

SFOE R&D Project „Green Lighting“

- Project: Integration of day- and electric lighting systems within office rooms
- Goal: development of an innovative low-power lighting system with optimal visual comfort
- Partners: Laboratory of Solar Energy and Building Physics (LESO-PB), Regent Beleuchtungskörper, Philips Lighting

Idea: making Green Lighting part of IEA ECBCS Annex 45!

Short presentation of Green Lighting on the following 5 slides...

1

Two topics within Green Lighting considered:

High Performance Integrated Lighting Systems

- 1) Design of a combined daylight / electric lighting system for an office room (using most recent technologies and computer simulations)
- 2) Assessment of the combined system's optimisation potential using:
 - *innovative sources* (novel discharge lamps / fluorescent tubes,...)
 - *high efficiency fixtures* (non-imaging optics, high reflectance mirrored surfaces, ...)
 - *advanced daylight responsive lighting control strategies* (dimming, fuzzy logic, Bayesian statistics, ...)

Future Lighting Technologies

- 1) Investigation of possible optimisation of visual comfort conditions and power consumption in office rooms using
 - LED technology (task lighting)
 - planar light sources / OLED technology (ambient lighting)
- 2) Design of an innovative lighting system which combines
 - highly efficient light sources
 - innovative fixture technology (non-imaging optics, highly reflective materials, ...)



2

Final Goal: Highly effective integrated lighting system

- Design of an integrated day- and electric lighting system with minimum power consumption (less than 3 W/m²) and optimal visual comfort
➔ Uses results from topics 1 and 2!
- Setup of the developed innovative lighting system on a 1:1 scale test facility (office room within LESO experimental building)
- Performance assessment of the system and comparison with similar office room with conventional lighting technology

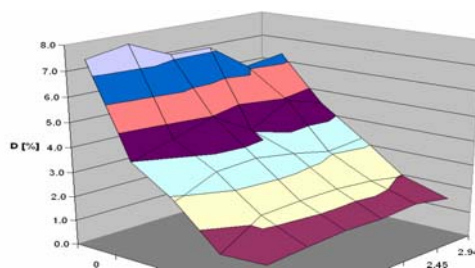


Possible future steps

- Application of the developed innovative lighting system to other office rooms
- System adaptation for use in various buildings (commercial, public, residential, ...)

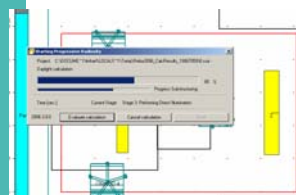
3

Green Lighting so far:



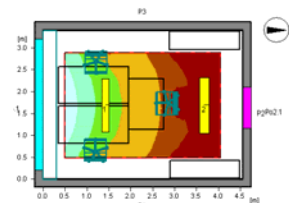
Daylight factor measurements within the LESO experimental office rooms.

Status: **DONE.**



Design of realistic numerical models of the experimental office rooms and simulation of day- and artificial light distributions.

Status: **IN PROGRESS.**

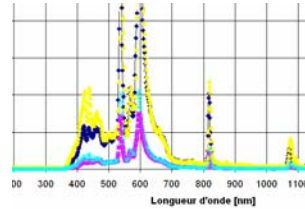


4

Green Lighting so far:

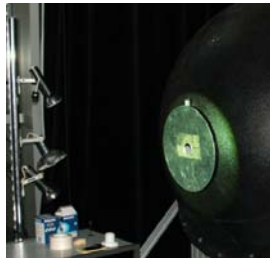


Spectral distribution measurements for various promising light sources (high intensity discharge lamps, fluorescent lamps, LEDs).



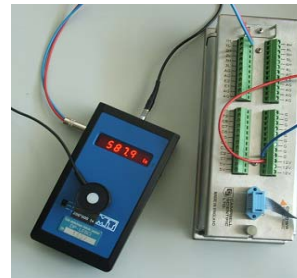
Status: **DONE**.

5



Further measurements (e.g. luminous flux using an integrating sphere...) for various promising light sources (high intensity discharge lamps, fluorescent lamps, LEDs).

Status: **IN PROGRESS**.



The “Green Lighting” R&D project can be described as a combined R&D Project and Case Study attempting to bring together *innovative technical solutions* and *energy-saving* by *integration* of *day- and artificial lighting*.



Possible contribution to IEA ECBCS Annex 45 within Subtask B (and Subtask C ?)

6