Dim Sum Lights

Jack Anninos
Abigail Copeland
Will Guinn
Rachel McBroom

In partnership with GT Facilities:
Lance Johnson
Mike Leasure
Jamie Ready
Onkar Auzla

Project Goal

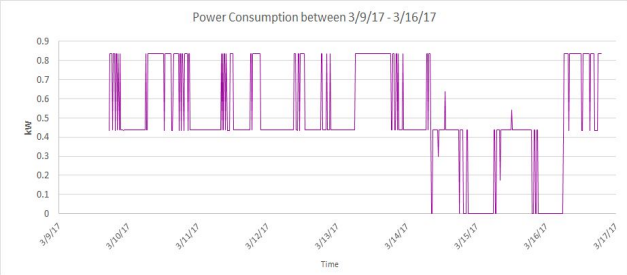
- Save 10,000 lbs. of carbon dioxide from being emitted into the atmosphere.

Strategy

- Electricity generation is the largest source of energy related carbon emissions. Lighting accounts for 20% of electricity consumption[1].
- LEDs can reduce electricity usage up to 50%[1].
- **Proposal**: Replace 228 fluorescent bulbs (57 fixtures) with LED fixtures in the basement hallways of Boggs at Georgia Tech.

Metered Data

Power consumption of 8 fluorescent fixtures over one week.



- Non-emergency fixtures on for 12.29 (hours/day)
- Non-emergency fixtures consume 9.95 (kWh/fixture/week)
- Average between non-emergency and emergency fixtures 5800 (hours/fixture/year)
- Weekdays - motion sensors turn lights on as needed, 18 of the 57 fixtures remain on
- Weekend nights all non-emergency lights off
- Georgia Tech pays $0.068/kWh for electricity

Calculations

Energy Consumption (Fluorescent, metered):

- 9.95(kWh/fixture/week) x 39(fixtures) x 52(weeks/year) = **20,183(kWh/year)**
- 0.105(kW/fixture) x 18(fixtures) x 24(hours/day) x 365(days/year) = **16,556(kWh/year)**

Energy Consumption (LED):

- 0.03(kW/fixture) x 57(fixtures) x 5800(hours/year) = **9,918(kWh/year)**

Electricity Cost Savings:

- (36739-9919 kWh/year) x ($0.068/kWh) = **1,823($/year)**

Carbon Savings:

- (36739-9918 kWh/year) x (1.15 lbs CO2/kWh) = **30,884 (lbs CO2/year)**

Total Savings:

- 100000(hours) / 5800(hours/year) x 1823 ($/year) = **$31,431**
- 100000(hours) / 5800(hours/year) x 30884(lbsCO_2/year) = 532482 lbsCO_2

	Troffer 2x4' HE LED	**T8 fluorescent lamps**
Lifespan (hours)	100,000	26,000
Wattage per fixture	30	105
		

over 100,000 hour (17 year) life span

Total Electricity Cost Saved:

$31,431

over 100,000 hour (17 year) life span

Total Carbon Saved:

532,482 lbs CO_2

Payback Period

Initial cost:

- $8998 (including installation)

Savings:

- $1823/year (electricity costs)
- $920/year (maintenance costs, PRS. COMM. Lance Johnson)

Return on Investment:

- $8998 / ($1823/year + $920/year) = **3.28 years**

Takeaway

- This small change has had a very large impact in both cost and carbon savings.
- **Scalability**: The savings are easily scalable through replacing light fixtures in more floors and buildings. If all hallway lights in Boggs were switched the savings would total **2,129,928** lbs CO_2.

LEDs save 30,844 lbs CO_2/year

30,844 lb CO_2 ≈ **13** Ramblin Recks!

References: 1. Humphreys, C.J. (2008). Solid-State Lighting. MRS Bulletin, 33(4), 459-470.

Georgia Institute of Technology