Proposal for Energy Efficient Light Program in Pritchard Hall

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Green RFP Program

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EXECUTIVE SUMMARY

We propose that the hallway lights of Pritchard Hall be replaced by LED efficient bulbs on an automatic dimming timer system. The timer system would dim the lights halfway during the quiet hours of the building, 10PM - 8AM. The solution we propose supports two of the Virginia Tech Climate Action Commitment goals: improving electricity and heating efficiency of campus facilities and being a leader in campus sustainability. The solution we propose creates immediate, realizable savings: 69% of Pritchard's light energy and $9,381 can be saved annually by this project. The solution we propose is includes a one-time implementation, yet will continue to reap the benefits of saved energy and money.

PROPOSAL

Problem

Pritchard Hall is a residence hall on campus that houses over 1,000 students. The residence hall uses excessive amounts of energy every day by keeping every light in the hallways on at all hours. The lights do not need to be at full brightness at all hours of the night, and the building could save energy by implementing a system that minimizes this energy waste and saves money.

Solution

We propose that the hallway lights of Pritchard Hall be replaced by LED efficient bulbs that can be put on an automatic timer system. The timer system would dim the lights halfway during the quiet hours of the building, 10PM - 8AM. For safety purposes, this lighting system could be set so the lights come to full brightness again during fire alarms or other similar alarms during these hours. A similar project has been completed in Derring Hall, which replaced all outdated lights with LED energy-efficient lightbulbs. Our project, however, takes the solution to another level by dimming the lights overnight to save even more energy and money.

Goals

The project we propose meets the preferences as outlined in the Green Program's RFP page: "Proposals that support the Virginia Tech Climate Action Commitment, produce realizable savings, and require one-time (as opposed to ongoing) funding are given preference" (Green RFP Program).

Our solution supports 2 the Virginia Tech **Climate Action Commitment goals**:

1. Virginia Tech will improve electricity and heating efficiency of campus facilities and their operations.
   By dimming lights 50% for ten hours of the night and using LED bulbs, the lights would use 69% less energy than they do now.

2. Virginia Tech will be a Leader in Campus Sustainability, where Sustainability pursues enhanced economic stability and affordability and environmental stewardship.
   By switching to cost-effective bulbs that are free of hazardous chemicals and are recyclable, our plan caters to both economic stability and environmental stewardship.

The solution we propose creates **immediate, realizable savings**. LED lights use ⅙ of the amount of energy used by typical compact fluorescent lights, do not include mercury, and are RoHS compliant (USA Lighting).

The solution we propose is includes a **one-time implementation**, yet will continue to reap the benefits of saved energy and money for the entire life of the new light system.

Implementation

In order to implement the new light system, we propose that we install three Intermatic ET8000 digital light controllers per floor. This model is a reasonable price of $185 per unit, but with three per floor in Pritchard, the project would need 18 total units. The Intermatic ET8000 has a medium capacity, which is best for the purposes needed. It has features that allow for returning to full brightness during alarms (Intermatic, Westside). This model can be hooked into the fire alarm system through one of its many input/output connections (Intermatic).

The LED light bulbs, as sold by BulbsPro are three feet long, as per the measurements of lights in Pritchard Hall. The three foot long bulbs cost $497.50 for a pack of 25 bulbs, and the project calls for 360 of these bulbs (14 packs needed).

Pros of LED lights	Cons of LED lights
Increased Energy Efficiency LED: 80-90% energy efficiency	Slightly Steeper Price LED costs more than most standard bulbs
Increased Lamp Life Standard incandescent light bulb: 750 to 2,000 hours LED lamps: 100,000 hours	Color Limitations LED lamp can be a bit too blueish
Decreased Environmental Impact About 95% of LED lamps are able to be recycled.	Temperature LEDs can have overheating issues.
From ShineRetrofits article on Pros and Cons of LED Lighting	

According to Todd Pignataro, the Trade Manager for residential projects at Virginia Tech who approved the project, the materials for each fixture will cost $110 each.

Pignataro also supplied the information for the labor costs of the project, which are as follows. The lights and controller would have to be installed professionally through the University's vendor, Jameson Electric Company. Jameson Electric Company's electricians will need to

remove the old lights, recycle them according to the university's hazardous waste management guidelines, recycle all scrap metal from the old fixtures, set the new lights in place, and set up the light controllers in the electric panels. Each fixture will take approximately 15 minutes to replace, and labor will cost $80 and hour. For 360 fixtures, labor will be priced at $7,200. Any needed maintenance thereafter would be conducted by Jameson Electric Company as well.

Funding

Project Costs			
Item	Price per each	Amount needed	Total price
Lights + Fixtures	$20 per bulb + $110 for materials per fixture	360 bulbs + 360 fixtures	$46,800
Light Controllers	$180 per controller	18 controllers	$3,240*
Labor	$80 per hour	15 minutes per fixture x 360 fixtures	$7,200
Total			$57,240

*University discounts may apply

The project could be funded by grants through the VT Office of Sustainability, the EPA, and the US Department of Energy. The project will pay off the cost within six years, as the project will be saving the building $9,381.96 annually. Between the possibility of being funded through grants and the short turnaround for the pay off, the project's cost is feasible.

Approval

Todd Pignataro, the Trade Manager for residential projects at Virginia Tech, approved our project, saying that our proposal is in the right direction that his department is looking to go with residential buildings. Other projects have been started that are similar to ours, which shows that

our project is feasible. We addressed Mr. Pignataro's concerns about the light switch controls by choosing a more appropriate model. Otherwise, all other aspects of the project were of no issue.

Conclusion

The final cost for our project to replace the hallway lights in Pritchard with LED bulbs with dimming capability will pay itself off in a matter of six years and can be covered by the abundance of potential grant money. The savings the project will bring, both monetary ($9,381 per year) and environmentally (69% of light energy in Pritchard saved per year), make the project worthwhile in the long run.

BIBLIOGRAPHY

Bulbspro, "Satco S9731 - 23W LED PLL 4-PIN 2G11 Base - 4000K - 2800 Lumens - Direct Replacement for 40W PL-L with Electronic Ballast." www.bulbspro.com/Satco-s9731.html. Accessed 4/24/2018.

Facilities Department Virginia Tech, "Green RFP Program." www.facilities.vt.edu/sustainability/sustainability-programs/green-rfp-program.html. Accessed 4/19/18.

Intermatic, "ET91215CR." https://www.intermatic.com/en/timer-controls/electronic-controls/et91215cr, 2017. Accessed 4/16/18.

Pignataro, Todd. Personal Interview. 24 April 2018.

Shineretrofits, "LED Lighting: Pros and Cons," *ShineRetrofits*, www.shineretrofits.com/knowledge-base/lighting-learning-center/pros-and-cons-of-led-lighting. Accessed 4/24/2018.

VT News, "Lighting upgrades to Derring Hall will save the university $128,000 annually" https://vtnews.vt.edu/articles/2017/02/adm-fs-derring-lighting-upgrades.html, 2017. Accessed 4/19/18.

Westside, "ET91215CR." https://www.westsidewholesale.com/intermatic-et91215cr.html, 2017. Accessed 4/16/18.