Title

Subtitle

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In April 2014, the Durango County Museum of History installed a small exhibit titled *Our heritage: Pictures from the past*. The collection consists of five daguerreotypes and several silver albumen prints. A study was made to measure the benefits and costs of using L.E.D. lights instead of traditional halogen lamps.

Risks of Lighting Historic Photographs

All lighting harms photographs. It is the task of the conservator to minimize this harm so that the photographs can be viewed for a significant span of time, typically 50 to 100 years. For these reasons, historical photographs are displayed only periodically in rooms with significantly reduced lighting. These practices minimize the visitor experience and according to Hunt, reducing light levels diminishes color saturation and contrast.

In all lighting systems, ultraviolet light (UV) must be eliminated as that spectrum harms photographs the most. Halogen lights must have UV filters installed, which adds to their cost and effectiveness. L.E.D. lamps do not emit UV light and do not need extra filters. According to a study by the Getty Conservation Institute, fading from L.E.D. lamps does not result in any more damage than conventional halogen lamps with ultraviolet filtering. They found that it is likely using L.E.D. lamps results in less fading of photographic materials.

Methodology

In the new exhibit, 12-watt PAR38 20° lamps were utilized. The temperature rating for these lamps was 2700 Kelvin. Although the L.E.D. light output was significantly less than traditional halogen lamps, some screening was still needed. UV filters were not installed because LED lights do not emit any significant levels of ultra-violet light. This simplified the installation process.

In the past, the museum curator would have lighted the exhibit with 60 watt, PAR38 30° 120V halogen flood lamps. UV filters were installed over each lamp, and then each light was screened down to decrease the light output to the desired level.

The cost of purchase, installation, and electricity consumed during the exhibit were monitored and recorded. Using past records of exhibits using Halogen lamps, a cost-benefit analysis was conducted by comparing the two sets of data.

Cost-Benefit Analysis

Studies show that the higher initial costs of L.E.D. lighting systems is usually offset by less energy consumption and reduced replacement costs due to their long life span. (Wiggens, McKenney and Dieckmann) Our findings are consistent with this hypothesis:

The purchase price is more expensive than Halogen lamps by a factor of 18.5.

Halogen lamps would have increased electricity costs by a factor of 6.

L.E.D. lamp life is longer by a factor of 16.67.

Using the three factors given above, a 10-year life-cycle analysis was conducted. With the costs annualized over a 10-year period, L.E.D. lamps provided a cost reduction over Halogen lamps of 66%.

Recommendations

Based on the data, this report recommends the following:

Use L.E.D. lighting in all new exhibits.

In existing exhibits, replace failed halogen lights with L.E.D. replacement lamps.

Conduct a similar cost-benefit analysis for non-exhibit areas of the museum.

Share study findings with all City Hall departments.

Using L.E.D. lighting not only cuts museum expenditures, it reduces overall demand for electricity. Thus, converting to L.E.D. lights benefits both the organization’s “bottom line” and the environment. The study supports the city’s decision to find ways to utilize L.E.D. lighting in city operations.