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Recommended Practice for the Economic Analysis of Lighting

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Economic Analysis of Lighting**

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1.0 THE ROLE OF ECONOMIC ANALYSIS IN LIGHTING DESIGN

Good lighting should be responsive to the needs of the user. Among those needs are the aesthetic and the visual, as admitted in the oft-quoted “lighting is both a science and an art”. But the user also has economic needs. In fact, it is the economic needs that often drive the decision making process when lighting systems are designed and purchased. Unfortunately, because they frequently control the final decision, economic concerns are often thought of as the antagonists of aesthetic and visual concerns. The lighting professional will tend to draw up a list of system desiderata, then heave a large sigh of resignation and say “but the budget won’t allow it...”

This recommended practice is written from the point of view that “economic analysis” is not the same as “how to beat the budget.” Rather than considering economic analysis as the antithesis of engineering or artistic analysis, it should be thought of as subsuming these other needs. A couple of generic examples illustrate this. When a worker’s vision is impaired by reflected glare, reduced productivity is an economic consequence. A decision to improve the lighting would be based on the economic needs of the owner. When the lighting of an office building atrium fails to complement the architecture of the space, the rental value would fail to achieve its potential. Again, a decision to improve the lighting is an economic decision. Thus, when a competent lighting professional takes care of economic needs, in conjunction with artistic, engineering, and other needs, it increases the likelihood a project will have success and longevity. Financial considerations as demonstrated through an accurate lighting financial analysis are important, but other elements such as aesthetics, human visual performance resulting from a lighting system appropriate to a given task, and other considerations involved in lighting for the human and natural environment are of equal importance.

1.1 The Importance of Making Wise Economic Decisions on Selecting Lighting Systems

Lighting economics may not be the most exciting subject for the lighting professional to master, but it is one of the most important. The idea of reducing energy use is a noble pursuit for many reasons. Preserving natural resources through conserving fossil fuels is good for the future. Limiting air pollution and reducing carbon dioxide and other greenhouse gases helps keep the environment healthier. If demand for electricity is steadily growing through economic growth in North America and the rest of

the world, by reducing the demand for energy needed to power more energy-efficient lighting systems, more resources can be made available for other uses. Reducing consumption while still providing adequate levels and quality of illumination when and where needed makes good sense for any individual, company, government, or institution paying its own energy bill.

The increased cost associated with buying a more efficient lighting system can be looked at as an investment like any other kind of investment. The returns can be very high, as much as 60% per year or more, but with one significant difference. The risk for an investment in lighting is relatively low, because the resulting cash flows for lighting are relatively predictable. In general, investments with lower financial risk, such as lighting upgrades, are analyzed with interest rates that can be several percentage points lower than more risky capital investments.

1.2 LEDs and Solid State Lighting Systems

With the dramatic growth in solid state lighting, the use of economic tools and rigorous financial analysis becomes more important than ever. Selecting a new lighting system, with a less familiar technology, is an important and difficult task for the lighting professional. The designer needs to make sure that the proposed lighting system meets or exceeds IES recommended practices, complies with energy code power limits and control requirements, and is able to meet extra targeted goals for the building, such as LEED, Advanced Energy Design Guides, or other local or project standards. But at the most practical level, any new lighting equipment selection needs to make sense economically. The days of specifying an LED lighting system just because it is “green” are largely in the past. Most owners and architects want to help the environment and reduce energy waste, but they also want good lighting at an affordable overall cost that makes sense. Owners often will not mind paying more for an improved system, but they want to get a return back from this increased cost. Solid financial analysis tools are essential to prove that such a system can be a better value when compared to traditionally sources, i.e., incandescent, halogen, fluorescent, or HID.

This recommended practice will help answer many types of lighting economic questions. It provides a framework for selecting from a group of competing lighting designs. It gives insight into the question of when a system under consideration will “pay off.” It can help the lighting professional make energy conservation decisions. Most importantly, it provides methods for gauging the profitability of a capital investment in a lighting system, which