MEMORANDUM

Date: Tuesday, March 22, 2016

To: Leif Christiansen, Manager, Local Government and Community Partnerships, Pacific Gas & Electric Company

From: East Bay Energy Watch Partnership Strategic Advisory Committee

Subject: Expanding Residential Direct Install LED Offerings

With opportunities for CFL installations decreasing in the face of increased lighting efficiency standards and heightened customer demand for the newest and most up-to-date technologies, the cities of the East Bay Energy Watch (EBEW) partnership wish to explore the expansion of the LED offerings provided by the residential direct install program California Youth Energy Services (CYES).

Rising Sun Energy Center, a leading workforce education and training nonprofit focused on the green sector, created the CYES program in 2000, and has partnered with Pacific Gas & Electric Company's (PG&E) Local Government Partnerships since 2006. Today, CYES operates as the residential direct install program of five Energy Watch Partnerships, including EBEW. CYES serves over 5,000 residential customers annually through its 7-week Green House Call service.

CYES operates in 9 EBEW cities each summer. In 2015, those cities included Antioch, Dublin, Fremont, Hayward, Lafayette-Moraga-Orinda, Martinez, Oakland, Richmond, and Walnut Creek. CYES provided Green House Calls to 2,537 customers in these cities in 2015 and employed 81 local youth, resulting in an annual reduction of 442,894 kWh, 3,925 therms, and 12 million gallons of water.

The cities of the East Bay Energy Watch are dedicated to providing this meaningful residential energy efficiency, water conservation, and youth employment program within our partnership territory, seeing it as an important method of maximizing residential energy and water savings, reducing greenhouse gas emissions, and promoting market transformation. Continued and increased investment in LEDs is a key pathway to these outcomes.

Background

When CYES began, it installed CFLs as the exclusive lighting measure. Starting in 2014, it worked with PG&E to offer up to (1) A-Lamp LED per home in the East Bay, Solano, Sonoma, and San Joaquin Energy Watch territories, and up to (4) in the Marin County Energy Watch (due to the specifics of the Marin County contract). Throughout its service territory, CYES installed an average of 1.025 LEDs per home in 2014, and an average of 1.11 in 2015.

ALL CYES	2012	2013	2014	2015
CFLs Installed	29,935	28,226	34,398	38,413
LEDs Installed	0	0	4,846	6,334
Homes Served	3,388	3,369	4,729	5,706

Total homes served, CFLs installed, and LEDs installed in the CYES Program: 2012-2015

Fremont Case Study

Thanks to additional funding from the City of Fremont via PG&E for Fremont's participation in the national Georgetown University Energy Prize competition, Rising Sun was also able to offer indoor dimmable LED flood lamps (R-BR) to Green House Call customers in Fremont during the summer of 2015. With a material cost of $9.41 and an installed cost of $15.42 per lamp, the Fremont CYES site was supplemented with (391) 10 watt R-BR lamps at a total cost of just over $6,000. The reason dimmable LED flood lamps were chosen as an added measure was due to the fact that past CYES programs had noted a missed opportunity in Fremont homes where screw-in halogen or incandescent flood lamps were found in recessed ceiling cans that were controlled by wall dimmer switches, making the replacement of these with CFLs infeasible. With the supplemental offering of the R-BR lamps, however, dimmable incandescent and halogen flood lamps were able to be replaced with a 10 watt LED equivalent.

At the conclusion of the CYES summer program in 2015, the CYES Fremont site ranked 1st of all 20 CYES sites for total kWh saved, and 2nd for total number of Green House Call visits (334 homes, or 134% of the homes-served goal). The 391 supplemental R-BR lamps resulted in average energy savings of 15.78 kWh per lamp. All of the supplemental R-BR lamps were installed before the end of the 7 week program, demonstrating the demand for these LED items.

Finally, in-field outreach staff in Fremont reported that the LEDs were instrumental in customer uptake of the program in summer 2015, opening up opportunities for more in-home installations of other measures and greater savings. Fremont far exceeded its homes-served goal of 200-250 homes served, instead reaching 334 customers.

FREMONT	2012	2013	2014	2015
CFLs Installed	2,666	3,145	2,282	2,899
A19 LEDs Installed	0	0	218	288
R-BR LEDs Installed	0	0	0	391
Homes Served	264	298	297	334

Total homes served, CFLs installed, and LEDs installed in the CYES Program (Fremont only): 2012-2015

The Challenge: Deemed Savings and Cost-Effectiveness

The current challenge of expanding these offerings even further is cost-effectiveness: A-Lamp LEDs still cost about 5 times more than their CFL equivalents, but only achieve 48% the energy savings based on current DEER-based workpapers for deemed measures. While LEDs use less energy than CFLs, the workpaper assumes that an LED can replace either an incandescent or a

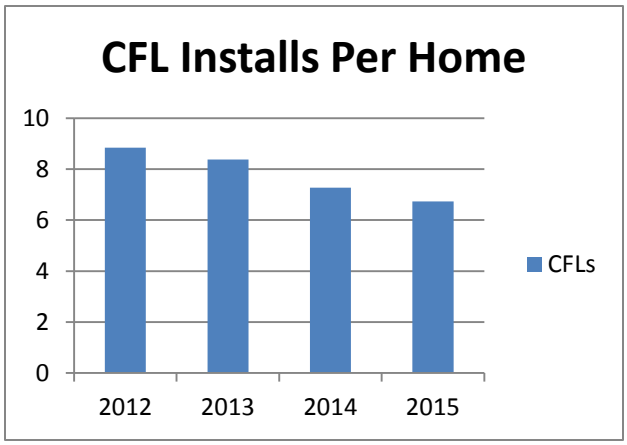
CFL, and therefore uses the lower savings baseline of a CFL to LED conversion for the deemed value of the measure.

As a result, increasing LED offerings would necessitate a faster spend-down of Rising Sun's direct install budget, since LEDs are more expensive than CFLs. Assuming no change in the DEER-based workpaper, nor an increase in Rising Sun's budget, an increase in LED offerings would mean that CYES could serve fewer homes annually, and would achieve fewer savings. However, in homes served by the CYES program, a majority of recessed lighting is still incandescent or halogen, and thus actual savings from conversion to LEDs is much greater than the deemed savings. It is therefore our opinion that the workpaper, as currently written, does not reflect the true value of LEDs.

Diminishing Opportunity of CFL Installations

New lightbulb energy efficiency standards enacted in the Energy Independence and Security Act of 2007 went into effect in California a year earlier than the rest of the country, starting in 2011 with 100W bulbs, and ending in 2013 with 40W bulbs. While incandescent bulbs still exist in the market and in customer homes, these new standards mean that CFL replacement opportunities are harder and harder to find: many homes have already converted their incandescent lighting to CFLs (due to what's available on the shelves), resulting in fewer opportunities for CFL installations. GE recently announced that it will be phasing out sales of its CFL bulbs, and Rising Sun vendors have stated that they are ramping down or discontinuing their stock of CFLs due to higher demand for LEDs.

Indeed, in the final CPUC decision for 2015 Energy Efficiency Programs (Decision 14-10-046), in Section 2.4.3, IOU administrators are instructed "to capture the remaining market potential for CFLs reflected in…hard-to-reach markets", but "not to focus their incentive programs on basic CFL measures". While the CYES program successfully targets hard-to-reach customer segments, it has still experienced a 24% reduction in the number of CFLs installed per home between 2012 and 2015, with a steady decrease in each consecutive year, despite expanding into new, unserved territories. This speaks to the market transformation that has happened in terms of widespread CFL adoption.



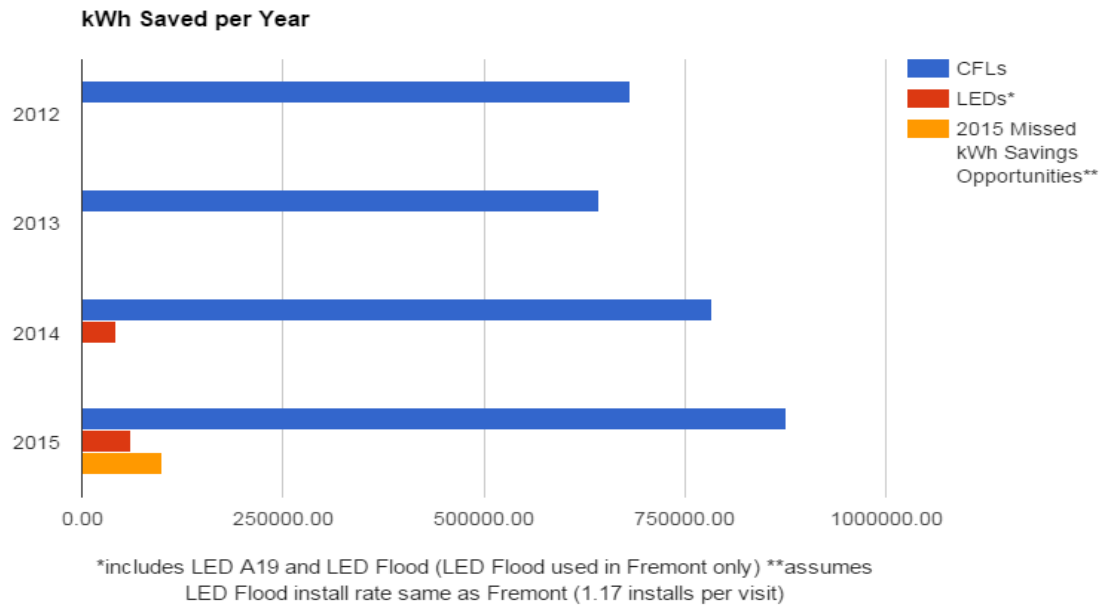
Average installation of CFLs per home across the CYES Program: 2012-2015

If Rising Sun must limit its LED offerings due to cost-effectiveness, and simultaneously finds fewer opportunities to install CFLs due to ongoing market transformation, reportable savings will continue to decrease in this valuable program.

Stranded Opportunity

A final dimension of this issue is missed or stranded opportunity: CYES encounters a significant number of canned or recessed halogen and incandescent lights that operate on a dimmer switch, and are therefore ineligible for CFL replacement. LEDs, however, can operate on dimmers and still achieve measurable energy savings. Without more comprehensive LED offerings, CYES must leave savings opportunities behind, leaving customers wondering why there is no energy-efficient replacement option for dimmable fixtures.

To gauge the impact of these stranded opportunities, we used the Fremont pilot of R-BR LEDs in 2015 as our sample, estimating the savings missed by not being able to replace dimmable flood lights in other cities.



Comparison of CFL savings vs LED savings (kWh), including stranded opportunities, 2012-2015

Assuming a rate of 1.17 R-BR installations per visit across all 20 CYES cities, we estimate that CYES was forced to ignore about 99,237 kWh in savings opportunities in 2015. This calculation, of course, still assumes the savings value of LEDs based on the DEER calculation of a CFL to LED conversion, failing to accurately capture the fact that these LEDs in reality may be replacing the higher watt incandescent or halogen equivalents.

Conclusion

The hardware replacement opportunities for CFLs are decreasing due to the phase-out of incandescent lamps. Upgrade opportunities that do exist – such as incandescent lights on dimmers – are passed up due to workpaper restrictions. Customers are increasingly requesting

LEDs, and increased LED offerings tend to attract more customers. LED prices are starting to come down, and while workpapers ensure that LEDs can't compete with CFLs for deemed savings, CFLs will cease to earn savings if there are fewer and fewer viable opportunities to install them.

We have a chance to take the lead in promoting a technology that uses less energy, saves customers money, and reduces greenhouse gas emissions. To add more LEDs to the residential service, we need to temporarily accept higher costs and potentially lower energy savings – until LED costs drop, as CFL costs have, or until adjustments are made to available workpapers.

We understand that there is not an easy answer to this challenge. We offer our input as a problem-solving partner, and welcome further discussion and collaboration on the issue to strike the balance between customer satisfaction, energy savings, market transformation, and cost-effectiveness.

Signed:

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