

ENSURING LIGHTING QUALITY AND LIGHTING EFFICIENCY: A NEW BASIS FOR LIGHTING STANDARDS

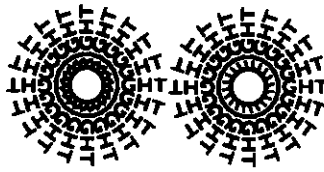
James A. Wise
Barbara K. Wise
Susan F. Savage

Pacific Northwest Laboratory
Richland Washington
USA

SUMMARY

This paper reports the first year results of a major United States Department of Energy (DOE) study that assesses potential lighting quality impacts of lower lighting power density levels (lpds in watts/m²) under consideration for DOE's commercial buildings energy standard. This standard sets energy performance requirements that are mandatory for federal buildings and voluntary for the private sector in the United States. New energy legislation passed during 1992 will make it mandatory in the future that individual States adopt energy codes at least as stringent as the Federal standard. The research performed under this study is providing a new basis for setting DOE power density levels, in order to assure that quality of lighting is maintained as lighting energy is improved.

Quality impacts on lighting have been continuous for years in discussion on progressive energy standards. As lighting utilizes 40-60% of the energy budget of a modern building, significant energy savings are possible if lighting can be lowered without undue effects on occupants. Professional opinions on the relevance of quality issues range from "irrelevant for energy efficient lighting" to warnings that arbitrarily lowered lpds can severely constrain lighting designs meant to provide the proper lighting for users of new schools, health-care settings and computerized offices. This assessment study engages a multipronged approach to review laboratory and field evidence, conduct focused research and combine evidence to provide a rational basis for setting new lpds in the energy standard.



During its first year, the lighting impacts study is concentrating on:

- a reviewing and integrating results of laboratory, simulation and Post-Occupancy Evaluation studies before and after moves (or retrofits) to building adopting energy efficient lighting.
- b commissioning lighting simulations to assess strategies for lighting quality as different designs are employed to meet stringent hypothetical lpd requirements for different "generic spaces".
- c working with state energy offices and professional societies to find exemplars of lighting designs that respond to desired or mandated low lpd.

The paper will include results on recommended lpd values for the 1994 calendar year revision of the DOE commercial building energy standard, along with there supportive rationale. Continuing research on lighting quality, efficiency and occupant response should help place the standardization of allocated lighting power densities on a firm scientific basis.