Conf-920828--13

PNL-SA--20976

DE92 041336

RELIGHTING FOR ENERGY EFFICIENCY & PRODUCTIVITY

L. Harris
C. W. Purcell

August-September 1992

Presented at the ACEEE Summer Study
August 30 - September 5, 1992
Pacific Grove, California

Prepared for
the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830

Pacific Northwest Laboratory
Richland, Washington

PNL-SA-20976

POSTER ID NO. 431

RELIGHTING FOR ENERGY EFFICIENCY & PRODUCTIVITY

Louis Harris, U.S. Department of Energy

Charles W. Purcell, Pacific Northwest Laboratory[1]

H:1. SYNOPSIS

This paper presents an overview of the process and approach of the Federal Relighting Initiative (FRI). It describes the major steps in relighting Federal buildings for energy efficiency and increased productivity.

H:2. INTRODUCTION

The call to reduce energy use has been formalized in Public Law 100-615 and Executive Order 12759, which mandate that all Federal buildings must reduce energy consumption by at least 10% from the 1985 base year and by a total of 20% by 2000. The U.S. Federal building stock consists of more than 500,000 buildings and facilities, totaling more than 3.3 billion square feet of floor space.

The Federal agencies currently use more than 0.8 quads of energy per year in their buildings, with an estimated 33% or 0.26 quads attributed to lighting. Currently available lighting technology has demonstrated significant energy savings with a short-term payback, and many energy efficiency projects have been undertaken at Federal facilities. The results of these projects have varied.

To develop consistent and satisfactory long-term results, a systematic approach to using advanced lighting technologies holds tremendous potential. A systematic approach can ensure that solid gains in

---

[1] Pacific Northwest Laboratory is operated for the U.S. Department of Energy by Battelle Memorial Institute under contract DE-AC06-76RLO 1830

[Figure 1 goes here]

energy efficiency are achieved, increasing productivity. The energy savings estimates resulting from use advanced lighting technologies approach 0.09 quads and $250 million per year by ???. Through a 19-step process, the Federal Relighting Initiative focuses on capturing savings as quickly and efficiently as possible, simultaneously ensuring high-quality and life-cycle-cost-effective lighting.

H:3. METHODOLOGY

The Federal Relighting Initiative is a broad-based multi-year effort to help Federal agencies modernize lighting systems in all Federal buildings and facilities. To encourage the use of high-quality, life-cycle-cost-effective lighting systems, DOE/FEMP developed a 19-step systematic approach to relighting projects. These steps are divided into five major areas: Screening, Selection, Design, Implementation, and Evaluation. An integrated suite of easy-to-use tools to help agency managers with relighting projects has been designed to support the FRI process.

H:3.1. SCREENING

The process for prioritizing agency relighting opportunities requires that relighting candidates in the stock of agency buildings be ranked. We developed a computerized tool to help energy managers screen buildings for possible life-cycle-cost-effective relighting projects. The information provided by the computer model helps managers identify those facilities that have the highest lighting conservation potential and warrant further examination.

A manager using this model can conduct two levels of evaluation. The first level, pre-audit evaluation, requires simple inputs such as building location, size in square feet, type (e.g., prison, office, industrial), operating hours, average cost of electricity and any available utility rebate offer. This first level provides the initial project listing. A post-audit evaluation is performed after a building walk-through survey. A post-audit evaluation requires inputs specific to the stock of standard fluorescent and small incandescent

fixtures and refines the initial list. In each case, the buildings are ranked according to the ratio of the net present value of energy savings to the project cost; this is termed the "savings index".

H:3.2. SELECTION/DESIGN

The building for the project is selected based on budgets, savings index and other factors unique to the needs of the agency. Once the project is approved, the design process begins. Tools available include a technology screening model that provides a listing in life-cycle-cost order of potential relighting technologies for existing conditions. Use of a survey handbook facilitates characterization of existing lighting and inventory. This handbook is a guide to conducting an existing lighting characterization (ELC) in federal buildings. Information is collected on a variety of building features to support a thorough analysis of lighting requirements, energy intensities, and energy efficiency improvement opportunities. These data are collected in a prescribed fashion so that the surveys can be routinely completed by trained surveyors, results can be compared among buildings, and lighting designers can become accustomed to a standard set of existing lighting characteristics. These data are then used by a qualified lighting designer to develop the most life-cycle-cost-effective project and produce a statement of work for a procurement package.

H: 3.3. IMPLEMENTATION

This portion of the process uses a set of Technical Notes and Master Specifications developed by the Relighting Initiative to assist the federal manager in developing a solicitation. The Technical Notes contain explanations that enable the users to understand the background and reasons for specification requirements. The Master Specifications are in the CSI format and form the basis for competitive bidding and contracting to undertake relighting initiatives. Once the contract is awarded and the project completed, development begins on commissioning of the lighting system and the operation and maintenance program.

H: 3.4. EVALUATION

The four evaluation steps are optional, but are based on factors unique to each agency's requirements, funding methods and project objectives. Savings validation requires development of a baseline. These issues should be considered in the design phase. The need for a post-occupancy evaluation and the documentation requirements are determined in both the implementation and design stages. The post-occupancy evaluation will need to be designed early, and support requirements for the documentation dissemination step will be determined at several stages of the process. The solicitation could contain evaluation requirements, or the facility staff may choose to conduct the evaluation and documentation separately.

H:4. DISCUSSION

The 19-step process was designed to assist the Federal manager in developing and completing projects to ensure high quality, life-cycle-cost-effective lighting. It is not intended to be used without training and qualified design assistance; however, it provides a detailed framework to enhance the manager's probability of success.

H:5. ACKNOWLEDGEMENTS

This paper was prepared with the support of the U.S. Department of Energy (DOE). The opinions, findings, conclusions and recommendations expressed herein are solely those of the authors and do not necessarily reflect an official policy or position of the DOE.

END

DATE
FILMED
11/18/92