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The Viability of LEDs at LANL

Student Project Summary



Sydney Shelton

7 August 2017



Purpose

- **Can we replace High Pressure Sodium bulbs with LEDs?**
- **Where are HPS being used at LANL?**
- **We should complete a pilot project**
 - **Leo and ES-LFO were excited to provide a location**
 - **Prove if LEDs are a viable lighting option**
 - **Create a template for an LED upgrade**

Scope

- **Replace 42 building exterior fixtures on MPF-0001**
- **My role was project manager and researcher**
- **Release an internal report**
 - **Explain benefits and constraints of the upgrade**

Steps

- Identified past fixtures
- Completed energy analysis
- Completed cost analysis
- Completed light survey and pictures at night
- Purchased LED fixtures
- Installation is about 3/4 completed

Fixtures



Quantity		16	4	1	1	1	1	18
Original Fixture	Description	Original Wallpacks, High Pressure Sodium	Wallpacks circa 2007, Metal Halide	unknown incandescent fixture	unknown wallpack	unknown ceiling-mounted fixture	Original recessed fixture, Metal Halide	Original recessed fixtures, general Edison base
	Image							
New Fixture	Description	Wallpack; Lumark XTOR Crosstour MAXX LED				Ceiling-mounted LED, CLCSLED		LED bulb

Energy Savings

- Initial analysis has about a 75% energy savings
- 22420.2 kWh saved
- Different applications will have different savings

Past Wattage			
Fixture	Wattage (W)	Quantity	Total Wattage (kW)
General wallpack	200*	16	3.2
Recessed near main entrance	150 *	4	0.6
Other recessed	150 *	14	2.1
2007 wallpack	150 *	4	0.6
unknown wallpack	150 ^	1	0.15
ceiling mounted	150 ^	1	0.15
incandescent	100 ^	1	0.1
recessed	150 ^	1	0.15
Total Wattage (kW)			7.05
Total kWh ¹			30315
Total Energy Cost Low (\$)²			2,122.05
Total Energy Cost Middle (\$) ³			3,031.50
Total Energy Cost High (\$)⁴			3,637.80
New Wattage			
Fixture	Wattage (W)	Quantity	Total Wattage (kW)
Wallpack	58	22	1.276
Recessed near main entrance	17	4	0.068
Other recessed	30	14	0.42
CLCSLED	36	2	0.072
Total Wattage			1.836
Total kWh¹			7894.8
Total Energy Cost Low (\$)²			552.64
Total Energy Cost Middle (\$) ³			789.48
Total Energy Cost High (\$)⁴			947.38
Energy Savings			
Energy Savings (kWh)			22420.2
Energy Cost Savings Low (\$)²			1,569.41
Energy Cost Savings Mid (\$)³			2,242.02
Energy Cost Savings High (\$)⁴			2,690.42

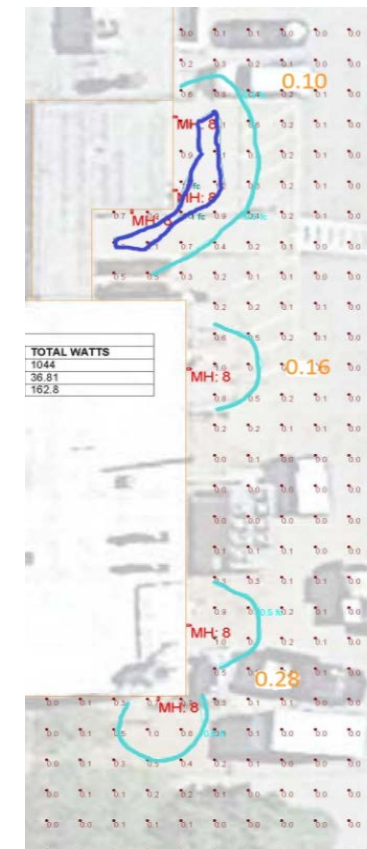
*numbers taken from original drawings
^numbers estimated
1-assuming about 4300 hours of night per year^f
2-\$0.07 per kWh^g
3-\$0.10 per kWh^e
4-\$0.12 per kWh^h

Cost Savings

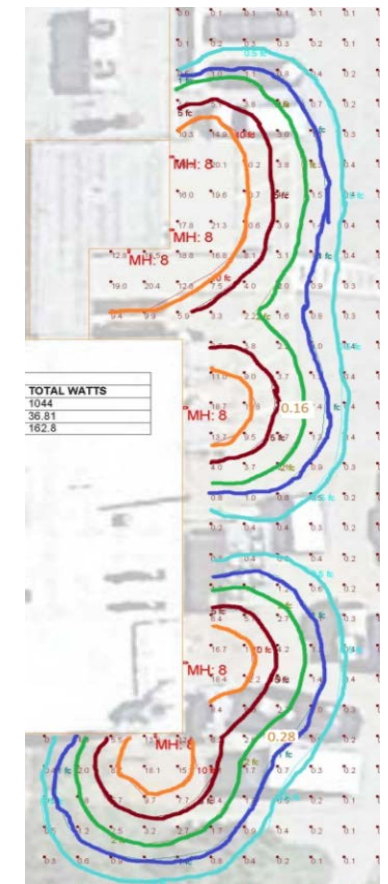
- **\$50,000 project cost (with contingency)**
- **\$1,569.41 energy cost savings per year**
- **\$1,655.00 maintenance cost savings per year**
- **15 year simple payback**

Quality of Light

- Superior quality of light
 - Color
 - Distribution



Original



Current

Light Pollution

- **Affects wildlife**
- **Compliance with Night Sky Protection Act and Endangered Species Act**
- **Directional**
- **“Blue” light**



Transferability

- Dimmable
- Instant start time
- Less waste
 - Reduce a LLW stream

Conclusion

While the cost return is not strong, the other benefits of an LED upgrade prove that an upgrade is feasible.

Thank You

- **Everyone in MSS**
 - **Particularly Randy King, Ray Richey, and Kelly Gee**
- **ES-LFO**
- **The P2 Team**