

**The Economics of Dimming**

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Technical white paper  
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## The Economics of Dimming

*Executive Summary: Using assumptions outlined in the text... a residential dimmer can save \$7.36 (or more) in electricity costs per year, and can pay for itself in about two years. A commercial dimmer can save \$85 (or more) in electricity costs per year, and pay for itself in about one year. Higher dimming use will result in shorter payback periods.*

### Residential Dimming

The typical investment for a Lutron® residential single-location 600 W dimmer ranges from \$9.97 for rotary dimmers to \$29 for Maestro® dimmers, with the average retail price being \$16. This investment can be easily recouped by substantial energy savings that result from using the dimmer. Here's how:

- Average residential dimmer load = 300 W<sup>1</sup>
- Average energy savings while dimmer is in use = 20%<sup>2</sup>
- Average daily residential dimmer use = 3 hours<sup>3</sup>
- Total electricity savings = decrease in load (300 W x 20%) x hours used (3 hours / day x 365 days) = **65.7 kWh / year**
- Average cost of residential electricity = \$0.112 per kWh<sup>4</sup>
- Average annual cost savings = 65.7 kWh / year x \$0.112 / kWh = **\$7.36 / year**

A single Lutron residential dimmer saves an average of \$7.36 per year.

An average residential dimmer (at \$16) pays for itself in 2 years and 2 months.

A rotary dimmer (at \$9.97) pays for itself in 1 year and 4 months.

### **Energy Savings Over the Life of the Dimmer**

A Lutron® dimmer is designed to operate for at least 10 years, meaning that each dimmer will ultimately pay for itself several times over.

- Minimum design life of dimmer = 10 years
- Minimum lifetime cost savings = 10 years x \$7.36 / year = \$73.60
- Net savings = \$73.60 - \$16 = **\$53.60**

### **The More You Dim, the More You Save**

Dimmers operated for longer periods of time, at dimming levels greater than 20%, save even more electricity and money. For example, here's what happens when you dim a light by 50% for 5 hours/day:

- Annual electricity savings = decrease in load (300 W x 50%) x hours used (5 hours / day x 365 days) = 270 kWh / year
- Annual cost savings = 270kWh / year x \$0.112 / kWh = **\$30.24 / year**

In this case, a single residential dimmer saves \$30.24 / year. This would reduce this payback period for an average dimmer (at \$16) to less than seven months.

## Commercial Dimming

The typical investment for a Lutron® commercial dimmer is \$100. This investment is a little higher than the residential purchase because the dimmer is required to control larger loads. However, the running hours are much longer in a commercial installation and this results in larger savings. Here's how:

- Average commercial dimmer load = 1200 W<sup>5</sup>
- Average energy savings while dimmer is in use = 20%<sup>6</sup>
- Average daily commercial dimmer use = 14 hours / day<sup>7</sup>
- Average number of days used for commercial operations = 250<sup>8</sup>
- Average annual electricity savings = decrease in load (1200 W x 20%) x annual use (14 hours / day x 250 days) = **840 kWh / year**
- Average cost of commercial electricity = \$0.102 / kWh<sup>9</sup>
- Average annual cost savings = 840 kWh / year x \$0.102 / kWh = **\$85.68/yr**

A single Lutron commercial dimmer saves an average of \$85.68 per year.

An average commercial dimmer (at \$100) pays for itself in about 1 year and 2 months.

### **Energy Savings Over the Life of the Dimmer**

A Lutron® commercial dimmer is designed to operate for at least 10 years, meaning that each dimmer will ultimately pay for itself several times over.

- Minimum design life of dimmer = 10 years
- Minimum lifetime cost savings = 10 years x \$85.68 / year = \$856.80
- Net savings = \$856.80 - \$100 = **\$756.80**

## Conclusions

### Residential dimming

- A residential dimmer can **save \$7.36 / year in electricity costs** compared to a switch.
- An average residential dimmer pays for itself in 2 years and 2 months. After that, the customer continues to save \$7.36 / year, every year.
- If the dimming level is increased, the savings will be larger and the payback period will be shorter.

### Commercial dimming

- A commercial dimmer can **save \$85.68 / year in electricity costs** compared to a switch.
- An average commercial dimmer pays for itself in **1 year and 2 months**. After that, the customer continues to save \$85.68 / year, every year.
- If the dimming level is increased, the savings will be larger and the payback will be shorter.

## References

- 1 Lutron® survey of customers and employees
- 2 California Energy Study  
<http://www.energy.ca.gov/efficiency/lighting/VOLUME01.PDF>
- 3 EPA/Energy Star and Energy Information Administration  
<http://www.eia.doe.gov/emeu/lighting/ftnotes.html#f15>
- 4 Energy Information Administration  
[http://www.eia.doe.gov/cneaf/electricity/epm/table5\\_3.html](http://www.eia.doe.gov/cneaf/electricity/epm/table5_3.html)
- 5 Lutron survey of commercial lighting designers, architects and field service engineers
- 6 California Energy Study  
<http://www.energy.ca.gov/efficiency/lighting/VOLUME01.PDF>
- 7 Energy Information Administration  
<http://www.eia.doe.gov/emeu/cbecs/cbecs2f.html>
- 8 Energy Information Administration  
<http://www.eia.doe.gov/emeu/cbecs/cbecs2f.html>
- 9 Energy Information Administration  
[http://www.eia.doe.gov/cneaf/electricity/epm/table5\\_3.html](http://www.eia.doe.gov/cneaf/electricity/epm/table5_3.html)

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