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Workplace De-lamping

This policy brief summarizes the results of a de-lamping project undertaken as part of the “Sustainable Saunders Initiative” in Saunders Hall. A major part of the Sustainable Sanders Initiative is to explore potential energy savings, and there is no better place to start than with lighting. Lighting accounts for nearly 40% of all energy used in Saunders Hall, and is surprisingly easy to adjust through removal of bulbs. The results of our de-lamping pilot study show that not only will de-lamping save a considerable amount of energy and money, but it will also be greatly accepted and appreciated by the workplace community.

Like many office buildings, the standard fluorescent fixtures are brighter than modern recommended levels. Through initial discussions with faculty and staff, we discovered that many occupants had complaints that it is too bright in Saunders Hall. We set out to measure the existing luminosity in the building.

Using a Lutron LX-1010b light meter, measurements were taken of both the 6-bulb and 8 bulb fixtures. It was discovered that the typical desk location receives 120 foot candles from an 8-bulb fixture and 90 foot candles from a 6-bulb fixture.

The Illuminating Engineering Society of North America recommends only 30-50 foot candles in an office or classroom. In addition, the City and County of Honolulu Ordinance (Chapter 32: Building Energy Efficiency Standards, Article 6:

Lighting) sets a limit for the amount of electricity that can be used by a building for lighting. Using software provided by the Department of Business and Economic Development and Tourism, we found that the legal limit for Saunders Hall is 63,981 Watts, while the actual amount of electricity used for lighting is 92,426 Watts. Simply put, Saunders Hall is over-illuminated by twice as much as the IES recommends and 44% more than the legal limit set by the City and County Ordinance.

One major concern of over-illumination besides energy profligacy is that it can lead to light-induced ailments such as eye-strain, headaches, and stress, which have negative consequences on workplace productivity.

By removing half the bulbs from the fixtures, we can successfully lower the luminance to the recommended and legal limits of lighting.

Key Findings

- Saunders Hall is over-illuminated, both by IES recommendations and the legal limits set by the City and County of Honolulu ordinance.
- Removing bulbs to provide optimal illumination will reduce energy costs up to \$15,000/year.
- No survey respondent expressed dissatisfaction with a 50% reduction in illumination for their office.
- De-lamping measurably reduced light-induced ailments such as eye-strain, headaches, and stress.

We learned that each 8 or 6-bulb fixture is powered by a pair of identical ballasts capable of supporting 3 or 4 fluorescent bulbs each (with maximum efficiency and bulb lifespan at 3 bulbs). The optimal de-lamping scenario would be to remove 3 bulbs from each 6-bulb fixture and 5 bulbs from each 8-bulb fixture, completely disengaging one ballast from each fixture.

Based on prior survey data that carefully documented the work hours of building occupants, we estimate that this de-lamping proposal will generate energy savings between 2.3% and 4.1% of the total building electrical load, depending on the rate of de-lamping (\$8,714 to \$15,070 at 16cents/KWh). Restocking of the bulbs also creates a one-time inventory wind-fall for Buildings and Grounds of \$3,209, and a 50% de-lamping scenario cuts future bulb replacement labor costs in half. In addition to lowering future energy costs, HECO subsidizes de-lamping in commercial buildings through its energy conservation rebate program. If a bulb is verifiably removed in such a way that it cannot be replaced, HECO will compensate building owners with \$5 per bulb removed.

Before advocating a full de-lamping of Saunders, we wanted to consider individual lighting preferences and satisfaction with de-lamped offices. To do this, we began a de-lamping pilot project, in which we asked each of the department chairs to volunteer their offices as well as a few others to be temporarily de-lamped. In those volunteer offices, we brought all of the 8 and 6 bulb fixtures down to 3 bulbs per fixture. After four weeks, we surveyed the participants on their satisfaction with the reduced lighting levels and achieved a 96% response rate to our anonymous survey. As shown in Figure 1, while some respondents were dissatisfied with their lighting prior to the pilot, not a single respondent was dissatisfied following the de-lamping. Figure 2 shows that light-induced ailments also decreased dramatically as a result of de-lamping.

While none of our subjects expressed dissatisfaction with the delamping in our survey, a few did report a “neutral” attitude, and two faculty requested some or all of the bulbs replaced, when given the opportunity. We therefore estimate that 92% of the building occupants prefer, or at least will not object to a building-wide implementation of delamping in Saunders. For the remaining

Occupants, we suggest an efficient feedback mechanism to allow for quick correction of under-illuminated areas by providing desk lamps.

Figure 1

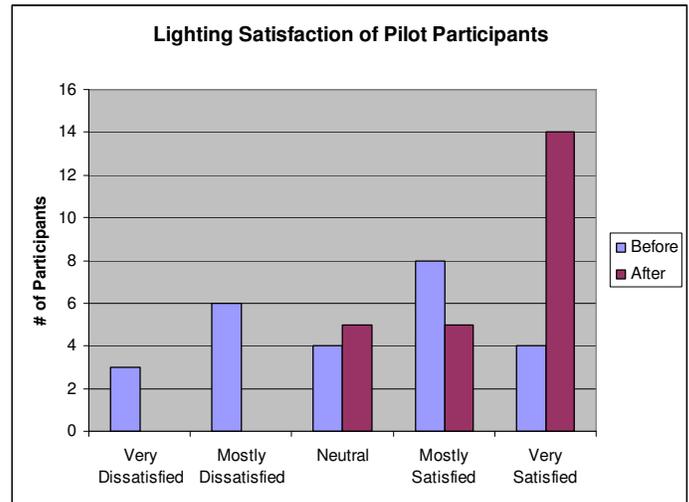
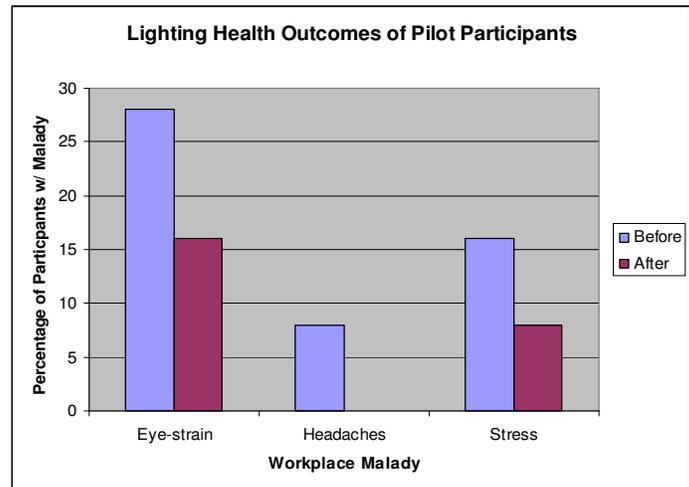


Figure 2



About the Author

Matthew Wolfe is a recent UH graduate (B.A. Political Science), and is a member of the Sustainable Saunders Initiative Energy Team. He specializes in conflict management and sustainable development.

A copy of the pilot study on which this Policy Brief is based can be found at www.publicpolicycenter.hawaii.edu/sustainability.html