

**CPUC Staff Ex Ante Review**

CPUC Staff Project ID Number	PGE 23 T A 867 PRJ - 04003910 Lighting
CMPA Directory Link	<a href="https://deeresources.info/cmpa/projects/20876">https://deeresources.info/cmpa/projects/20876</a>
PA	PGE
PA Application ID	PRJ - 04003910
PA Application Executed Date	
PA Program ID	PGE Ag 001
PA Program Name	TRC - Agricultural Energy Savings Action Plan AESAP Ag - Customized Retrofit
PA Program Year	
Date of CPUC Staff Review:	6/22/2023
PA CMPA Upload Dates Included in this review:	
First PA Upload	4/17/2023
Second PA Upload	5/16/2023
Third PA Upload	N/A
Fourth PA Upload	
Fifth PA Upload	
Sixth PA Upload	
Seventh PA Upload	
Eighth PA Upload	
PA Measure Description(s):	
Measure 1	LIGHTING RETROFITNEW-INT LED HORTICULTURAL
Measure 2	
Measure 3	
Measure 4	
Measure 5	
Measure 6	
Measure 7	
Measure 8	
Measure 9	
Measure 10	
PA Project Description:	Install horticultural LED lighting instead of HPS lighting at a new indoor greenhouse cannabis cultivation facility
Bi-Monthly Upload kW Demand Reduction	240.3
Bi-Monthly Upload Annual kWh Impacts	4,639,199.4
Bi-Monthly Upload Therm Impacts	122,424.0
PA Proposed Incentive \$ (to Customer)	\$750,084.32
Project Documentation kW Demand Reduction	240.3
Project Documentation Annual kWh Impacts	4,639,199.4
Project Documentation Annual Therm Impacts	0.0
Project Documentation Incentive \$ (to Customer)	\$750,084.31
CPUC Staff Primary Reviewer Name	
CPUC Staff Primary Reviewer Firm	Quantum
CPUC Staff Review Supervisor Name	
CPUC Staff Review Supervisor Firm	Quantum
PA Primary Reviewer Name	
PA Primary Reviewer Firm	
CPUC Staff Project Manager	
CPUC Staff Policy Authorization (as needed)	
CPUC Staff Recommendation:	Application ready to proceed with exception(s), as noted
For rejection, action required:	N/A
M&V Review:	Post M&V Review (M&V Results and Final Calculations) Required

Action Number:	Summary of CPUC Staff Required Action by the PA:	Action Category	PA Response
1	<p><b>The PA should improve the financial calculations (incremental costs and payback) for this projects and all future cannabis lighting projects.</b> Similar to previous cannabis lighting projects, the PA has identified upfront costs as the primary barrier to installing LEDs. Therefore, it is important to address the deficiencies in the PA's cost analysis for all cannabis lighting projects. The following points highlight some of the issues observed in this specific project:</p> <p>According to CPUC policy, the baseline should provide a comparable level of service to the energy efficiency (EE) measure for the effective useful life of the EE measure. The baseline cost should consider the costs of equipment or materials purchased, such as sales tax, installation, and ongoing operation and maintenance costs. For cannabis lighting projects, achieving the same level of service as the grow LEDs with a 36,000-hour lifespan at Q90 (90% output) requires replacing HPS lamps and reflectors based on the manufacturer's recommendations. For instance, the baseline lamps used in this project (Phillips MASTER GreenPower Plus 1000-watt lamps) should be replaced at least every 10,000 hours, as their light output diminishes by 90% after that duration. Additionally, the manufacturer recommends annual replacement of reflectors to maintain fixture effectiveness. When considering the net present value of these replacement costs alongside the upfront costs of acquiring baseline equipment, the incremental project costs are significantly reduced, resulting in a much faster project payback period. It is inappropriate for the PA to consider these replacement costs as cost savings (benefits), as they are necessary to achieve service equivalency.</p> <p>Furthermore, it is incorrect to calculate incremental costs assuming that the installed LEDs have control capabilities while the baseline lacks the same level of control. Excluding control costs would further reduce the incremental cost and shorten the payback period.</p> <p>Additionally, the PA did not provide adequate support for the baseline HPS costs through actual quotes, and our research indicates that similar fixtures (such as the 1000-watt Gavita Pro DE HPS) are priced higher in the market. When we requested actual comparable quotes (showing equivalent baseline fixtures available for purchase in the required quantity for the project), the PA provided a recent invoice from the customer for a different HPS fixture that appears to only include the cost of fixtures without the bulbs or bulbs alone. Our research indicates that the complete fixture would cost significantly more than the invoiced amount.</p> <p>The PA also stated that the customer does not replace reflectors and only cleans them. It's important to note that calculating incremental cost based on equivalent level of service should be done regardless of the site practices. Additionally, cleaning the HPS reflectors to maintain performance can be a very labor-intensive process and more expensive than replacing the reflectors as this often requires removing the reflector, dust and water stain removal from the reflective material, drying, and reinstalling them, all done on a fixture-by-fixture basis. The PA should not overlook the net present value of these additional costs required for service equivalency.</p> <p>Furthermore, we observed that the PA included \$1M in electrical costs for the LEDs, while completely overlooking (assuming it to be zero) the same costs for the baseline technology. When using HPS grow lights, each fixture typically requires a dedicated electrical drop, resulting in higher installation and wiring costs compared to LEDs, which can be daisy-chained together.</p> <p>Another issue with the PA's standard practice cost calculation is the use of LED costs for a higher-performing LED when calculating the mixed technology cost. Specifically, the PA calculated the standard practice cost by combining the cost of DE HPS with 1,772 PPF (Photosynthetic Photon Flux) and 1.7 PPE (Photosynthetic Photon Efficacy) with the cost of LEDs with 847 PPF and 3.32 PPE. The standard practice cost should be calculated using products that are comparable in terms of performance and characteristics. Mixing costs of different technologies with significantly different PPF and PPE values can lead to inaccurate cost calculations and misleading comparisons.</p> <p>Considering all the issues highlighted with the cost calculations, we are not confident in the project's ability to yield a positive IMC. Therefore, the PA is required to thoroughly review and revise the cost calculations and the incentive cap for this project based on these recommendations. It is crucial to improve the cost estimation process for future cannabis lighting projects.</p>	Measure cost	

2	<p>The PA calculated the baseline efficacy for single layer flowering to be a mixed technology baseline with an efficacy of 1.85 <math>\mu\text{mol}/\text{J}</math>. This value was calculated assuming the standard practice baseline consists of 49.4% LEDs (with an average efficacy of 2.2 <math>\mu\text{mol}/\text{J}</math>), 39% DE HPS (with an average efficacy of 1.67 <math>\mu\text{mol}/\text{J}</math>), 2.6% of CMH (with average efficacy of 1.43 <math>\mu\text{mol}/\text{J}</math>), 9.1% of fluorescent lighting (with an average efficacy of 0.92 <math>\mu\text{mol}/\text{J}</math>), and 5.2% of other lighting (with an average efficacy of 3.6 <math>\mu\text{mol}/\text{J}</math>). We have several concerns about these assumptions:</p> <p>The CBT survey data utilized in the PA to determine the technology mix reveals a significantly higher saturation of LEDs. According to this data, the existing installations indicate a LED saturation rate of approximately 75%. However, it's important to note that CPUC defines standard practice based on new installations rather than the cumulative adoption indicated by the saturation rates of previously installed technology. Given the current installations already comprise 75% LEDs and there has been a consistent upward trend in LED installations over the past seven years, it is reasonable to expect that new and retrofitted projects will have an even higher proportion of LEDs to align with the prevailing market shift towards LED technology. Contrary to this expectation, the PA assumed a lower LED fraction and derated the current LED installations asserting that the survey data includes 30% vertical operations with 100% LEDs thus reducing the LED content of the balance of operations. Considering that 75% of installed cases are LEDs (accounting for the 30% vertical operations with 100% LEDs), it can be inferred that the remaining non-vertical operations should have an even higher penetration of LEDs to keep up with the upward trend. Therefore, the PA's derating approach is not justified or supported by the complete data including trending over the multi-year CBT research periods.</p> <p>Another issue with the PA analysis is that the non-LED technologies considered have PPEs that are lower than the minimum requirement set by 2022 Title 24 (i.e., 1.7 <math>\mu\text{mol}/\text{J}</math> for greenhouses and 1.9 <math>\mu\text{mol}/\text{J}</math> for fully enclosed operations). It is essential to assign all non-LED technologies a PPE that meets at least the minimum compliance level outlined in Title 24.</p> <p>Furthermore, there are inaccuracies in the calculation of LED efficacy at 2.2 <math>\mu\text{mol}/\text{J}</math>, as PA included a list of non-DLC fixtures in the analysis that are not valid choices for standard practice. Here are some specific examples:</p> <p>Some of the LEDs included in the list have lower efficacy than the minimum requirements set by the DLC and 2022 Title 24, and even lower efficacies than HID lighting. It is not appropriate to include these low-performance fixtures in the standard practice efficacy analysis as they do not meet the necessary standards.</p> <ul style="list-style-type: none"> <li>o Certain LEDs included in the list are older, less efficient versions of products that are already represented in the DLC data, such as the Mars Hydro FC-3000. It is not appropriate to include outdated and less efficient versions of products in the standard practice analysis when the current DLC-certified products are available and adequately represented in the DLC data.</li> <li>o Some LEDs included in the list, like the Lumigrow Pro 650e LED, are no longer available in the market as they utilize older chips that have been discontinued. It is not appropriate to include fixtures that can no longer be manufactured in the standard practice analysis as they are not representative of the current market offerings.</li> </ul> <p>For these reasons we disagree with inclusion of the non-DLC products in the LED efficacy analysis.</p> <p>The PA assumed that different standard practice technologies are used based on the grow stage. However, this assumption is not suitable when considering LED lighting systems. Unlike HIDs, which traditionally use MH lighting for initial growth phases and HPS lighting for more mature plants, LEDs are adjustable and can provide optimum light in various spectrum ranges for different stages of growth. This means that growers can use LED lighting systems throughout the plant's growth cycle, eliminating the need for multiple systems. Additionally, the assumption of multiple systems for different grow stages is inappropriate because most non-LED technologies included in TRC analysis are not allowed by the 2022 Title 24 requirements, which mandate the same efficacy values for all grow areas. Therefore, we find this conclusion to be invalid.</p> <p>The PA did not address the distinction between the standard practice efficacy that should be established based on future installations compared to in-situ or cumulative adoption indicated by saturation rates of previously installed technology by performing a trend analysis on CBT data. The study conclusions are based on a snapshot of the CBT data in 2022 and does not include a trend analysis to estimate future LED installations.</p> <p><b>The PA should update the calculation by incorporating a weighted efficacy that reflects a mix of 75% LEDs. For the non-LED technologies, the analysis should utilize the Title 24 minimum efficacy requirement of 1.7 <math>\mu\text{mol}/\text{J}</math> for greenhouses. The LED minimum efficacy should be set at 2.48 <math>\mu\text{mol}/\text{J}</math> based on the data provided by DLC.</b></p>	Baseline	
3	<p>The PA's analysis is inconsistent as it assumed a mixed technology PPE but utilized the DE HPS PPF of 1,772 <math>\mu\text{mol}/\text{s}</math> to calculate savings. When employing a mixed technology standard practice baseline, it is essential to ensure that all calculation assumptions are based on the same technology mix.</p>	Analysis assumptions	
4	<p>There are also some issues with assuming the same height (5 foot) for LEDs and HID fixtures. LEDs can be mounted closer to the plants, allowing for a shorter distance between the light source and the canopy. However, HID fixtures would require more space to ensure an adequate distance between the light source and the plants as they grow (note that this site doesn't seem to have a process in place to change HID positions during the grow cycle). Also, this greenhouse appears to have a ceiling height of 10 feet. Assuming a height of 5 feet for both LED and HID fixtures may only be applicable to fully mature plants but should be much higher for HIDs during the grow cycle.</p>	Analysis assumptions	
5	<p>In response to our SDR, the PA agreed to remove 122,424 therms of gas savings as this project does not result in any gas savings.</p>	Analysis assumptions	
6	<p>Please resubmit this project for our review after trued up savings are calculated and above issues are addressed.</p>	Continue Document Upload	

Note or Instruction Number:	CPUC Staff Notes or Instructions:	Instruction Category	PA Response
1	Noting here that the program is open to increasing the incentive rates in order to fulfill the customer's request for \$750K in cash incentives. For example, when the gas savings were disqualified during our review, the program increased the incentive rates to provide the same total incentives to the customer.	Incentive calculation	

CPUC Staff Recommendation Definitions	
CPUC Staff Recommendation	Definition
Application ready to proceed without exception	The PA will continue to upload application documents to the CMPA directory through the implementation and claims phases of the project. The PA may proceed to approve the project without waiting for CPUC Staff response. A project is waived from further review at the post-installation stage by CPUC staff, but the PA is responsible for post-installation (IR) review. There will not be conditional approval.
Application ready to proceed with exception(s), as noted	<p>The PA must make revisions or changes as noted in CPUC Staff's review comments before signed agreement with customer. The PA will continue to upload application documents to the CMPA directory through the implementation and claims phases of the project. The PA may proceed to approve the project without waiting for CPUC Staff response. If CPUC Staff decides to perform IR review of a project, CPUC Staff will notify the PA. The scope will be limited to determine if the project was carried out consistent with the application and notes provided during pre-installation review and to obtain information pertaining to whether the eligibility criteria or metrics should be revised.</p> <p>Unless the scope of work presented in project application has changed at IR review, the project will not be reviewed again in the areas specified below. Scope change is defined by substantial changes include significant modifications to the proposed equipment type, size, quantity, configuration, the expansion of a project to include additional retrofits, or the splitting of a project into multiple phases.</p> <p>The following areas will not be reviewed again by CPUC Staff:</p> <ul style="list-style-type: none"> <li>• Calculation Tool</li> <li>• Calculation Methodology</li> <li>• M&amp;V Plan</li> <li>• Baseline</li> <li>• Eligibility</li> <li>• EUL/RUL</li> <li>• Measure Type</li> <li>• Program Influence</li> </ul>
Application rejected.	<p>The application is rejected as submitted. The PA shall promptly inform the applicant as to the reasons why the project was rejected and the specific recommendations for the conditions under which the project would be approved. CPUC Staff shall provide the reasons for the rejection or request for modification, including each basis as to why the project is rejected, or modification is requested. In addition, CPUC Staff shall provide specific recommendations for the conditions under which the project would be approved.</p> <p>If any party to the project is unsatisfied with the Commission's directions for the project, a dispute resolution process may be initiated by that party. The Commission shall adopt rules for the conduct of the dispute resolution process. – Section 381.2 (g) (3) (F)</p>
Advisory.	The PA is not formally required to follow instructions or recommendations given in an Advisory review. However, issues found will affect ESPI scoring and may come up again in Ex-Post review.