

Each year, our products save nearly 10 billion kWh of electricity

Our estimate of the installed base of commercial dimmers relies on historical sales data. Sales data for Commercial products are easily obtainable back to 1996. To estimate the installed base of dimmers sold prior to between 1990 and 1996, we assume 15% sales growth between 1990 and 1996. The true sales growth is likely smaller than that. It is counter intuitive, but still true, that assuming a larger sales growth will result in a smaller estimate of installed dimmers (since the estimate is working backwards in time). Thus our estimate is conservative.

Math:

(Energy saved by Installed Lutron commercial dimmers per year) =
(Installed Lutron commercial dimmers) X
(Energy saved by a Lutron Wallbox Dimmer)

(Installed Lutron Dimmers) =
(Installed Lutron Wallbox dimmers sold last year) +
(Installed Lutron Wallbox dimmers sold two years ago) + ...
(Installed Lutron Wallbox dimmers sold twenty years ago) +

(Installed Lutron commercial dimmers sold N years ago) =
(Lutron commercial dimmers sold N years ago)*
[1 – (average commercial returns rate)]^N

Spare circuits ignored.
Residential systems ignored.

Math:

(Energy saved by Lutron commercial dimming circuit per year) =
(Average commercial dimming circuit, undimmed) X
(Average commercial dimming) X
(Hours per week commercial usage) X
(Weeks per year commercial usage) X
(HVAC multiplier)



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Description	Value	Units	Source
Average commercial circuit load (undimmed)	712	W	Average load of 25 Grafik 7000 jobs chosen randomly between 2005 and 2009 (SEM = 15 W, N = 2072, 25th percentile = 140 W, 75th percentile = 1200 W)
Average power consumption percentage for a dimmer relative to a switch ("Power Correction factor for dimmers" in CEC study)	80%	*	California energy Commission study, p. 83 http://www.energy.ca.gov/efficiency/lighting/VOLUME01.PDF
Average power reduction percentage for a dimmer relative to a switch	20%	*	1.0 - .08
Commercial usage	70	hours/week	"Average Full Time Equivalent Lighting Hours per Week for Large Office", in California Energy Commission Study, P. 104 http://www.energy.ca.gov/efficiency/lighting/VOLUME01.PDF
Commercial usage	50	weeks/year	
Energy saved by Lutron commercial dimming circuit	498.4	kWh/yr	$(712) \times (.02) \times (12) \times (250) \times (1.00) / 1000 = (498)$

This claim depends on CLAIM 1, the average energy saved by an incandescent dimmer.
The hours of use do not enter in to CLAIM 1 (see Commentary for CLAIM 1).

Math:

(Energy saved by Lutron dimmers per year) =
(Installed Lutron dimmers) X
(Energy saved by a Lutron Wallbox Dimmer)

(Installed Lutron Dimmers) =
(Installed Lutron Wallbox dimmers sold last year) +
(Installed Lutron Wallbox dimmers sold two years ago) + ...
(Installed Lutron Wallbox dimmers sold twenty years ago) +

(Installed Lutron Wallbox dimmers sold N years ago) =
(Lutron Wallbox dimmers sold N years ago)*
 $[1 - (\text{average Wallbox returns rate})]^N$

Description	Value	Units	Source
Energy saved by a Lutron Wallbox dimmer	59.2	kWh/yr	CLAIM 1
Average Lutron Wallbox dimmer returns rate	2%	millions	Lutron Quality Information System
Lutron Wallbox dimmers sold, 1997-2009 inclusive	106.8	millions	Lutron Wallbox incandescent + MLV + ELV sales, from Lutron Quality Information System (see attached pages for detail)
Lutron Wallbox dimmers sold, 1990-1996 inclusive	24.3	hours/week	Assumes 15% sales growth before 1997
Installed Lutron Wallbox dimmers, assuming above return rates	122.5	weeks/year	(see below)
Energy saved by installed Lutron Wallbox dimmers	7.25	kWh/yr	$(122.5) \times (59.2) / 1000 = 7.25$



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Claim 2 Supporting Data:

Lutron Wallbox Dimmers sold, 1997-2009 Inclusive:

QIS Query:

```
select
year ( YQISFR.SALES_VIEW.ORDER_DATE ) AS ORDER_DATE ,
YQISFR.SALES_VIEW.ENG_SORT_2_TYPE AS ENG_SORT_2_TYPE ,
sum ( YQISFR.SALES_VIEW.QUANTITY ) AS QUANTITY

from
YQISFR.SALES_VIEW

where
YQISFR.SALES_VIEW.SBU_CODE = 'WBX' AND
(YQISFR.SALES_VIEW.ENG_SORT_2_TYPE = 'Magnetic Low Voltage' OR
YQISFR.SALES_VIEW.ENG_SORT_2_TYPE = 'Electronic Low Volta' OR
YQISFR.SALES_VIEW.ENG_SORT_2_TYPE = 'Incandescent' )

group by
year ( YQISFR.SALES_VIEW.ORDER_DATE ) ,
YQISFR.SALES_VIEW.ENG_SORT_2_TYPE
```

Results:

year	Wallbox dimmers sold in this year (calculated in italics)	Wallbox dimmers installed in 2010 from this year
1990-1996	<i>24,340,386</i>	17,471,652
1997-2009	<i>106,774,948</i>	95,114,579
TOTAL	<i>143,873,551</i>	122,505,998



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Commentary: In 1999, the California Energy Commission published a “lighting efficiency technology report” on ways to improve the efficiency of lighting in California. Among other things, the study (referenced below) estimated the average energy use of dimmers versus a switch. Although the study dates from 1999, it comes from a reputable, independent source. Furthermore, we are not aware of a more recent study from such a reputable, independent source, and thus the California Energy Commission study represents the best reference for this statistic. In the calculations below the statistic is referred to as “average power consumption percentage for a dimmer relative to a switch.”

Note that this claim does NOT rely on the operating hours per day for the dimmer. The calculation depends only on the energy (kilowatt-hours) used for lighting in typical dimmer locations, which we obtain from references, and the energy savings resulting from dimming. This implies an ASSUMPTION that hours-per-day usage with a dimmer is no more than it is with a switch. This assumption is consistent with the California Energy Commission study we use as a reference.

Math:

(Annual energy savings from installed Wallbox dimmer) =
(Annual connected load in dimmer locations) X
(average power reduction percentage for a dimmer relative to a switch)

(average power reduction percentage for a dimmer relative to a switch) =
100% - (average power consumption percentage for a dimmer relative to a switch)

(Annual connected load in dimmer locations) =

(Annual energy usage for Kitchen/Dining) X
(Probability of a dimmer being used in Kitchen/Dining) +

(Annual energy usage for Living / Family / Finished Basement) X
(Probability of a dimmer being used in Living / Family / Finished Basement) +

(Annual energy usage for Bathroom (Net)) X
(Probability of a dimmer being used in Bathroom (Net)) +

(Annual energy usage for Bedroom (Net)) X
(Probability of a dimmer being used in Bedroom (Net)) +

(Annual energy usage for Porch (Front, Back, Enclosed), Sunroom) X
(Probability of a dimmer being used in Porch (Front, Back, Enclosed), Sunroom)



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Description	Value	Units	Source
Connected Load in Dimmer Locations	296	kWh/y	Navigant + Ipos
Average power consumption percentage for a dimmer relative to a switch ("Power Correction factor for dimmers" in CEC study)	80%	*	California energy Commission study, p. 83 http://www.energy.ca.gov/efficiency/lighting/VOLUME01.PDF
Average power reduction percentage for a dimmer relative to a switch	20%	*	1.0 - .08
Energy Savings from installed Wallbox dimmer	59.2	kWh/y	296 X .02 = 59.2

Reference Details	
Navigant	http://eere.energy.gov/buildings/info/documents/pdfs/lmc_vol1_final.pdf
Ipos	Ipos 2004 study, commissioned by Lutron
CEC	http://www.energy.ca.gov/efficiency/lighting/VOLUME01.PDF

Room Type	kWh/y	Rank	Source
Kitchen/Dining	377	2 + 10	Navigant, Table 5-9
Living	426	1 + 8	Navigant, Table 5-9
Yard/Porch	248	4	Navigant, Table 5-9
Bathroom	251	3	Navigant, Table 5-9
Bedroom	215	5	Navigant, Table 5-9
Utility Room	67	9	Navigant, Table 5-9
Garage	103	7	Navigant, Table 5-9
Hall Entry	171	6	Navigant, Table 5-9
Den	37	11	Navigant, Table 5-9

Room Type	kWh/y	Rank	Source
Kitchen/Dining	979	34.8%	Ipos
Living/Family/Finished Basement	730	26.0%	Ipos
Porch (Front, Back, Enclosed), Sunroom	161	5.7%	Ipos
Bathroom (Net)	226	8.0%	Ipos
Bedroom (Net)	258	9.2%	Ipos
Unfinished Basement	9	0.3%	Ipos
Garage	22	0.8%	Ipos
Hall/Stairway	125	4.4%	Ipos
Den/Home Office/Study/Library	303	10.8%	Ipos
Total Dimmers	2813	100.0%	

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Room Type	Connected Load (kWh/y)
Kitchen/Dining	131
Living/Family/Finished Basement	111
Porch (Front, Back, Enclosed), Sunroom	14
Bathroom (Net)	20
Bedroom (Net)	20
Unfinished Basement	0
Garage	0
Hall/Stairway	0
Den/Home Office/Study/Library	0
Total Dimmers	296

