

Docket # 15-BSTD-01

April 10, 2015

Greetings

Since the CEC did not really seem to get my previous information about controls not being cost effective with currently available low wattage LED and even high performance fluorescent systems in lighting retrofit projects, I am reformatting it now for the same typical private office.

Lighting upgrade	Existing wattage	Proposed wattage	saved KW	Annual operating hours	KWH Saved	KWH rate	Annual electric savings	Installed cost	Payback
	180	40	0.14	3000	420	\$0.18	\$ 75.60	\$ 260.00	3.44

Basic Controls	Controlled KW	16% reduced operating hours	Controlled KWH	KWH rate	Annual electric savings	Installed cost	Payback
	0.04	480	19.2	\$0.18	\$ 3.46	\$ 70.00	20

Advanced Controls	Controlled KW	25% reduced KW (or KWH)	Controlled KWH	KWH rate	Annual electric savings	Installed cost	Payback
	0.04	750	30	\$0.18	\$ 5.40	\$ 140.00	26

It is my understanding that the CEC's payback hurdle is 15 years or less for controls, and if that is the case, neither of these controls would qualify.

In general a 15-year payback does not make any practical sense, because

- Controls may not last that long.
 - It is my understanding that DEER estimates 8 years end of useful life for controls.
 - So a wall mounted occupancy sensor would need a maximum \$27.68 installed cost.
 - So advanced controls would need a maximum \$43.20 installed cost.
- With the upcoming IoT and tunable products a majority of everything installed now will probably be replaced within 5 years, 10 years max.
- Most important, show me one real world end-customer, who will accept a 15 year payback on a retrofit project.
 - Many only want 3 years or less. (With rebate this lighting is probably be below 3 years)
 - A significant number of end-customers will only accept maximum 2 years.

Yes, people can get new fixtures and kits with a wireless module for about an extra \$10. But when you include the control devices, transceivers, computer, software, software licensing fee, labor, commissioning and optional service contract, it can cost \$50 - \$100 per fixture. I used \$70 per fixture.

Plus, controls, including wall mounted occupancy sensors, can often increase annual hours of operation.

Yes, dimming and control manufacturers, organizations and proponents can try to make dimming and controls system look like the best thing since sliced bread. But please 'follow the money' and do your own calculations.

Following are my calculations, which you can check.

This compares lighting only, basic controls only, advanced controls only, lighting with basic controls and lighting with advanced controls in a typical private office. No Title 24 costs are included. If they are, costs could be increased by 20 – 50%.

EXISTING TYPICAL PRIVATE OFFICE

- 10' x 12'
- Two 2x4 18 cell parabolic troffers
 - Each with three basic grade fluorescent 32W F32T8s and generic standard ballast factor (BF) ballast, which consumes 90W
- 3500 maximum annual hours of operation, because building facility manager or owner turns on and off switch rated breakers every day
 - 3000 annual hours, because office worker does an average job manually turning off lights in office when leaving
- \$ 0.18 KWH rate
- \$ 97.20 Annual lighting consumption
- There is already good LED task lighting, which will be kept
- Good size south facing window
 - With the sun's intensity and glare the window blinds are closed most of the time

Although these products may qualify for rebates, which would improve financial return, rebates are not included.

LIGHTING ONLY

- \$260.00 Parts and labor for 2 20W 5000K LED troffer kits
- \$ 21.60 Annual electrical consumption
- \$ 75.60 Annual electrical savings
- 3.4 Year payback without rebate

This could also be done by retrofitting each troffer with 1 high lumen 32W F32T8 850 lamp, 71 BF high performance program start ballast and upscale kit for about \$110 parts and labor. Wattage would be 25.

BASIC GRADE CONTROLS ONLY

- \$ 70.00 Install wall mounted occupancy sensor
- 16% Estimated energy savings, based on California Energy Commission Database for Energy Efficient Resources (CEC DEER)
- \$ 15.55 Annual savings
- 4.5 Year payback without rebate (if controls are mandated, there may be no rebate)

ADVANCED CONTROLS ONLY

- \$140.00 Install advanced controls, include modules in fixtures and percentage of transceiver, computer, software, licensing fee and optional service contract
- 25% Estimated energy savings
- \$ 24.30 Annual savings
- 5.8 Year payback without rebate (if controls are mandated, there may be no rebate)

LIGHTING & BASIC CONTROLS

- \$330.00 Parts and labor
- \$ 79.06 Annual electrical savings, which controls savings are based on 40W lighting
- 4.1 Year payback without rebate (if controls are mandated, there may be no rebate)

Based on getting the lighting down to 40W, the occupancy sensor would only save \$3.46 per year, which is a 20 year payback, which may be infinite because sensor may not last that long.

LIGHTING & ADVANCED CONTROLS

- \$400.00 Parts and labor
- \$ 81.00 Annual electrical savings
- 4.9 Year payback without rebate

Based on getting the lighting down to 40W, the advanced controls would only save \$5.40 per year, which is a 26 year payback, which may be infinite because controls may not last that long.

PAYBACK IN YEARS COMPARISON

- 3.4 Lighting only
- 4.5 Basic controls only
- 5.8 Advanced controls only
- 4.1 Lighting & basic controls **(20 years for occupancy sensor assistance)**
- 4.9 Lighting & advanced controls **(26 years for advanced controls assistance)**

Many real world customers do not want anything over a 3-year payback. This lighting option with rebates would usually be less than 3 years. Those customers would not approve any other option, so there would be no energy savings.

Paybacks and other financial returns would vary depending on other parameters, which you could do. But even if the percentage savings from basic or advanced controls were doubled, their paybacks would still be terrible when done with lighting.

In open offices each 2x4 troffer could cover 80 SF, compared to 60 SF in this private office, so the WSF and LPD would be lower with the same LED troffer kits in an open office.

In a previous letter I mentioned that several pro-dimming and pro-controls companies specify much higher wattage lighting systems than necessary and show how much energy can be saved with their controls. It is much better to just get low wattage lighting.

In a previous letter, I showed that electric car charging stations and addressable HVAC units are much more cost effective for automatic demand response than lighting.

For X amount of money, allow lighting professionals and end-customers to do more lighting and less controls, when lighting is much more cost effective.

Lighting retrofitters and end-customers will use controls, when they are cost effective, but it is not a good idea to mandate controls.

If you want to learn more about controls, I will present these classes.

- New Age Of Controls, seminar through San Diego Gas & Electric, 4/20/15
 - https://seminars.sdge.com/iebms/coe/coe_p1_all.aspx?cc=coe&oc=05
- Lighting Controls & The Evolution of Smart Lighting, webinar through Association of Energy Engineers, 6/22/15 – 6/23/15
 - <http://www.aeeprograms.com/realtime/SmartLighting/>

You can email or call me 10 AM or later Pacific time during daylight savings time, which is 7 AM or later here in Hawaii. Thanks for your consideration.

Stan Walerczyk

Stan Walerczyk, HCLP, CLEP
Principal of Lighting Wizards
Chair of Human Centric Lighting Society and Committee
<http://lightingwizards.com/>
<http://humancentriclighting.org/>
stan@lightingwizards.com
808-344-9685