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Atwater Kent Efficiency Plan

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Atwater Kent Efficiency Plan

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Abstract

Atwater Kent contains a variety of facilities, all contributing to substantial energy consumption. Working to reduce this load through the installation of higher efficiency fixtures and mitigating heat loss result in reduction of operational costs. Many of these fixtures have payback periods of under 5 years.

Atwater Kent

- Built in 1907
- Houses Electrical and Computer Engineering and Social Science and Policy Studies Departments
- Includes lecture halls, classrooms, computer labs, lounges, offices, etc.
- Renovations done following World War II, and in 1961 and 1981
- Brick exterior walls
- Some interior walls are exterior walls of original building

Computers

Phantom Load

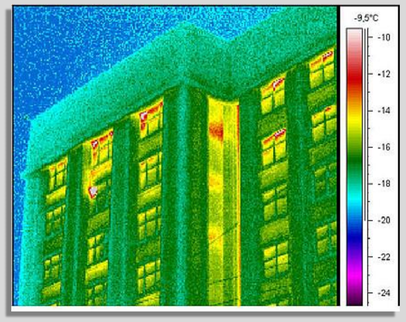
- Power drain by appliances that are not in use
- "Smart" power strips only draw current when appliance is on

Cost Analysis

Computers in Atwater Kent	237
Power Draw in Off State	2W
Cost of Powering Computers in Off State / Year	4,000 USD
Cost of Smart Power Strips (2 computers / strip)	10,700 USD
Payback Period	**2.7 Years**

Heating

- Temperature sensors indicate constant temperature of 23.5°C over a 24-hour period
- Heat does not need to be kept at this high level overnight while building is vacant



Thermal image of Russian Parliament building. Greenpeace.org. Greenpeace, 15 Feb. 2005. Web. 7 Dec. 2009.

LED Lighting

Background:

- 90% more efficient than incandescent light bulbs
- Last up to 10 times longer than incandescent bulbs
- 3-watt LED and 45-watt incandescent have same light output
- LED technology costs about 4 times more per unit than current incandescent technology

Cost Analysis

Fluorescent Lighting Energy	27,4000kWh/year
Electricity Cost	0.1851 USD/kWh
Fluorescent Lighting Cost	50,600 USD/year
Total Investment for LED Lights ($60 / unit)	58,560 USD
LED Lighting Energy	128,000 kWh/year
LED Lighting Cost	24,000 USD/year
Yearly Savings	**26,600 USD**
Payback Period	**2 years**
Savings Over Lifespan	**212,800 USD**

Windows

Low-E Window Coatings

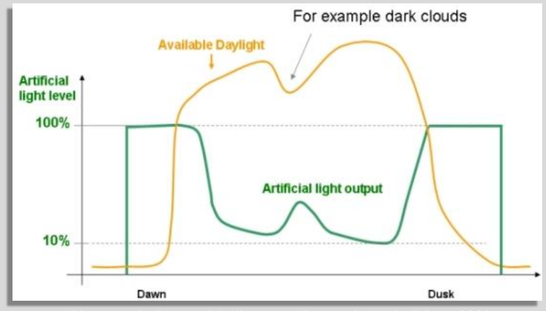
- Stands for "low-emittance"
- Reflect light from the non-visible spectrum
- Can be painted onto preexisting windows
- Can improve HVAC efficiency by up to 72% in summer and 55% in winter

Daylight Dimming

Background:

- Reduces light fixture brightness to compensate for sunlight.
- Average energy savings are approximately 35% over conventional ballasts
- Daylight dimming ballasts replace standard florescent light ballasts without changing light fixture

Day Lighting Profile



Photograph. *Daytronicballast.com.* Daytronic. Web. 7 Dec. 2009.

Cost Analysis for AK116

	Conventional Ballast	DAYTRONIC Daylight Dimming Ballast
Electricity Cost / Year	1,400 USD	1,000 USD
Annual Bulb Replacement Cost	270 USD	144 USD
Operation Cost / Year	**1,800 USD**	**1,200 USD**
Operation Cost / Lifespan	21,600 USD	14,400 USD
Ballast Cost for Room	3,240 USD	6,480 USD
Installation Cost	4,680 USD	7,200 USD
Overall Cost / Lifespan	26,280 USD	21,600 USD
Payback Period		**4.2 years**
Savings Over Lifespan		**4,680 YSD**

Conclusions

We recommend that the University implements the above changes, in the form of LED tube lights, "smart" power strips, and daylight dimming devices. In the future, the University may also find the use of Low-E coatings to be substantially beneficial in reducing heating costs. Furthermore, overnight building temperatures should be more closely monitored and adjusted based on occupancy. These analyses can be further applied to any and all buildings on the WPI campus.