



LAB MICROSCOPE RETROFITS

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BACKGROUND

PowerSave Campus Program of the Alliance to Save Energy

- Empowers students to be leaders of energy efficiency on college campuses
- Goals: Promote green careers, realize measureable energy savings, incorporate energy efficiency concepts into academic curricula, and engage community in outreach



MOTIVATION

Laboratories are one of the largest energy consumers on university campuses

- HVAC system
- Ultra-low temperature freezers, SEMs, autoclaves, fume hoods



PROBLEM

Microscopes are a standard in most labs

- Light source illuminates sample for high-powered viewing

Standard microscopes use high-intensity discharge (HID) metal halide lamps

- Produces light through gaseous mixture of mercury and metal halides
- Wide range of radiation to illuminate samples
- Older form of technology developed in 1960s



PROBLEM

Metal Halide

Contains mercury

Produces heat as a byproduct, which can damage samples

Light quality degrades over time

Avg lifetime: 2000 hrs (~1 yr)

Long warm-up time so light is left on when not in use

Avg power draw: 150 W



SOLUTION

Metal Halide	LED
Contains mercury	No mercury
Produces heat as a byproduct, which can damage samples	No heat as byproduct
Light quality degrades over time	No degradation in light quality
Avg lifetime: 2000 hrs (~1 yr)	Avg lifetime: 25,000 hrs (~12 yrs)
Long warm-up time so light is left on when not in use	Turns on instantly
Avg power draw: 150 W	10× less power consumed

PROCEDURE

Contacted Allison Paradise, Executive Director of My Green Lab

Reached out to Holly Aaron, Director of the Molecular Imaging Center (MIC)

- MIC is a central hub for researchers at UC Berkeley and Lawrence Berkeley National Laboratory
- Over 200 active users



PROCEDURE

Applied to The Green Initiative Fund (TGIF) at UC Berkeley for a \$25,200 grant in spring of 2014

- Each microscope was estimated to cost \$5,000
- Extensive research with our stakeholder contacts
- Funds allocated to pursue outreach campaign

Successfully awarded grant in May 2014

- 4th largest TGIF grant awarded in the year



RESULTS

Baseline readings taken in fall 2014

- 4 metal halide lamps retrofitted in October 2014

Total annual energy savings of 1656 kwh and \$175

- Lifetime savings of nearly 20,000 kWh and over 4000 lbs of CO₂ abated

Cost of LED is equal to the cost of metal halide replacements for ~4 yrs

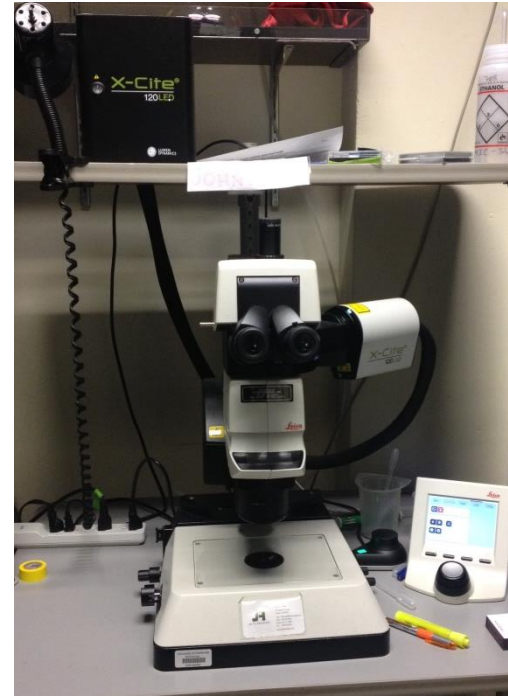
- Lifetime of LED lamp is estimated to be 12 yrs
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LESSONS LEARNED

We can help push a new frontier of energy efficiency in laboratory spaces

Steps to success:

- Research thoroughly
- Anticipate opposition and respond accordingly
- Build relationships with stakeholders



NEXT STEPS

Education materials being developed

- Infographics to explain the benefits of the LEDs
- Stickers to remind researchers to turn off lamps when not in use
- Donate additional funds from the grant to other labs to replace their equipment

Pursue energy savings in laboratories

- Competition-style
- Both behavioral and retrofit changes



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The Green Initiative Fund (TGIF) Committee

Holly Aaron, Director of the Molecular Imaging Center

Allison Paradise, Executive Director at My Green Lab

PowerSave Campus Program of the Alliance to Save Energy



**The Green
Initiative Fund**



*Pacific Gas and
Electric Company*



THANK YOU!

QUESTIONS?



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