



Advanced Sunlighting of Buildings for Improved Health and Energy Balance  
Helmut F.O. Müller, Prof. Dr.-Ing.  
Successful R&I in Europe: 13th European Networking Event 2026  
19-20 February – 2025, Düsseldorf

# Advanced Sunlighting of Buildings for Improved Health and Energy Balance

Successful R&I in Europe: 13th European Networking Event 2026  
19-20 February – 2026, Düsseldorf

**Helmut F.O. Müller, Prof. Dr.- Ing.**  
Green Building R&D GmbH, Düsseldorf,  
[Helmut.Mueller@greenbuilding-rd.com](mailto:Helmut.Mueller@greenbuilding-rd.com)

**Previous scientific and technological expertise:**

**Emeritus since 2009: Chair of Energy Efficient Architecture, TU Dortmund**

**Selected Research Projects:**

- TaHo - Development and test of sunlight redirecting window systems**
- EULEB - European high quality low energy buildings**
- PREA - Promoting Renewable Energy in Africa**



# Improved Health and Energy Balance by Sunlighting

**Beside visual performance daylighting influences:**

## **Health and Well-Being**

- Circadiane 24-hour bio-rhythm (cortisol-, melatonin-, and serotonin-level)
- Improved productivity, creativity, physical activity
- Reduced stress, anxiety, depression, pain, use of pain medication
- Period of hospitalization influenced by daylight (orientation of ward)
- Beneficial impact of daylight on people with type 2 diabetes
- Amount of germs in rooms reduced by daylight
- Increasing short-sightedness (myopia) of young people by lack of daylight

## **Energy Balance**

- Electricity consumption, CO<sub>2</sub>-emission
- Influence of daylighting on cooling and heating loads

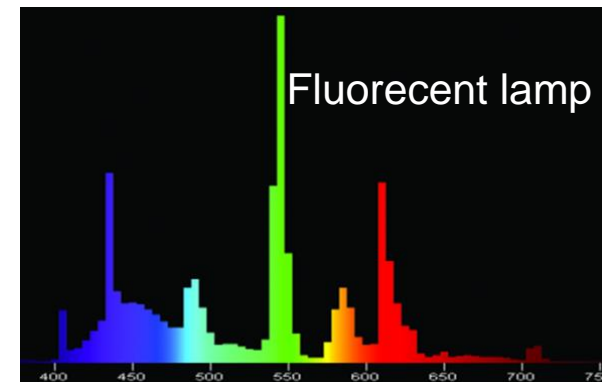
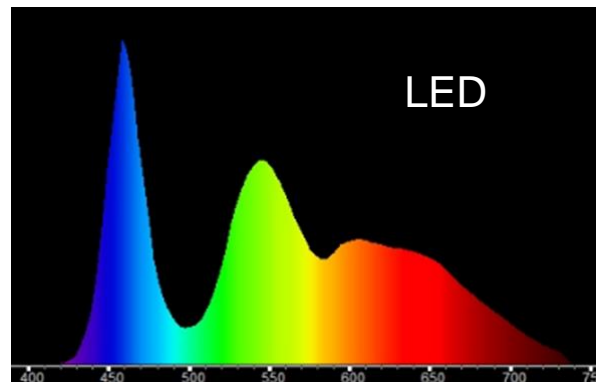
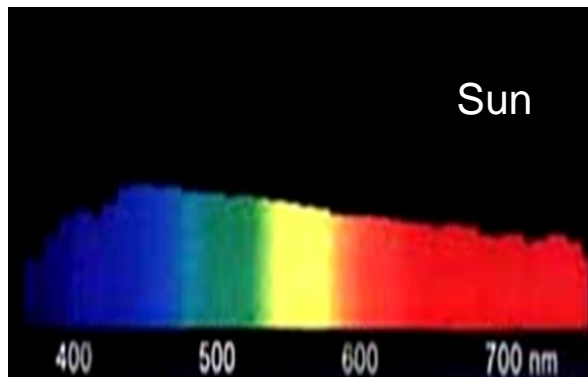
## Daylight characteristics influencing Health

Illuminance 10.000 to 100.000 lux (artificial lighting 300 to 1000 lux)

Dynamic variation of illuminance and colour

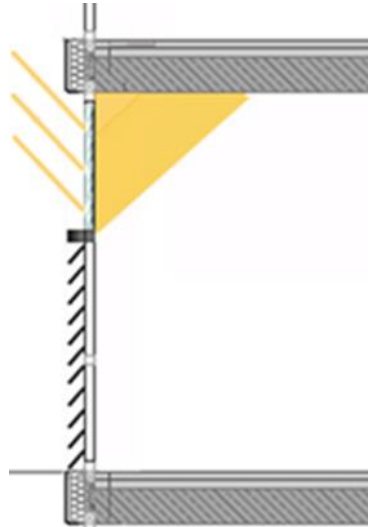
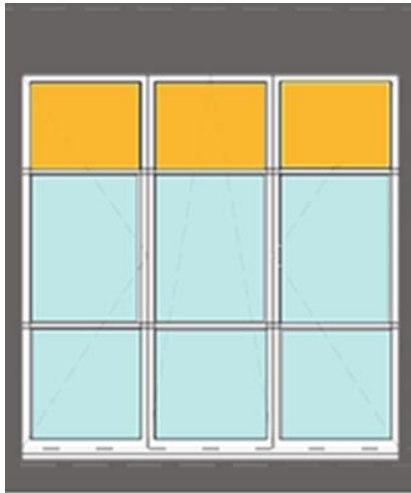


## Spectrum



## Joint Research Project „TaHo“, 2021 – 2024: Redirection of sunlight to room depth by micro-optics

- High visual, nonvisual and health performance (illuminance > 1000 lx)
- Low energy consumption for artificial lighting
- Low investment and running costs



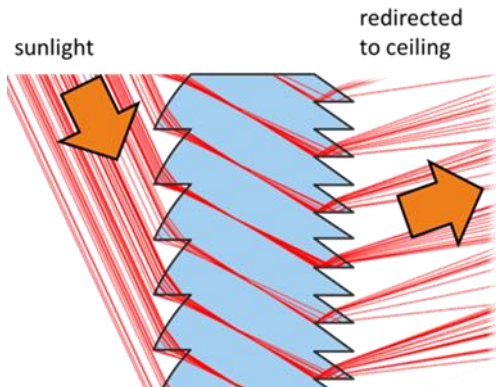
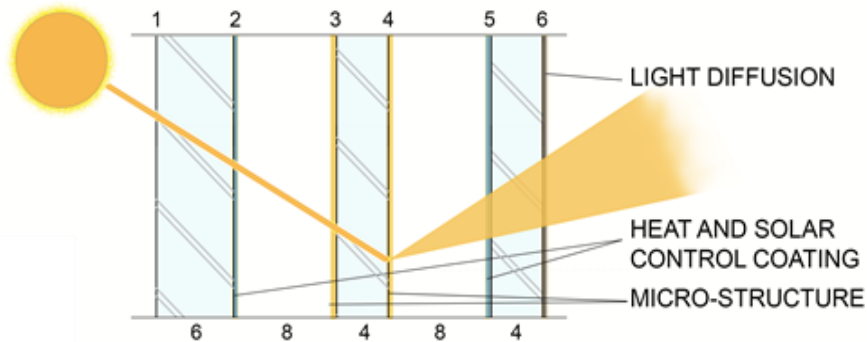
Supported by:



on the basis of a decision  
by the German Bundestag

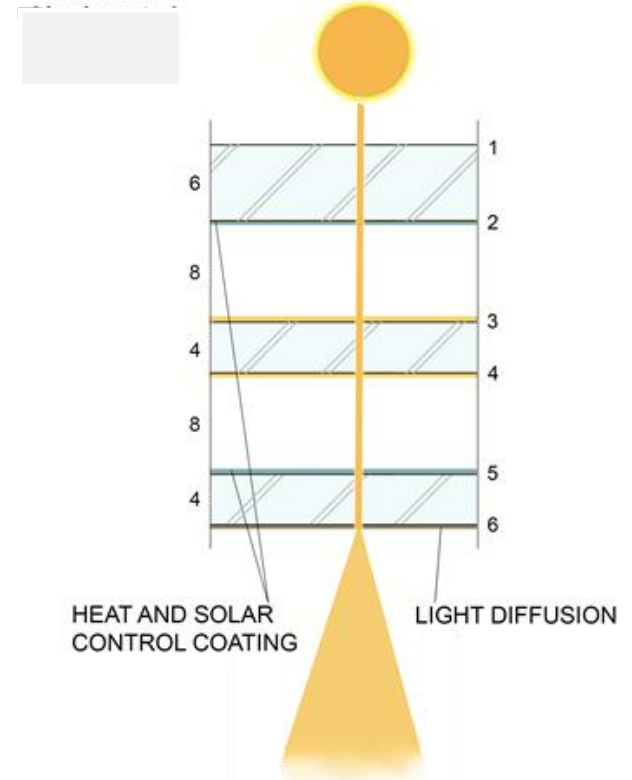
# Vertical sunlight redirection by micro-optics and horizontal diffusion, integrated in triple glazing. Ready for application

## vertical section



## micro-optics

## horizontal section





Advanced Sunlighting of Buildings for Improved Health and Energy Balance  
Helmut F.O. Müller, Prof. Dr.-Ing.  
Successful R&I in Europe: 13th European Networking Event 2026  
19-20 February – 2025, Düsseldorf

## **Proposal for European Research Project:**

**Demonstration of advanced sunlighting in hospitals, school- and office buildings (existing, new)**

**Comparing measurements and user surveys as to health, well-being, and productivity**

**Co-operation with European partners:**

- Building operators, owners**
- Occupational medicine,**
- Healthcare,**
- Scientific experts for lighting, building physics,**