

# Energy-Efficient Lighting Explained

*A guide for business people who aren't lighting techies*

By RealEnergyWriters.com and  
The Daily Energy Report

June 2011

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## Introduction

For years, we thought little about lighting. We were called upon to make few decisions about our lights because the choices were limited. That has all changed. Lighting is undergoing a technology revolution never before seen in the field.

As [Rensselaer Polytechnic Institute](#) said in a recent news release about its lighting research programs,

*“The field of lighting is undergoing a fascinating, revolutionary transformation. The century-old light bulb is steadily ceding ground to its high-tech successor, the light-emitting diode (LED). While the promise of LEDs as a long-lived, energy-efficient heir to light bulbs is undeniable, the true promise of LED and solid-state lighting technology transcends illumination. LEDs offer the potential to control, manipulate, and use light in entirely new ways for a surprisingly diverse range of areas.”*

This revolution has spurred a myriad of new lighting products and companies—focused on LEDs, as well as other efficient technologies.

Marketing materials and technical reports about lighting now abound. It’s not easy for business owners with little time to wade through all of the noise about lighting on the Internet. So RealEnergyWriters.com and The Daily Energy Report has done the job for you. We prepared “Energy Efficient Lighting Explained: A guide for business people who aren’t business techies” to help commercial enterprises understand their options, including the benefits, costs and savings offered through the installation of high- efficiency lighting. We describe the big-picture landscape and today’s political controversies surrounding light bulbs, so that you can understand the excitement swirling around lighting. We also describe the various kinds of lighting and lighting controls and their pluses and minuses. In addition, we provide audio interviews with leaders in the field about energy efficient lighting and how to best take advantage of the different options. And finally, we feature some of the valuable government incentives now available that can help reduce the cost of your lighting project. Lighting is considered to be one of the most cost-effective energy- efficiency investments. We think you’ll see why after reading this report.

This report is written by veteran energy journalists [Lisa Cohn](#) and [Elisa Wood](#), along with Reid Smith, editor of [Energy Efficiency Markets](#) and Ben Lack, CEO/Chief Conversationalist of [The Daily Energy Report](#).

If you're considering installing energy-efficient lighting, start here so you can make an informed decision. We also suggest that lighting and energy efficiency businesses use this report in educating customers.

### **Who will benefit from this report?**

- US businesses considering installing energy-efficient lighting
- Lighting and energy-efficiency companies who can use the report to educate customers (See copyright below.)
- Corporate and government decision-makers seeking an overview of the lighting market
- Building owners who want to 'green' their facilities
- Commercial enterprises seeking to decrease their energy bills
- Innovators and investors in search of an introduction to the lighting market

### **Companies and organizations named in this report**

- Acura Technologies
- Ameresco
- American Council for an Energy Efficient Economy
- Bostonian
- Cascadia Capital
- Columbia Lighting
- Consolidated Edison
- Coolnrg USA
- Crestline
- Cushman & Wakefield
- Conservation Services Group
- CPower
- Daintree Networks
- Digital Lumens
- Earth Markets
- EcoAlign
- Efficiency Vermont
- Element Markets
- Energy Cost Savings Council
- Energy Star
- EnerNOC
- General Electric
- Global Climate Strategies
- Greentech Media
- Groom Energy

- IBM
- Illuminating Engineering Society of North America
- Johnson Controls
- Leviton
- Licht Kunst Licht
- Lighting Controls Association
- Light Right Consortium
- Lindsay Ferrai Office Building
- Lumenergi
- Lumetric
- Midwest Energy Efficiency Alliance
- National Grid
- Neuwing Energy
- New Buildings Institute
- New York State Energy Research & Development Authority
- Nexant
- Northeast Energy Efficiency Partnership
- NStar
- Pike Research
- Osram Sylvania
- Pacific Gas & Electric
- Philips
- Progress Energy
- Redwood Systems
- San Diego Gas & Electric
- Sacramento Municipal Utility District
- South Florida Tea Party
- Sterling Planet
- USAID Environmental Cooperation-Asia Clean Development and Climate Program
- University of California, Davis
- University of Maryland
- US Department of Energy
- US Energy Information Administration
- US Environmental Protection Agency
- UTC Power

## PART 1

# Efficient Lighting and Your Business

### Why change?

The common incandescent light bulb was an unqualified success for almost a century. It did its job and did so cheaply, giving inventors little impetus to change the technology over the years. What invention it did encourage came in the form of jokes about how many people it takes to screw one in.

Then, as innovators became increasingly aware of the value of energy efficiency, they began to realize that maybe the light bulb didn't work so well. In fact, contrary to its name, the light bulb did not emit light, but heat. Heat bulb might have been a more appropriate nomenclature, given that 90 percent of the energy it consumes produces heat, not light, according to the US Government's [Energy Star](#) program.

Who cares, you say? The old-fashioned light bulb works just fine, illuminating my office, store or home. Why change? The problem is that all this heat means 90 percent of the energy that goes into the light bulb dissipates as waste. As a result, you are paying for energy that you will never use. Think of it as water. You buy a gallon container, but you throw nine-tenths of the contents down the drain and only use one-tenth for drinking. That's what it is like to use incandescent light.

### Saving money with better lighting

Businesses and consumers pay for this wasted energy both directly and indirectly. It's easy to see the direct costs. A compact fluorescent light bulb (CFL), the most commonly used energy-efficient light at this point, creates about 75 percent less heat than a standard incandescent light bulb, and lasts about 10 times longer, according to [Energy Star](#). CFLs cost more to buy, but so much less to operate, that they pay back their initial cost many times over. By removing one incandescent and replacing it with one CFL, you save on average \$69 over the product's lifetime, according to the US Environmental Protection Agency (EPA). Exactly how much money you will save depends on your electric rate, which varies by utility. In its calculation, the EPA assumed an electric rate of 11.3 cents/kWh. If

you operate a business in North Dakota, you're paying a lot less than that for electricity, about 6.6 cents/kWh, so your savings from a CFL will be lower. If you're in Hawaii, you are paying a lot more, about 28 cents/kWh, so your savings will be greater. Below is a chart of the average commercial electric rates in the 50 states. Is your business in one of the pricier states? If so, an investment in new lighting may quickly pay back. After you've found your electricity rate, you can go to this calculator and gauge what you'll save at your business or home if you switch from old-fashioned incandescent light bulbs to CFLs

<http://e3living.com/cfl-savings-calculator>. (Of course, CFLs are just one kind of efficient lighting. Others include the up-and-coming LED light and highly effective lighting controls, which are described in Section III of this report.)

**Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State, February 2011 and 2010**  
(Cents per Kilowatthour)

Census Division and State	Residential		Commercial		Industrial		Transportation	
	Feb-10	Feb-11	Feb-10	Feb-11	Feb-10	Feb-11	Feb-10	Feb-11
<b>New England</b>	<b>15.91</b>	<b>16.28</b>	<b>14.35</b>	<b>14.74</b>	<b>12.58</b>	<b>12.99</b>	<b>8.51</b>	<b>9.68</b>
Connecticut	17.63	19.08	15.82	16.66	13.45	14.75	10.31	13.29
Maine	15.85	15.58	12.7	13	9.54	9.65	--	--
Massachusetts	14.6	14.97	13.92	14.44	13.17	13.56	7.2	7.89
New Hampshire	16.34	15.48	14.4	13.77	12.59	12.62	--	--
Rhode Island	16.36	16.03	12.93	13.38	11.42	12.46	13.87	12.58
Vermont	15.96	15.33	13.77	13.23	10.15	9.58	--	--
<b>Middle Atlantic</b>	<b>15.19</b>	<b>14.92</b>	<b>13.26</b>	<b>13.36</b>	<b>8.91</b>	<b>8.73</b>	<b>13.06</b>	<b>11.93</b>
New Jersey	16.7	15.82	13.43	13.24	11.86	11.83	10.87	12.36
New York	17.45	17.86	15.22	15.23	9.25	9.12	14.09	13.47
Pennsylvania	12.72	12.22	9.77	10.37	8.36	8.03	9.6	7.32
<b>East North Central</b>	<b>11.04</b>	<b>10.52</b>	<b>9.41</b>	<b>9.12</b>	<b>6.46</b>	<b>6.34</b>	<b>6.75</b>	<b>7.44</b>
Illinois	11.22	10.56	8.58	8.53	6.23	6.61	6.6	7.26
Indiana	9.51	8.79	8.8	8.19	6.3	5.77	9.86	8.75
Michigan	12.47	11.52	10.14	9.61	7.35	6.88	9.38	10.84
Ohio	10.45	10.51	9.66	9.59	6.01	6.17	6.63	8.48
Wisconsin	12.57	12.04	10.19	9.71	7.17	6.6	--	--
<b>West North Central</b>	<b>8.98</b>	<b>8.31</b>	<b>7.6</b>	<b>7.1</b>	<b>5.77</b>	<b>5.38</b>	<b>6.44</b>	<b>6.03</b>
Iowa	9.64	8.87	7.44	6.78	5.11	4.64	--	--
Kansas	9.74	9.27	8.27	7.97	6.41	5.79	--	--
Minnesota	10.24	9.6	8.14	7.92	6.2	6.28	7.62	7.91
Missouri	8.32	7.4	7.15	6.29	5.47	4.74	5.52	4.56
Nebraska	8.03	7.9	7.47	7.24	5.57	5.31	--	--
North Dakota	7.31	7.05	6.88	6.66	6.2	5.91	--	--
South Dakota	8.3	7.99	7.39	7.11	6.01	5.77	--	--
<b>South Atlantic</b>	<b>10.96</b>	<b>10.83</b>	<b>9.5</b>	<b>9.46</b>	<b>6.56</b>	<b>6.48</b>	<b>9.09</b>	<b>10.66</b>



Delaware	13.06	12.96	11.07	11.6	9.56	9.4	--	9.59
District of Columbia	13.25	13.21	13.58	13.59	7.7	8.19	10.94	12.32
Florida	11.67	11.62	10.11	10.16	8.97	8.62	9.34	8.95
Georgia	10.15	9.49	9.64	9.24	6.32	6.09	7.38	6.99
Maryland	13.62	14.21	11.79	11.91	9.56	10.03	9.27	11.44
North Carolina	10.12	10.15	8.06	8.12	5.83	5.66	6.94	7.37
South Carolina	11.57	10.43	9.34	9	5.62	5.49	--	--
Virginia	9.84	10.27	7.61	7.81	6.47	6.99	7.63	7.41
West Virginia	8.82	8.34	7.75	7.46	6.04	5.77	8.69	8.85
<b>East South Central</b>	<b>9.72</b>	<b>8.76</b>	<b>9.7</b>	<b>8.9</b>	<b>5.92</b>	<b>5.29</b>	<b>12.33</b>	<b>11.02</b>
Alabama	10.88	9.99	10.45	9.86	5.85	5.26	--	--
Kentucky	8.74	8.06	8.44	7.83	5.16	4.76	--	--
Mississippi	9.97	9.17	9.65	9.27	6.48	5.97	--	--
Tennessee	9.42	8.19	9.98	8.76	6.89	5.89	12.33	11.02
<b>West South Central</b>	<b>9.97</b>	<b>10.27</b>	<b>8.65</b>	<b>8.97</b>	<b>5.88</b>	<b>6.07</b>	<b>9.81</b>	<b>9.68</b>
Arkansas	7.93	8.52	6.93	7.63	5.1	5.43	11.55	10.87
Louisiana	8.36	8.54	8.38	8.69	5.21	5.97	8.79	9.54
Oklahoma	8.31	8.08	7.13	6.79	5.18	4.45	--	--
Texas	10.94	11.38	9.11	9.5	6.38	6.49	9.93	9.69
<b>Mountain</b>	<b>9.76</b>	<b>9.79</b>	<b>8.46</b>	<b>8.28</b>	<b>5.64</b>	<b>5.7</b>	<b>9.36</b>	<b>8.47</b>
Arizona	9.93	9.85	8.82	8.59	6.02	6.18	--	--
Colorado	10.5	10.57	8.96	8.54	6.7	6.39	9.88	8.66
Idaho	7.79	7.69	6.54	6.72	4.6	4.65	--	--
Montana	9.33	8.61	9.07	8.25	5.17	5.57	--	--
Nevada	11.86	13	9.49	10.33	5.68	6.6	7.94	10.55
New Mexico	10.18	9.92	8.69	8.3	5.95	6.04	--	--
Utah	8.35	8.23	6.9	6.71	4.73	4.41	8.82	7.72
Wyoming	8.5	8.26	7.57	7.39	5.21	4.95	--	--
<b>Pacific Contiguous</b>	<b>11.9</b>	<b>11.74</b>	<b>11.31</b>	<b>10.56</b>	<b>7.44</b>	<b>7.27</b>	<b>8.09</b>	<b>8.4</b>
California	14.83	14.65	12.96	11.96	10.07	9.84	8.09	8.46
Oregon	9.39	8.61	8.34	7.58	5.67	5.26	7.81	6.93
Washington	8.04	7.66	7.49	7.29	4.09	4.06	8.64	7.32
<b>Pacific Noncontiguous</b>	<b>24.33</b>	<b>22.17</b>	<b>21.86</b>	<b>19.47</b>	<b>22.26</b>	<b>19.38</b>	<b>--</b>	<b>--</b>
Alaska	16.76	16.1	14.79	13.56	15.51	14.13	--	--
Hawaii	31.04	27.46	28.44	25.34	24.82	21.5	--	--
<b>U.S. Total</b>	<b>11.2</b>	<b>10.95</b>	<b>10.11</b>	<b>9.93</b>	<b>6.72</b>	<b>6.55</b>	<b>10.85</b>	<b>10.78</b>

Source: US Energy Information Administration

[http://www.eia.doe.gov/cneaf/electricity/epm/table5\\_6\\_a.html](http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_a.html)