



# Student Energy Habits and Energy Efficiency in WPI Dorms

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## Abstract

This project involved studying energy consumption in the dorms. A typical dorm room has two televisions, one refrigerator, two computers, and lighting. We found that many students already have good energy habits and that many devices in the dorms are Energy Star approved. Some of largest impacts that can be made would be installing building automation systems to control lighting so it is not constantly on and encouraging students to unplug devices not in use.





## Background

- A typical student has a computer, cell phone, refrigerator, TV, game console, microwave all of which consume energy on a daily basis.
- Many colleges are building new or retrofitting existing buildings to meet LEED standards.
- A portion of the energy used in the dorm is from lighting. Currently, the dorms use fluorescent lighting, however a move to LED based lighting would save even more energy.
- A few colleges have tried to change student habits through different means of communication such as a lecture or social networking campaigns, some have been successful in changing habits and some have not.

## Goal and Process

- Our goal was to learn about energy usage in the dorms and find ways to lower it.
- Distributed an online survey asking students about their energy habits in the dorm.
- Took an inventory of ten student rooms to determine how much electricity is drawn by students' personal electronics.
- Our results were used to create a generalized student energy profile and make recommendations of how to possibly change it.

## Types of Lighting

INCANDESCENT	FLUORESCENT TUBE	COMPACT FLUORESCENT	LED
			
<ul style="list-style-type: none"> <li>• 60 watt bulb</li> <li>• 850 lumens</li> <li>• 1000 hour lifetime</li> <li>• \$1 initial cost</li> </ul>	<ul style="list-style-type: none"> <li>• 32 watts</li> <li>• 2660 lumens</li> <li>• 20,000 hour lifetime</li> <li>• \$3 - \$5 initial cost</li> </ul>	<ul style="list-style-type: none"> <li>• 15 watts</li> <li>• 900 lumens</li> <li>• 8,000 - 10,000 hour lifetime</li> <li>• ~\$5</li> </ul>	<ul style="list-style-type: none"> <li>• 12 watts</li> <li>• 800 lumens</li> <li>• 25,000 - 30,000 hour lifetime</li> <li>• \$40 - 50</li> </ul>

## A Typical Dorms Energy Footprint

DEVICE	POWER DRAW (WATTS)	PHANTOM DRAW	TOTAL POWER (HOURS)	kWh / DAY
Television	30 - 150	1	1- 2	.16
Refrigerator	100 - 150	2	24	2.4 - 3.6
Microwave	~1300	1	.05	.08
Computer	65 - 90	2	6	.5
Game Console	52 - 160	1 - 3	1 - 2	.26
Room Lighting	128 - 164	-	6.5	.95
Common lighting	1904	-	24	45.7
Common television	150	2	5	.82

## Conclusions/Recommendations

- Changing student habits will not make the largest impact on energy consumption seeing as that they are already fairly good.
- Replacing lighting with LEDs and automating the lighting system alone could reduce lighting draw from 45kWh/day to 15kWh/day.
  - This could include motion and door contact sensors to activate the lighting in the halls and the bathroom so that lighting is only on when needed.
- Since room lighting uses less than a kWh/day compared to common space lighting that uses over 30 kWh/day, common lighting is far more important to replace with higher efficiency bulbs.

## References

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- <http://www.greenoptions.com/wiki/lifetime-costs-of-light-bulbs>
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- [http://www.amazon.com/Slimline-Fluorescent-Length-Single-F42T12/dp/B000KCVH4Q/ref=sr\\_1\\_1?s=hi&ie=UTF8&qid=1291615123&sr=1-1](http://www.amazon.com/Slimline-Fluorescent-Length-Single-F42T12/dp/B000KCVH4Q/ref=sr_1_1?s=hi&ie=UTF8&qid=1291615123&sr=1-1)



A typical television setup in a dorm room