as a significant driver of customer participation. All interviewed participants reported that the SVP grant played a role in their decision to invest in an eligible Small Business Grant program project. Participants considered anticipated future money savings as well as aesthetic and functional improvements when deciding to install energy-efficient equipment. Most participants reported that the grant played a role in their businesses weathering the pandemic. All lighting and non-lighting measures installed through the program were reported as remaining in service, reflecting 100% measure persistence approximately 1–1.5 years after installation.

## Introduction

SVP sponsors multiple energy efficiency programs for its customers. For the 2021–2022 program year, Cadmus evaluated SVP’s three highest saving commercial rebate programs and the Small Business Grant program, as shown in Table 3. These programs constituted 94.8% of reported savings.

**Table 3. 2021–2022 Commercial Rebate Programs Evaluation Scope**

Rebate Program	Impact	Persistence
Controls	✓	
Lighting	✓	
Data Center	✓	
Small Business Grant–Food Service	✓	✓
Small Business Grant–HVAC	✓	✓
Small Business Grant– Lighting	✓	✓

Most *ex ante* savings in the commercial program portfolio come from the Controls, Data Center, and Lighting programs. The Lighting program comprised the largest number of individual projects.

The Small Business Grant program was developed in response to the COVID-19 pandemic and intended to help smaller customers remain in business, hence SVP’s interest in persistence of the measures.

## Methodology

Cadmus evaluated the programs in accordance with the California Energy Commission’s most recent *Publicly Owned Utility (POU) Evaluation, Measurement, and Verification Guidelines*. When evaluating measure energy savings and demand reduction impacts, Cadmus followed the most recent POU technical reference manual (TRM). If a measure was not found in the TRM, other California-specific savings estimation methods, such as the California eTRM, were applied.

For the Small Business Grant persistence evaluation, Cadmus conducted telephone interviews of grant recipients. The overall objectives of the persistence evaluation were to assess whether the business was still operating at the same location, whether the grant measure was still in service or removed, and what factors helped the business persist through the pandemic including whether the grant had any impact.

## Evaluation Activities

In conducting the 2021–2022 commercial rebate programs evaluation, Cadmus used the approach outlined in Table 4.

**Table 4. Evaluation Activities**

Activity	Overview
<b>Initial Program Data Review</b>	Review program tracking data to characterize the sample frame and design a sampling plan.
<b>Sampling</b>	Select verification and participant survey samples for each program to meet or exceed $\pm 10\%$ precision at a 90% confidence level.
<b>Desk Reviews</b>	Review program documentation and identify data gaps and calculation methodology inaccuracies.
<b>Savings Analysis</b>	Adjust savings calculations using findings from desk reviews; extrapolate realization rates to the population and compute confidence and precision.
<b>Participant Interviews (Energy Efficiency Grant program for Small Businesses only)</b>	Collect qualitative feedback about the program, focusing on persistence of business operations and of persistence of installed measures; and verify hours of use.

## Sample Design

Cadmus reviewed SVP’s program data and worked with SVP to ensure projects were allocated to the correct program and reporting year prior to developing a sample frame for each major program. To select a robust impact evaluation sample that would ensure a minimum of 90% confidence with  $\pm 10\%$  precision for evaluated energy savings by program, Cadmus divided the population of 2021–2022 Commercial Rebate program projects into five program strata: Controls, Data Center, Large and Small Lighting, and Small Business Grant projects. Due to their large savings but small populations, Cadmus selected a census of records for the evaluation samples for the Controls program (one project) and Data Center program (ten projects).



The Lighting program was stratified into large projects ( $\geq 100,000$  kWh of reported savings) and small projects (less than 100,000 kWh of reported savings), and Cadmus selected a random sample within each stratum. Four projects were selected from the large lighting stratum, representing 23% of total reported lighting savings. Ten projects were selected from the small lighting stratum, representing 5% of total reported lighting savings. Overall, 28% of overall reported lighting savings were sampled.

For the Small Business Grant program, Cadmus examined persistence for a census of projects. *Appendix A* details the overall evaluation sampling distribution.

## Desk Reviews

Cadmus reviewed available project documentation for all sampled evaluation projects. The documentation included a completed application form with site and customer contact information; final approved energy savings, demand reductions, and rebate; and a post-installation inspection form from the implementer.

Lighting program projects also included detailed invoices, specification sheets, and prescriptive and/or customer calculation workbooks, as applicable. Cadmus reviewed the invoices to verify fixture quantities; the fixture or lamp specification sheets and ENERGY STAR or Design Lights Consortium (DLC) rated wattages to verify installed watts; and the calculation workbooks to verify appropriate space types, HOU, peak coincident factors, interactive HVAC energy factors, and controls savings factors. Cadmus found that the documentation for most lighting projects did not include post-inspection photos of installed lighting fixtures, space types, and controls.

Additional supporting project documentation for non-lighting program projects varied, although all projects included a completed application form and at least one calculation workbook. Some projects included pre- and post-installation summary reports, metered and/or trend data, M&V plans, and photos. Data center projects included for a second, third, fourth, or fifth-year evaluation sometimes included previous energy-savings calculations.

Several of the sampled evaluation projects were missing the following documentation:

- Post-inspection documentation of installed equipment, such as photos of nameplates and controls
- Energy model simulation files

Given the thoroughness of project documentation supplied by SVP, Cadmus did not conduct site visits for any of the sampled projects. When we had questions on the evaluated savings or provided documentation, we first confirmed with the implementer that it had provided all project documentation for review. Cadmus requested additional documentation from the implementer for projects with data gaps that prevented the team from recreating the reported energy savings and demand reductions. The implementer was able to supply all information Cadmus requested except in one instance when energy model simulation files could not be obtained. For the project where energy model simulation files could not be obtained, Cadmus interviewed the SVP team and they indicated that they did not obtain the file since they

did not have the software to open it, but reviewed the simulation files with the implementer over a conference call.

## *Energy Efficiency Grant Program for Small Businesses Participant Interviews*

Cadmus evaluated the persistence of the Small Business Grant measures and their impacts by conducting phone interviews with program participants. SVP sent an initial outreach email to small business grant program participants to advise them that Cadmus would follow up to conduct brief 10 to 15-minute interviews. Thirty-four businesses participated, representing a total of 37 Small Business Grant program projects. Cadmus completed interviews with 30 businesses, representing 33 projects. Cadmus was unable to conduct interviews with four businesses.<sup>1</sup> The phone interviews addressed the following questions:

- Is the participating business still open and operating?
- What are the business' operating days and hours?
- What did the program measure(s) replace or was the program measure(s) part of an expansion?
- Is the program measure(s) still installed and in service?
- Did the SVP program have an impact on energy/operating savings?
- Did the SVP program help the participant business during the pandemic economy?
- Did the SVP program have an impact on decision-making to move forward with and/or invest in the program-eligible project?

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<sup>1</sup> One business was too busy to provide feedback. Two businesses were not responsive despite several repeated outreach attempts. The fourth business no longer occupies the space where program measures were installed, and the new occupant could not be located.

# Impact Evaluation Findings

This section summarizes Cadmus' findings for the 2021–2022 SVP Commercial Rebate programs based on our analyses of the evaluation sample.

## Portfolio-Level Evaluated Energy Savings and Demand Reductions

Based on the findings from the desk reviews, Cadmus calculated energy savings and demand reductions for the evaluation sample and applied the results to estimate program savings and demand reductions. Table 5 and Table 6 summarize the evaluated energy savings, demand reductions, and realization rates for each of the commercial rebate programs.

**Table 5. 2021–2022 Commercial Rebate Programs Evaluated Energy Savings**

Rebate Program	Total Number of Projects	Sampled Projects	Total Reported Savings <sup>c</sup> (kWh/year)	Evaluated Savings (kWh/year)	Energy Savings Realization Rate (%)	Precision <sup>a</sup>
Controls	1	1	2,622,923	2,601,930	99.2%	0.0% <sup>b</sup>
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c SVP's total report savings were 23,565,898 kWh: 1,217,723 kWh in savings were attributed to the following programs, which were not evaluated: Exterior Lighting, SCOOP, AC/HVAC, Customer Directed, Food Service and Non-Profit Grant.

**Table 6. 2021–2022 Commercial Rebate Programs Evaluated Demand Reduction<sup>a</sup>**

Rebate Program	Total Number of Projects	Sampled Projects	Total Reported Demand <sup>d</sup> Reduction (kW)	Evaluated Demand Reduction (kW)	Demand Reduction Realization Rate (%)	Precision <sup>b</sup>
Controls	1	1	24.05	-21.25	-88.3%	0.0% <sup>c</sup>
Data Center	10	10	654.10	2020.58	308.9%	0.0% <sup>c</sup>
Lighting	81	14	548.30	598.36	109.1%	6.6%
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a SVP's peak demand reduction is defined as 2 p.m. to 6 p.m., Monday through Friday, June through September.

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d SVP's total report savings were 1,413 kW: 135 kW in savings were attributed to the following programs, which were not evaluated: Exterior Lighting, SCOOP, AC/HVAC, Customer Directed, Food Service and Non-Profit Grant.

*O* shows reported and evaluated energy savings, demand reductions, and realization rates for each sampled project. *O* contains detailed evaluation observations for each sampled project.

## *Program and Project-Specific Findings*

This section provides additional details on general evaluation observations for sampled projects and common reasons for savings adjustments.

### Controls Program

The Controls program project contained custom efficiency measures with unique analyses, including controls upgrades like supply air temperature and duct static pressure reset and the installation of pump variable frequency drives (VFDs). The implementer used post-installation data to calculate savings using temperature data gathered at the site. These data were used to develop regression models to estimate savings. Cadmus identified regressions were not split into occupied and unoccupied periods. This caused a discrepancy between evaluated and reported energy savings and demand reductions for the project.

Cadmus separated the data into unoccupied and occupied periods to try to improve regression R-squared values. In some cases, this resulted in improved accuracy; however, for many regressions it did not provide significant differences. The building that saw the largest change in savings due to separating the regressions, had a minor impact on energy savings and a significant impact on demand reductions. Other than the regression separation, Cadmus found the calculation methodology to be accurate for estimating savings.

### Data Center Program

The Data Center program projects were comprised of mainly custom cooling system efficiency measures and high efficiency IT equipment. Because data center IT loads (and associated energy use) typically ramp up over a period of three to four years for new construction data centers, the Data Center program is designed to provide incentives and claim savings annually for each year of the four-year M&V period. By doing this, SVP can claim the verified full build-out savings instead of savings for a partly loaded facility. The claimed savings each year represent the incremental savings achieved over the prior year. The incentive paid annually to the customer is a portion of the overall project incentive. In a situation when a data center's IT load decreased from the prior period, SVP will report no additional incremental savings for that period but the customer may still receive an incentive payment based on a portion of the cumulative project savings. This evaluation focused on the incremental savings of a specific M&V period for each project.

Measures rebated in the Data Center program include rack fluid-cooling systems, high-performance chillers, electronically commutated (EC) plug fans for computer room air handling (CRAH) units, optimized airflow control strategies, and VFDs for pumps and fans.

Three of four data center projects involved the implementation of back-of-the-rack cooling systems. These systems cool IT equipment with in-rack liquid heat exchangers instead of traditional CRAH airflow systems, resulting in greater cooling efficiency. Two of the back-of-the-rack cooling system projects also utilized high efficiency chiller plants. The fourth data center project utilized waterside economizers to produce process cooling water instead of a chiller or DX cooling. Reported calculations for all four projects utilize a weather bin model spreadsheet calculation method that simulates energy use of the data center and cooling energy use as a function of annual outside air wet bulb temperatures. Cadmus adjusted the evaluated load for all four projects by establishing a relationship of IT server energy use and cooling equipment energy use to outside air temperature wet bulb and applying the results to the reported weather bin model spreadsheet. For the back-of-the-rack projects, these adjustments resulted in greater electric energy savings and peak demand savings than reported for two projects and lower savings than reported for one project. For the project with lower savings, the reported calculation used three months of measured data for the IT load and chiller plant operation. The average IT load and average chiller plant efficiency data over the three month measurement period was compared to the baseline chiller plant efficiency to calculate the annual energy savings. The waterside economizer project was found to realize 100% of reported electric energy savings and greater than 100% of reported peak demand savings.

Two projects involved the replacement of CRAH constant speed fans with variable speed EC plug fans. The EC plug fans modulate speed to maintain underfloor plenum pressure, resulting in lower fan energy use during variable load conditions. Cadmus found the reported energy savings calculations for both projects assumed that the operating CRAH units were enabled and running at 100% speed at all times. For each project, the number of CRAH units operating in the baseline condition was adjusted to match the airflow requirements for the IT load installed plus an N+2 redundancy for each data suite. Cadmus adjusted the savings calculations by removing the redundant units, reducing the number of baseline supply fans enabled to match the measured cooling load. Lower energy savings were realized after making these adjustments. Due to the ability of the CRAH units to operate at full speed, the projects did not report demand reductions from the EC plug fans, but Cadmus calculated demand reductions of 92 kW and 29 kW respectively based on the provided trend data.

One project involved the implementation of an optimized airflow control strategy for a data center. The reported calculations utilized trend data from 1/1/21 – 12/31/21. A subset of the trend data from the reported calculations was from a prior M&V period (1/1/21 – 5/1/21). Cadmus removed the trend data from the prior M&V period (1/1/21 – 5/1/21) and analyzed the IT equipment energy use, cooling equipment energy use, and outside air temperature based on trend data from 5/1/21 – 12/31/21. The resulting regression analysis was utilized in revising calculations resulting in lower energy savings than reported. The project did not report a demand reduction, but Cadmus calculated a demand reduction of 159 kW based on the updated trend data.

One project involved the installation of VFDs on chilled water pumps and CRAH fans. VFDs save energy by modulating pump or fan motor speed to match the load conditions. Cadmus found this project accurately calculated electric energy savings and included appropriate supporting documentation.

Cadmus found the demand reduction was slightly lower than reported, based on an analysis of trend data.

One project involved the installation of a high-efficiency chiller to cool the data center. Reported electric energy savings and demand reductions were calculated using an energy model; however, the project documentation did not include the energy model files and the report included discrepancies that did not match other verification documentation. For example, the energy simulation model results for the “existing IT load” indicated a 7,200 kW demand load by the IT equipment while the reported rebate calculation document indicated a 5,485 kW demand load by the IT equipment. Additionally, the energy simulation model indicated cooling energy use as 447 kW for the “existing IT load” and the reported rebate calculation document indicated a 1,751 kW load. Cadmus and the SVP team conferred these discrepancies over a conference call and were unable to resolve the discrepancies. Cadmus and SVP were unable to collect documentation supporting the energy model inputs. To evaluate savings, Cadmus utilized screen captures of the baseline system load and energy use prior to project implementation and determined savings as the average power usage effectiveness (PUE) improvement across all data center projects evaluated through this program. As a result of this evaluation, the project realized lower electric energy savings but significantly higher demand reduction than reported.

## Lighting Program

The Lighting program incentivizes customers to install new energy-efficient lighting to reduce their energy costs. The program has two rebate options: prescriptive and custom. The prescriptive rebate offers a fixed rate per fixture for 2’x2’ and 2’x4’ LED troffers, low-bay LED fixtures, and high-bay LED fixtures. Alternatively, customers can use SVP’s custom lighting rebate calculator to estimate the energy savings, demand reduction, and custom rebate amount for their lighting projects. The custom rebate is based on estimated energy savings from fixture and/or control changes and is capped at 100% of qualifying equipment costs. Customers can take advantage of either the prescriptive or custom offering for each measure in their project, but not both.

## Small Stratum

Except for one project, verified fixture models, wattages, and quantities matched values listed in the project documentation. In general, the primary source of discrepancy between reported and evaluated savings resulted from a difference in deemed demand value used to calculate savings. Cadmus evaluated demand reductions based on the program planning tool’s deemed values, which Cadmus verified was in alignment with the TRM. In three cases the demand value did not align.

## Large Stratum

Most large stratum lighting projects had minimal adjustments. The most common adjustment among these projects were due to HOU discrepancies and unverified controls.

## Small Business Grant Program

The Small Business Grant program incentivizes small businesses for installations pertaining to lighting, food service, and HVAC upgrades. Cadmus reviewed a census of these projects for the program year 2021–2022.

## *Small Business Grant–Lighting*

For small business lighting, Cadmus calculated savings based on interviews, invoices, specification sheets, and other project documentation. Cadmus found the interviews to be particularly helpful for updating project information, as we found many of the HOU assumptions differed significantly based on interview responses. Generally, we found the most common discrepancies were differences in wattages, HOU, and controls. For one project, which saw the biggest difference in realization rate, the HOU were updated based on interview responses. Additionally, the 6 W lamps that were claimed were found to have a wattage of 10 W. Another project had no documentation provided for the existing lighting. Cadmus had to assume a reasonable baseline that differed from SVP's calculations. Last, Cadmus found one project (R22-SBGR-0047 – HVAC) was miscategorized as lighting when it was HVAC. Cadmus adjusted this in reporting and is noting it for SVP's awareness of claimed savings.

## *Small Business Grant–Food Service*

For small business food service, three of the projects were calculated using the POU TRM. The third project involved a walk-in cooler evaporator fan ECM measure not found in the POU TRM, so the eTRM was used to calculate savings. All projects received a realization rate near 100%. Only one discrepancy was found where a project did not claim a demand reduction for a measure that should have had a demand reduction.

## *Small Business Grant–HVAC*

For small business HVAC, only one project of the two had a discrepancy. This project involved the installation of a 7-ton heat pump. Cadmus used the TRM100 workbook (from the POU TRM) to calculate savings, which were slightly higher than claimed savings resulting in a realization rate of 107%.

## Energy Efficiency Grant Program for Small Businesses

### Persistence Findings

#### *Business Operations Persistence*

All interviewed Small Business Grant participants, except for two participants, reported that their businesses continue to operate at the same address where program measure(s) were installed with no significant changes to operating hours. One participant shared that program measures were left in place but that their business is in the process of relocating and the vacated space has not yet been leased by a new tenant. Another participant shared that they are choosing to relocate their business to another state and the space is temporarily being used for storage while in the process of moving. This participant shared that they own the building where the measures were installed and plan to continue ownership. Despite moving their business, they plan to leave the program measures in place for the next tenant.

#### *Measure Findings and Persistence*

Twenty-eight of thirty-three interviews conducted were specific to installed lighting measures. All these respondents shared that the lighting measures replaced existing lighting, in many cases fluorescent lighting. Most participants indicated their existing lighting was operational at the time of program participation. One participant shared that half of their existing lighting was no longer working at the time of replacement. Another explained that their lighting was requiring constant bulb replacement, while one participant advised that some lighting was not operational as it had become difficult to find replacement bulbs. Five interviews conducted were specific to non-lighting measures installed through the program. All but one non-lighting respondent shared that the equipment replaced through the program was operational at the time of participation. All lighting and non-lighting measures installed through the program were reported as remaining in service, reflecting 100% measure persistence approximately 1–1.5 years after installation. Respondents indicated overall satisfaction with the equipment installed.

#### *Program Impacts*

All respondents shared that the Small Business Grant program spurred them to replace existing equipment. This was true for both lighting and non-lighting measures. Nineteen participants noted that the grant had an impact on energy and/or operating cost savings. Though several participants shared that they did not believe the grant had an impact on energy or operating cost savings, four were not certain of the savings impact from the grant measures. Two participants who were uncertain of the impact from the grant on energy/operating savings noted that they do not track energy costs. Another participant indicated that they utilize a lot of high-power equipment making it difficult to decipher the impact on savings of a lighting project. Yet another advised that their energy bill was about the same as prior to measure replacement.



When asked if the grant program helped their business weather the impact of the COVID-19 pandemic, twenty-four respondents indicated that it did. For those who indicated that the grant did not impact their business weathering the COVID-19 pandemic, few participants elaborated. One participant shared that their businesses was considered essential and as a result their business hours and ability to remain open to the public were not impacted by the pandemic.

Participants noted a reduction in energy costs, increased productivity, a better work environment, and an uptick in business because of improved measures.

## *Program Satisfaction and Challenges*

Overall, participants are satisfied with the Small Business Grant and their energy efficiency measures. Participants appreciate the support from SVP and have a positive impression of SVP. Participants also noticed the improved quality of program measures, as compared to the equipment that was replaced. Though participants were quite satisfied, six participants did note issues that were measure- or contractor-related and not related to SVP. Issues included difficulty finding a contractor willing to do the installation, measure availability, individual lights no longer operating, occupancy sensors' settings, poor installation quality, and lack of contractor follow up with participants. The implementer confirmed all the customers who experienced issues were served by the same contractor.

## Conclusions and Recommendations

Cadmus evaluated overall 2021–2022 Commercial Rebate program energy savings and demand reduction realization rates of 88.1% and 207.9% respectively. However, we identified project-level discrepancies, particularly with the non-lighting programs. Some of these discrepancies may be mitigated with more rigorous post-inspection data collection and review and quality control of program tracking database entries. The Small Business Grant program was largely successful, achieving 100% persistence; however there were a few instances where participants noted issues with their contractors or installed equipment. Our conclusions and recommendations for improvement are listed below.

- **Conclusion 1:** Small business lighting project wattages were found to be different in many cases than reported wattages. This is because the implementer added 2 watts per lamp to account for energy used by the ballast. This was done because the rebate is calculated based on energy savings and the implementer did not want to overpay for energy savings that were not achieved.
  - **Recommendation 1:** Implementer should make every attempt to capture complete model numbers of fixtures so that the DesignLights Consortium (DLC) database can be used to record efficient wattages..
- **Conclusion 2:** Understanding project demand impacts are critical for utility electric grid planning. Many of the evaluated projects did not report or include calculations for peak demand reductions.
  - **Recommendation 2:** Require all projects to report peak demand impacts. Projects with no demand impacts should be reported as 0 kW.
- **Conclusion 3:** The large controls project’s regression R-squared values were very low. When linear regression is used to evaluate energy consumption in a bin-data analysis, separate regressions based on independent variables, like occupancy, should be used.
  - **Recommendation 3:** When performing a bin-data analysis to evaluate energy consumption, perform separate regressions based on independent variables like occupancy. In some cases this may be difficult but identifying these variables should improve regression accuracy in most cases.
- **Conclusion 4:** For a large data center project, the implementer did not provide energy model input files for the project’s reporting savings through an energy model simulation. Without the energy model input files, Cadmus was unable to verify or resolve discrepancies between the energy model report output and the on-site M&V documentation.
  - **Recommendation 4:** Require the implementer to provide all energy model simulation files for projects reporting savings through energy model simulation.
- **Conclusion 5:** Two projects involving the replacement of CRAH constant speed fans with variable speed EC plug fans reported savings where the baseline cooling load did not match the post-implementation cooling load. The reported savings applied an N+2 redundancy to the number of

CRAH units needed to match the baseline airflow requirements. In these situations, the reported savings may be overestimating baseline cooling energy use and overstating savings.

- **Recommendation 5:** Ensure the data center cooling load is equivalent before and after project implementation for projects where IT equipment efficiency is not improved.
- **Conclusion 6:** Some Small Business Grant participants noted difficulty locating program-eligible equipment, challenges finding contractors willing to complete program eligible work, and a lack of contractor responsiveness when measure and/or work quality issues arose. The implementer confirmed all the customers who experienced issues were served by the same contractor. It is noted that customers can choose any contractor they wish and there are no program contractors.
  - **Recommendation 6:** For future small business grant programs, the implementer should consider enacting an outreach protocol with program participants both pre and post installation to mitigate potential measure and contractor challenges.
- **Conclusion 7:** Most projects were lacking post-inspection photos to verify equipment was installed and not just purchased.
  - **Recommendation 7:** The implementer informed Cadmus they began taking post-inspection photos starting July 1, 2022.

## Appendix A. Evaluation Sampling Distribution

Table 7 details the overall evaluation sampling distribution.

**Table 7. Verification Sample**

Rebate Program	Sample Type	Project ID	Reported Energy Savings (kWh)	Percentage of Program
<b>Controls</b>	Census (entire program)	R22-CPR-0015 - Controls	2,622,923	100%
	<b>Total Program Savings</b>		<b>2,622,923</b>	<b>100%</b>
<b>Data Center</b>	Census	R19-DCR-0113-4	-	0%
	Census	R19-DCR-0115-4	-	0%
	Census	R19-DCR-0116-4	457,307	3%
	Census	R19-DCR-0146-4	-	0%
	Census	R19-DCR-0147-4	87,172	1%
	Census	R20-DCR-0072-3	86,050	1%
	Census	R21-DCR-0022-2	133,811	1%
	Census	R22-DCR-0097	3,249,385	20%
	Census	R22-DCR-0097-2	8,052,361	49%
	Census	R22-DCR-0105	4,395,390	27%
	<b>Total Program Savings</b>		<b>16,461,476</b>	<b>100%</b>
<b>Lighting</b>	Large - Random	R22-SLR-0034 - Lighting	150,373	5%
	Large - Random	R22-SLR-0059 - Lighting	106,995	3%
	Large - Random	R22-SLR-0114 - Lighting	124,935	4%
	Large - Random	R22-SLR-0119 - Lighting	181,860	6%
	Small - Random	R22-SLR-0002 - Lighting	4,588	0%
	Small - Random	R22-SLR-0009 - Lighting	1,360	0%
	Small - Random	R22-SLR-0014 - Lighting	2,210	0%
	Small - Random	R22-SLR-0018 - Lighting	850	0%
	Small - Random	R22-SLR-0065 - Lighting	4,806	0%
	Small - Random	R22-SLR-0087 - Lighting	18,168	1%
	Small - Random	R22-SLR-0109 - Lighting	7,990	0%
	Small - Random	R22-SLR-0110 - Lighting	9,312	0%
	Small - Random	R22-SLR-0159 - Lighting	3,400	0%
	Small - Random	R22-SLR-0189 - Lighting	13,940	0%
	<b>Total Program Savings</b>		<b>3,068,673</b>	<b>13%</b>
<b>Small Business Grant – Food Service</b>	Census	R22-SBGR-0052 - SmBus Food Service	2,148	66%
	Census	R22-SBGR-0054 - Food Service	248	8%
	Census	R22-SBGR-0056 - SmBus Grant	854	26%
	<b>Total Program Savings</b>		<b>3,250</b>	<b>100%</b>

Rebate Program	Sample Type	Project ID	Reported Energy Savings (kWh)	Percentage of Program
Small Business Grant – HVAC	Census	R22-SBGR-0027 - HVAC	347	21%
	Census	R22-SBGR-0047 - HVAC	750	46%
	Census	R22-SBGR-0126 - HVAC	535	33%
	Total Program Savings		1,632	100%
Small Business Grant – Lighting	Census	R22-SBGR-0012 - SmBus Lighting	3,405	2%
	Census	R22-SBGR-0042 - SmBus Lighting	12,789	7%
	Census	R22-SBGR-0046 - SmBus Grant Lighting	9,088	5%
	Census	R22-SBGR-0054 - Lighting	4,386	2%
	Census	R22-SBGR-0056 - SmBus Grant	1,431	1%
	Census	R22-SBGR-0057 - SmBus Lighting	8,806	5%
	Census	R22-SBGR-0083 - SmBus Lighting	5,356	3%
	Census	R22-SBGR-0084 - SmBus Lighting	10,080	5%
	Census	R22-SBGR-0085 - SmBus Lighting	9,181	5%
	Census	R22-SBGR-0090 - Lighting	6,644	3%
	Census	R22-SBGR-0091 - SmBus Lighting	2,491	1%
	Census	R22-SBGR-0092 - Lighting	6,111	3%
	Census	R22-SBGR-0101 - SmBus Lighting	2,716	1%
	Census	R22-SBGR-0107 - SmBus	1,649	1%
	Census	R22-SBGR-0108 - Lighting	5,626	3%
	Census	R22-SBGR-0122 - SmBus Lighting	6,966	4%
	Census	R22-SBGR-0124 - SmBus Lighting	1,502	1%
	Census	R22-SBGR-0132 - SmBus Lighting	15,768	8%
	Census	R22-SBGR-0140 - SmBus Lighting	6,855	4%
	Census	R22-SBGR-0137 - SmBus Lighting	5,433	3%
	Census	R22-SBGR-0139 - SmBus Lighting	5,963	3%
	Census	R22-SBGR-0141 - SmBus Lighting	7,133	4%
	Census	R22-SBGR-0150 - SmBus Lighting	2,082	1%
	Census	R22-SBGR-0151 - SmBus Grant	10,246	5%
	Census	R22-SBGR-0152 - SmBus Lighting	8,616	5%
	Census	R22-SBGR-0153 - SmBus Lighting	12,689	7%
	Census	R22-SBGR-0155 - SmBus Lighting	4,470	2%
	Census	R22-SBGR-0156 - SmBus Lighting	2,037	1%
	Census	R22-SBGR-0157 - SmBus Lighting	6,038	3%
	Census	R22-SBGR-0158 - SmBus Lighting	2,173	1%
	Census	R22-SBGR-0161 - SmBus Lighting	2,491	1%
	Total Program Savings		190,221	100%

## Appendix B. Evaluated Savings and Realization Rates

Table 8 details reported and evaluated energy savings, demand reductions, and realization rates for each sampled project.

**Table 8. Evaluation Sample Detailed Savings and Realization Rates**

Rebate Program	Project ID	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Evaluated Energy Savings (kWh)	Evaluated Demand Reduction (kW)	Energy Savings Realization Rate (%)	Demand Reduction Realization Rate (%)
<b>Controls</b>	R22-CPR-0015 - Controls	2,622,923	24.05	2,601,930	(21.25)	99.2%	-88.3%
<b>Data Center</b>	R19-DCR-0113-4	-	-	7,588	0.86	N/A <sup>b</sup>	N/A <sup>a</sup>
	R19-DCR-0115-4	-	-	128,751	14.68	N/A <sup>b</sup>	N/A <sup>a</sup>
	R19-DCR-0116-4	457,307	44.80	-524,129	-3.29	-114.6%	-7.4%
	R19-DCR-0146-4	-	-	-903,204	91.88	N/A <sup>b</sup>	N/A <sup>a</sup>
	R19-DCR-0147-4	87,172	-	-141,680	28.61	-162.5%	N/A <sup>a</sup>
	R20-DCR-0072-3	86,050	-	45,660	159.06	53.1%	N/A <sup>a</sup>
	R21-DCR-0022-2	133,811	-	133,811	-4.08	100.0%	N/A <sup>a</sup>
	R22-DCR-0097	3,249,385	348.30	3,208,715	366.29	98.8%	105.4%
	R22-DCR-0097-2	8,052,361	261.00	8,034,751	939.84	99.8%	360.1%
	R22-DCR-0105	4,395,390	-	3,738,196	426.73	85.1%	N/A <sup>a</sup>
<b>Standard Lighting</b>	R22-SLR-0002 - Lighting	4,588	1.63	4,588	1.63	100.0%	100.0%
	R22-SLR-0009 - Lighting	1,360	0.38	1,360	0.57	100.0%	149.5%
	R22-SLR-0014 - Lighting	2,210	0.92	2,210	0.92	100.0%	100.0%
	R22-SLR-0018 - Lighting	850	0.36	850	0.36	100.0%	100.0%
	R22-SLR-0034 - Lighting	150,373	21.04	173,713	25.32	115.5%	120.4%
	R22-SLR-0059 - Lighting	106,995	29.56	107,090	29.74	100.1%	100.6%
	R22-SLR-0065 - Lighting	4,806	1.35	4,806	1.89	100.0%	139.8%
	R22-SLR-0087 - Lighting	18,168	5.15	18,168	5.42	100.0%	105.3%
	R22-SLR-0109 - Lighting	7,990	3.33	7,990	3.34	100.0%	100.2%
	R22-SLR-0110 - Lighting	9,312	1.92	9,312	1.92	100.0%	100.0%
	R22-SLR-0114 - Lighting	124,935	32.35	124,918	32.35	100.0%	100.0%
	R22-SLR-0119 - Lighting	181,860	18.12	182,057	18.16	100.0%	100.0%
	R22-SLR-0159 - Lighting	3,400	0.96	3,400	0.96	100.0%	100.0%
	R22-SLR-0189 - Lighting	13,940	3.94	13,940	5.82	100.0%	147.8%
<b>Small Business Grant – Food Service</b>	R22-SBGR-0052 - SmBus Food Service	2,148	-	2,148	0.22	100.0%	N/A <sup>a</sup>
	R22-SBGR-0054 - Food Service	248	0.03	2467	0.03	99.5%	99.9%
	R22-SBGR-0056 - SmBus Grant	854	0.09	854	0.09	100.0%	99.7%
<b>Small Business Grant – HVAC</b>	R22-SBGR-0027 - HVAC	347	2.40	371	0.22	106.9%	9.3%
	R22-SBGR-0047 - HVAC	750	0.17	750	0.17	100.0%	100.0%
	R22-SBGR-0126 - HVAC	535	0.19	535	0.19	100.0%	100.0%

Rebate Program	Project ID	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Evaluated Energy Savings (kWh)	Evaluated Demand Reduction (kW)	Energy Savings Realization Rate (%)	Demand Reduction Realization Rate (%)
Small Business Grant – Lighting	R22-SBGR-0012 - SmBus Lighting	3,405	0.64	3,602	0.67	105.8%	105.1%
	R22-SBGR-0042 - SmBus Lighting	12,789	3.26	14,727	3.47	115.2%	106.3%
	R22-SBGR-0046 - SmBus Grant Lighting	9,088	2.48	9,129	2.51	100.5%	101.1%
	R22-SBGR-0054 - Lighting	4,386	1.05	4,000	1.08	91.2%	103.0%
	R22-SBGR-0056 - SmBus Grant	1,431	0.40	1,372	0.37	95.9%	92.5%
	R22-SBGR-0057 - SmBus Lighting	8,806	1.65	4,415	2.14	50.1%	129.7%
	R22-SBGR-0083 - SmBus Lighting	5,356	1.33	4,505	1.15	84.1%	86.7%
	R22-SBGR-0084 - SmBus Lighting	10,080	1.41	10,650	2.63	105.7%	186.3%
	R22-SBGR-0085 - SmBus Lighting	9,181	1.39	10,123	3.98	110.3%	286.5%
	R22-SBGR-0090 - Lighting	6,644	1.39	6,667	1.41	100.3%	101.3%
	R22-SBGR-0091 - SmBus Lighting	2,491	0.98	2,926	1.15	117.5%	117.2%
	R22-SBGR-0092 - Lighting	6,111	1.26	6,111	1.26	100.0%	100.0%
	R22-SBGR-0101 - SmBus Lighting	2,716	0.56	2,716	0.56	100.0%	100.0%
	R22-SBGR-0107 - SmBus	1,649	0.34	1,649	0.34	100.0%	100.0%
	R22-SBGR-0108 - Lighting	5,626	1.16	5,626	1.16	100.0%	100.0%
	R22-SBGR-0122 - SmBus Lighting	6,966	2.95	7,491	2.96	107.5%	100.4%
	R22-SBGR-0124 - SmBus Lighting	1,502	-	1,250	0.26	83.2%	N/A <sup>a</sup>
	R22-SBGR-0132 - SmBus Lighting	15,768	6.54	17,046	6.59	108.1%	100.8%
	R22-SBGR-0137 - SmBus Lighting	5,433	1.66	5,759	1.66	106.0%	100.1%
	R22-SBGR-0139 - SmBus Lighting	5,963	2.30	7,074	2.56	118.6%	111.1%
	R22-SBGR-0140 - SmBus Lighting	6,855	-	6,141	1.44	89.6%	N/A <sup>a</sup>
	R22-SBGR-0141 - SmBus Lighting	7,133	1.68	7,524	1.76	105.5%	104.8%
	R22-SBGR-0150 - SmBus Lighting	2,082	0.63	2,282	0.70	109.6%	111.7%

Rebate Program	Project ID	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Evaluated Energy Savings (kWh)	Evaluated Demand Reduction (kW)	Energy Savings Realization Rate (%)	Demand Reduction Realization Rate (%)
Small Business Grant – Lighting	R22-SBGR-0151 - SmBus Grant	10,246	4.25	11,944	4.61	116.6%	108.5%
	R22-SBGR-0152 - SmBus Lighting	8,616	1.36	10,118	1.85	117.4%	136.0%
	R22-SBGR-0153 - SmBus Lighting	12,689	2.59	14,661	3.75	115.5%	144.8%
	R22-SBGR-0155 - SmBus Lighting	4,470	1.42	5,106	1.64	114.2%	115.5%
	R22-SBGR-0156 - SmBus Lighting	2,037	0.42	2,037	0.42	100.0%	100.0%
	R22-SBGR-0157 - SmBus Lighting	6,038	1.75	7,703	2.06	127.6%	117.8%
	R22-SBGR-0158 - SmBus Lighting	2,173	0.77	2,355	0.85	108.4%	110.0%
	R22-SBGR-0161 - SmBus Lighting	2,491	0.98	2,769	0.97	111.2%	98.9%

<sup>a</sup> Demand reduction was not reported for these projects.

<sup>b</sup> Energy savings were not reported for these projects.



## Appendix C. Detailed Impact Evaluation Summary Table

Table 9 provides detailed evaluation observations for each sampled project.

**Table 9. Evaluation Sample Detailed Energy Savings and Demand Reductions**

Program	Project ID	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Energy Savings Realization Rate (%)	Demand Reduction Realization Rate (%)	Observations
<b>Controls</b>	R22-CPR-0015 - Controls	2,622,923	24.05	99.0%	-88.3%	Separated regressions based on occupancy.
<b>Data Center</b>	R19-DCR-0113-4	-	-	N/A <sup>b</sup>	N/A <sup>a</sup>	Evaluated energy savings higher than reported based on Cadmus' analysis of cooling equipment and IT equipment trend data during the M&V period.
	R19-DCR-0115-4	-	-	N/A <sup>b</sup>	N/A <sup>a</sup>	Evaluated energy savings higher than reported based on Cadmus' analysis of cooling equipment and IT equipment trend data during the M&V period. Cadmus found the IT load and cooling load to be nearly three times higher than reported.
	R19-DCR-0116-4	457,307	44.80	-114.6%	-7.4%	Evaluated energy savings lower than reported based on Cadmus' analysis of cooling equipment and IT equipment trend data during the M&V period. Cadmus found the IT load and cooling load to be lower than reported.
	R19-DCR-0146-4	-	-	N/A <sup>b</sup>	N/A <sup>a</sup>	Cadmus adjusted the quantity of running CRAH fans in the baseline to match the airflow provided in the proposed condition resulting in lower baseline energy use and lower savings than reported.
	R19-DCR-0147-4	87,172	-	-162.5%	N/A <sup>a</sup>	Cadmus adjusted the quantity of running CRAH fans in the baseline to match the airflow provided in the proposed condition resulting in lower baseline energy use and lower savings than reported.

Program	Project ID	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Energy Savings Realization Rate (%)	Demand Reduction Realization Rate (%)	Observations
Data Center	R20-DCR-0072-3	86,050	0.00	53.1%	N/A <sup>a</sup>	Reported calculations utilized data from a prior M&V period (1/1/2021–5/1/2021). Evaluated savings utilized data from the current M&V period (5/1/2021–12/31/2021) resulting in lower energy savings than reported. Cadmus updated period to match period 3.
	R21-DCR-0022-2	133,811	-	100.0%	N/A <sup>a</sup>	
	R22-DCR-0097	3,249,385	348.30	98.8%	105.2%	Evaluated energy savings lower than reported based on Cadmus' analysis of cooling equipment and IT equipment trend data during the M&V period. Demand savings were found to be greater than reported.
	R22-DCR-0097-2	8,052,361	261.00	99.8%	360.1%	Evaluated energy savings lower than reported based on Cadmus' analysis of cooling equipment and IT equipment trend data during the M&V period. Demand savings were found to be greater than reported.
	R22-DCR-0105	4,395,390	-	85.1%	N/A <sup>a</sup>	Limited documentation available to support reported energy model savings. Evaluated savings based on the average PUE improvement across all data center projects from this evaluation; load profile based on screen captures of mechanical use and IT load at facility.
Lighting	R22-SLR-0119 – Lighting	181,860	18.12	100.0%	100.0%	
	R22-SLR-0002 - Lighting	4,588	1.63	100.0%	100.0%	
	R22-SLR-0009 - Lighting	1,360	0.38	100.0%	149.5%	Different deemed peak kW value.
	R22-SLR-0014 - Lighting	2,210	0.92	100.0%	100.0%	

Program	Project ID	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Energy Savings Realization Rate (%)	Demand Reduction Realization Rate (%)	Observations
Lighting	R22-SLR-0018 - Lighting	850	0.36	100.0%	100.0%	
	R22-SLR-0034 - Lighting	150,373	21.04	115.5%	120.4%	Removed the 7% HOU reduction.
	R22-SLR-0059 – Lighting	106,995	29.56	100.1%	100.6%	One line item missing savings. Small HOU discrepancy.
	R22-SLR-0065 - Lighting	4,806	1.35	100.0%	139.8%	Different deemed peak kW value.
	R22-SLR-0087 - Lighting	18,168	5.15	100.0%	105.3%	Different deemed peak kW value.
	R22-SLR-0109 - Lighting	7,990	3.33	100.0%	100.2%	
	R22-SLR-0110 - Lighting	9,312	1.92	100.0%	100.0%	
	R22-SLR-0114 - Lighting	124,935	32.35	100.0%	100.0%	
	R22-SLR-0159 – Lighting	3,400	0.96	100.0%	100.0%	
	R22-SLR-0189 - Lighting	13,940	3.94	100.0%	147.8%	Different deemed peak kW value.
Small Business Grant – Food Service	R22-SBGR-0052 - SmBus Food Service	2,148	-	100.0%	N/A <sup>a</sup>	No demand savings claimed.
	R22-SBGR-0054 - Food Service	248	0.03	99.5%	99.9%	Used new eTRM new savings over old savings.
	R22-SBGR-0056 - SmBus Grant	854	0.09	100.0%	99.7%	
Small Business Grant – HVAC	R22-SBGR-0027 - HVAC	347	2.40	106.9%	9.3%	Difference in TRM workbook savings. (TRM100)
	R22-SBGR-0047 - HVAC	750	0.17	100.0%	100.0%	HVAC project miscategorized as lighting.
	R22-SBGR-0126 - HVAC	535	0.19	100.0%	100.0%	
Small Business Grant – Lighting	R22-SBGR-0012 - SmBus Lighting	3,405	0.64	105.8%	105.1%	Removed 7% HOU reduction.
	R22-SBGR-0042 - SmBus Lighting	12,789	3.26	115.2%	106.3%	The LED panel was determined to be a 50W dimmable fixture. The 7% HOU reduction was removed.
	R22-SBGR-0046 - SmBus Grant Lighting	9,088	2.48	100.5%	101.1%	Rounding difference.

Program	Project ID	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Energy Savings Realization Rate (%)	Demand Reduction Realization Rate (%)	Observations
Small Business Grant – Lighting	R22-SBGR-0054 - Lighting	4,386	1.05	91.2%	103.0%	Savings based on TRM400 operating hours updated. No calculation file provided.
	R22-SBGR-0056 - SmBus Grant	1,431	0.40	95.9%	95.9%	HOU adjustment.
	R22-SBGR-0057 - SmBus Lighting	8,806	1.65	50.1%	129.7%	Hours differed from reported by 50%.
	R22-SBGR-0083 - SmBus Lighting	5,356	1.33	84.1%	86.7%	Changed 14W bulbs to 12W based on the provided specification sheet.
	R22-SBGR-0084 - SmBus Lighting	10,080	1.41	105.7%	186.3%	Changed 14W lights to 12W based on the specification sheet.
	R22-SBGR-0085 - SmBus Lighting	9,181	1.39	110.3%	286.5%	HOU was updated to match information provided in the interview. Changed from 14W to 12W.
	R22-SBGR-0090 - Lighting	6,644	1.39	100.3%	101.3%	Changed 14W light to 12W based on the specification sheet.
	R22-SBGR-0091 - SmBus Lighting	2,491	0.98	117.5%	117.2%	Changed the 14W light to 12W based on the specification sheet.
	R22-SBGR-0092 - Lighting	6,111	1.26	100.0%	100.0%	
	R22-SBGR-0101 - SmBus Lighting	2,716	0.56	100.0%	100.0%	
	R22-SBGR-0107 - SmBus	1,649	0.34	100.0%	100.0%	
	R22-SBGR-0108 - Lighting	5,626	1.16	100.0%	100.0%	
	R22-SBGR-0122 - SmBus Lighting	6,966	2.95	107.5%	100.4%	Removed 7% HOU reduction.
	R22-SBGR-0124 - SmBus Lighting	1,502	-	83.2%	N/A <sup>a</sup>	Preexisting lighting type not found, used a combo of invoice and SVP Excel Sheet.
	R22-SBGR-0132 - SmBus Lighting	15,768	6.54	108.1%	100.8%	Changed the 14W light to 12W based on the specification sheet. Removed the 7% HOU reduction.
	R22-SBGR-0137 - SmBus Lighting	5,433	1.66	106.0%	100.1%	Removed 7% HOU reduction. Changed all light wattages to match specification sheets.

Program	Project ID	Reported Energy Savings (kWh)	Reported Demand Reduction (kW)	Energy Savings Realization Rate (%)	Demand Reduction Realization Rate (%)	Observations
Small Business Grant – Lighting	R22-SBGR-0139 - SmBus Lighting	5,963	2.30	118.6%	111.1%	Changed 14W light to 12W based on the specification sheet. Removed 7% HOU reduction.
	R22-SBGR-0140 - SmBus Lighting	6,855	-	89.6%	N/A <sup>a</sup>	Removed 7% HOU reduction as controls could not be verified. The 2'x2' LED panel was updated from 20W to 30W to match the specification sheet.
	R22-SBGR-0141 - SmBus Lighting	7,133	1.68	105.5%	104.8%	
	R22-SBGR-0150 - SmBus Lighting	2,082	0.63	109.6%	111.7%	The baseline fixture Lamp Description was changed to be "Fluorescent 48" (3) T8 lamps BF normal," as compared to the HP lamp used as the baseline in the reported savings.
	R22-SBGR-0151 - SmBus Grant	10,246	4.25	116.6%	108.5%	The 7% HOU reduction was removed. Light wattages were changed based on the specification sheets.
	R22-SBGR-0152 - SmBus Lighting	8,616	1.36	117.4%	136.0%	Changed 14W light to 12W based on the specification sheet. Removed 7% HOU reduction.
	R22-SBGR-0153 - SmBus Lighting	12,689	2.59	115.5%	144.8%	Removed 7% HOU reduction as controls could not be verified. All wattages were changed to match the specification sheets.
	R22-SBGR-0155 - SmBus Lighting	4,470	1.42	114.2%	115.5%	Changed the 14W light to 12W based on the specification sheet.
	R22-SBGR-0156 - SmBus Lighting	2,037	0.42	100.0%	100.0%	
	R22-SBGR-0157 - SmBus Lighting	6,038.	1.75	127.6%	117.8%	HOU updated based on interview. Changed 6W lights to 10W based on the specification sheet.
	R22-SBGR-0158 - SmBus Lighting	2,173	0.77	108.4%	110.0%	Difference in pre-retrofit consumption.
	R22-SBGR-0161 - SmBus Lighting	2,491	0.98	111.2%	98.9%	Changed the 14W light to 12W based on the specification sheet.

<sup>a</sup> Demand reduction was not reported for these projects.

<sup>b</sup> Energy savings were not reported for these projects.