United Energy Associates, Inc

A Lighting Conversion Case Study

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The Knoxville Museum of Art
Knoxville, Tennessee

"There is no question that the State of Tennessee's new Environmental Loan Program (providing total funding at just 3% interest) made this lighting retrofit a project that we could NOT ignore."

Description:

Through its collections, exhibitions, interpretation and preservation of original works of art, the Knoxville Museum of Art serves as the premier visual arts resource for the diverse communities throughout East Tennessee.

The building, designed by Edward Larrabee Barnes and constructed in the late 1980's at a cost of $11 million, contains 53,000 square feet and is considered to be a state of the art facility.

It is located in downtown Knoxville, on the site of the 1982 World's Fair, within walking distance of the University of Tennessee. Today, the Museum operates 10,000 square feet of exhibition space in four galleries, two gift shops, a 2,000 volume library, a 170 seat auditorium, a 4,000 sq. ft. Great hall, two large garden areas, ample preparation, conservation and storage areas along with a suite of administrative offices and conference rooms.

Goals:

The lighting fixtures designated for retrofit in this lighting project consisted of 437 fixtures located in the Museum's offices, workrooms and common areas. Of these, approximately 374 fixtures utilized standard two, three and four foot, T-12 fluorescent lamps. Of the remaining fixtures, 49 burned 75-watt incandescent lamps and 14 fixtures burned 300 watt incandescent lamps. Average burn time for all fixtures was approximately 70 hours per week and the Museum's current electrical rate is .065 per KWH.

The objective of the retrofit was to improve the overall light quality within the designated areas, while saving as much energy as possible.

The UEA design team recommended that the Museum use a higher than normal CRI lamp in the conversion. Test fixtures were installed to allow management to select a suitable Kelvin temperature.

Solutions:

All fluorescent fixtures were converted to utilize electronic ballasts and T-8 lamps. Where necessary, reflector panels were utilized to increase the amount of fixture light output. Incandescent fixtures were converted to either compact fluorescent or Halogen HIR Par lamps.

What made this lighting retrofit particularly attractive to museum management was the availability of funds from an Environmental Loan Program sponsored by the State of Tennessee. With an annual interest rate of only 3% and the debt amortized over a 5 year period, the total cost of the project will be funded out of savings.

Components:

UEA's specification for this project was followed precisely. All hardware, including lamps, ballasts and end brackets were removed from the existing fixtures and replaced with all new components. Where feasible, old lamp sockets were replaced with new ones.

All electronic ballasts used in the project were parallel wired to eliminate emergency problems.

The T-8 lamps used in this conversion were all triphosphored and provided improved levels of CRI as well as a much higher lumen per watt output when compared to the T-12 lamps, which were replaced. All lamps were full spectrum (85 CRI) and low mercury rated to eliminate downstream maintenance costs.

The reflector kits used were custom fabricated from Alcoa "Everbrite" lighting sheet. The fixtures utilizing reflectors required half the number of lamps formerly used.

Results:

The combination of electronic ballasts and T-8 lamps resulted in lowering the average required fixture input watts 40 to 60 percent. In addition to improving the overall appearance of the building and enhancing its visual acuity, the renovation reduced the building's total annual lighting KWH by over 82,000 KWH and the KWD by almost 20 KWD. Based on the Museum's current rate of .065 per KWH, these savings will save the museum over $5,300 annually in lighting energy costs alone. With HVAC and maintenance savings included, the projected total savings for this project over a ten-year period are over $79,400!

Environmental:

This project eliminates the annual emission of over 123,000 pounds of CO_2 into the atmosphere. United Energy Associates, Inc. is an EPA Green Lights Ally.

Contact: Mr. Robert Shipley
Vice President Business Affairs
Knoxville Museum of Art
1050 World's Fair Park Drive
Knoxville, TN 37916
(423) 525-6101