DOCKETED

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Project Title:	2019 Title 24, Part 6, Building Energy Efficiency Standards Rulemaking
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Document Title:	Outdoor Luminaire Wattage Exemption Analysis
Description:	This document shows the calculations performed by staff in establishing an adjusted threshold for a wattage-based exception to outdoor luminaire control requirements.
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Outdoor Luminaire Wattage Exemption Analysis - CEC and CLTC

	Annual Operating Hours		Business Hours		Nonbusiness Hours										
Luminaire Wattage (W)	Nightime Business Hours	Nighttime Nonbusiness Hours	Energy - Occupied (kWh)	Energy - Unoccupied (kWh)	Energy - Occupied (kWh)	Energy - Unoccupied (kWh)	Total Annual Energy Use (kWh)	Baseline Annual Energy Use (kWh)	Annual Energy Savings (kWh)	Annual Cost Savings ($)	Lifetime Cost Savings ($)	Measure Cost (Minimum $)	Measure Cost (Maximum $)	Benefit/ Cost Ratio (Max)	Benefit/ Cost Ratio (Min)
100.00	2130.00	2250.00	55.81	78.60	27.68	98.66	260.74	438.00	177.26	$ 27.72	$ 415.85	$ 103.13	$ 176.75	4.03	2.35
95.00	2130.00	2250.00	53.02	74.67	26.29	93.73	247.70	416.10	168.40	$ 26.34	$ 395.06	$ 103.13	$ 176.75	3.83	2.24
90.00	2130.00	2250.00	50.23	70.74	24.91	88.80	234.67	394.20	159.53	$ 24.95	$ 374.27	$ 103.13	$ 176.75	3.63	2.12
85.00	2130.00	2250.00	47.44	66.81	23.52	83.86	221.63	372.30	150.67	$ 23.56	$ 353.47	$ 103.13	$ 176.75	3.43	2.00
80.00	2130.00	2250.00	44.64	62.88	22.14	78.93	208.59	350.40	141.81	$ 22.18	$ 332.68	$ 103.13	$ 176.75	3.23	1.88
75.00	2130.00	2250.00	41.85	58.95	20.76	74.00	195.56	328.50	132.94	$ 20.79	$ 311.89	$ 103.13	$ 176.75	3.02	1.76
70.00	2130.00	2250.00	39.06	55.02	19.37	69.06	182.52	306.60	124.08	$ 19.41	$ 291.10	$ 103.13	$ 176.75	2.82	1.65
65.00	2130.00	2250.00	36.27	51.09	17.99	64.13	169.48	284.70	115.22	$ 18.02	$ 270.30	$ 103.13	$ 176.75	2.62	1.53
60.00	2130.00	2250.00	33.48	47.16	16.61	59.20	156.44	262.80	106.36	$ 16.63	$ 249.51	$ 103.13	$ 176.75	2.42	1.41
55.00	2130.00	2250.00	30.69	43.23	15.22	54.26	143.41	240.90	97.49	$ 15.25	$ 228.72	$ 103.13	$ 176.75	2.22	1.29
50.00	2130.00	2250.00	27.90	39.30	13.84	49.33	130.37	219.00	88.63	$ 13.86	$ 207.93	$ 103.13	$ 176.75	2.02	1.18
45.00	2130.00	2250.00	25.11	35.37	12.45	44.40	117.33	197.10	79.77	$ 12.48	$ 187.13	$ 103.13	$ 176.75	1.81	1.06
40.00	2130.00	2250.00	22.32	31.44	11.07	39.47	104.30	175.20	70.90	$ 11.09	$ 166.34	$ 103.13	$ 176.75	1.61	0.94
35.00	2130.00	2250.00	19.53	27.51	9.69	34.53	91.26	153.30	62.04	$ 9.70	$ 145.55	$ 103.13	$ 176.75	1.41	0.82
30.00	2130.00	2250.00	16.74	23.58	8.30	29.60	78.22	131.40	53.18	$ 8.32	$ 124.76	$ 103.13	$ 176.75	1.21	0.71
25.00	2130.00	2250.00	13.95	19.65	6.92	24.67	65.19	109.50	44.31	$ 6.93	$ 103.96	$ 103.13	$ 176.75	1.01	0.59
20.00	2130.00	2250.00	11.16	15.72	5.54	19.73	52.15	87.60	35.45	$ 5.54	$ 83.17	$ 103.13	$ 176.75	0.81	0.47
15.00	2130.00	2250.00	8.37	11.79	4.15	14.80	39.11	65.70	26.59	$ 4.16	$ 62.38	$ 103.13	$ 176.75	0.60	0.35
10.00	2130.00	2250.00	5.58	7.86	2.77	9.87	26.07	43.80	17.73	$ 2.77	$ 41.59	$ 103.13	$ 176.75	0.40	0.24
5.00	2130.00	2250.00	2.79	3.93	1.38	4.93	13.04	21.90	8.86	$ 1.39	$ 20.79	$ 103.13	$ 176.75	0.20	0.12
0.00	2130.00	2250.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	$ -	$ -	$ 103.13	$ 176.75	0.00	0.00

Cost effective over full range of estimated costs (min to max)

Cost effective assuming minimum estimated cost

CONCLUSION: Luminaire Wattage of 40 watt and less are not cost effective (benefit/cost ratio less than 1) for the proposed motion sensing control requirements

ASSUMPTIONS:

Annual Days excluding holidays		355
Holidays		10
Nighttime Occupied Hours	6 pm to Midnight	6
Vacancy Rate		74%
Nighttime Unoccuppied Hours	Midnight to 6 am	6
Occupancy Rate		12%
% Reduction during Unoccupied Periods, Nightime Business Hours		50%
% Reduction during Unoccupied Periods, Nighttime Nonbusiness Hours		50%
Commercial Electricity Rate (Statewide Average, 2015 $)		$ 0.1564
Measure Life (years)		15

Technology Cost

RS Means - 2017 Electrical Cost Book

Location	Fixture Cost with Sensor	Fixture Cost Without Sensor	Unit Cost Increase for Sensor	Unit Cost Increase for Sensor at Volume	Product	Notes
Sacramento	179.85	95.52	169.47	152.523	Residential - PAR Flood, 2-Lamp fixture	Costs include material, labor, overhead, profit; assumes fixture-integrated sensor
Los Angeles	184.04	99.91	176.75	159.075	Residential - PAR Flood, 2-Lamp fixture	Costs include material, labor, overhead, profit; assumes fixture-integrated sensor
Bakersfield	188.68	93.94	168.11	151.299	Residential - PAR Flood, 2-Lamp fixture	Costs include material, labor, overhead, profit; assumes fixture-integrated sensor
Redding	181.66	95.13	169.08	152.172	Residential - PAR Flood, 2-Lamp fixture	Costs include material, labor, overhead, profit; assumes fixture-integrated sensor
Average			$ 170.85	$ 153.77		

Location	Sensor	Labor/AT Commissioning	Total Sensor Add Only			
Sacramento	38.12	85.14	123.26	110.934	PIR, occupancy sensor, indoor	Costs include material, labor, overhead, profit; assumes fixture-integrated sensor
Los Angeles	38.59	92.62	131.21	118.089	PIR, occupancy sensor, indoor	Costs include material, labor, overhead, profit; assumes fixture-integrated sensor
Bakersfield	41.22	73.37	114.59	103.131	PIR, occupancy sensor, indoor	Costs include material, labor, overhead, profit; assumes fixture-integrated sensor
Redding	38.77	82.55	121.32	109.188	PIR, occupancy sensor, indoor	Costs include material, labor, overhead, profit; assumes fixture-integrated sensor
Average			$ 122.60	$ 110.34		

Minimum Cost Addition - Average of all Locations	$ 103.13
Maximum Cost Addition	$ 176.75