

# Policies for human health beyond energy savings

Myrta Gkaintatzi Masouti, Richard  
Jedon, Megan Danell



# Sustainable development goals



Lighting accounts for 15% of global electric energy use and 5% of greenhouse emissions

(Altomonte et al., 2021)



# Existing standards/ regulations



International lighting standards focus on:

- Energy use
- Visual criteria

Often neglect:

- Integration between electric and daylight solutions
- Effects of light on human health and well-being

# Effects of light - indoors

Multiple lab and field studies investigated the effects of light measuring various outcomes. Outcomes studied include melatonin levels, mood/depression, waking performance, sleep, health, well-being.

(Lee & Boubekri, 2020) (Blume et al., 2019)

(Cajochen, Freyburger, et al., 2019)

(Cajochen, Reichert, et al., 2019) (Figueiro et al., 2019)

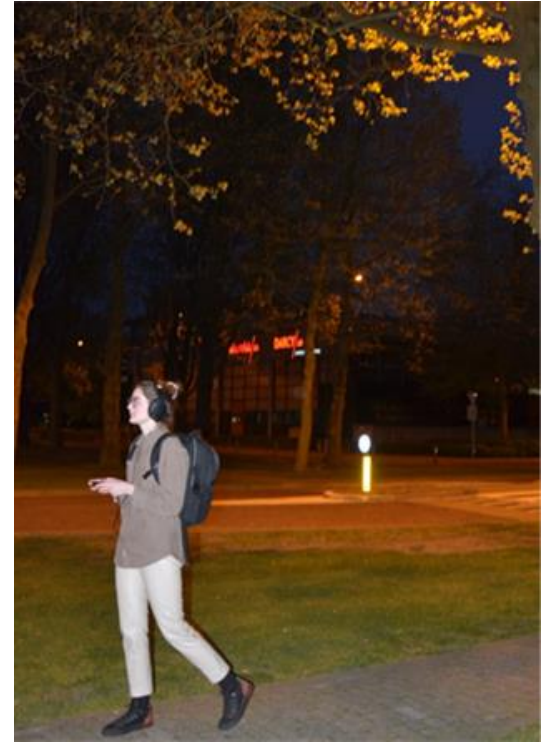
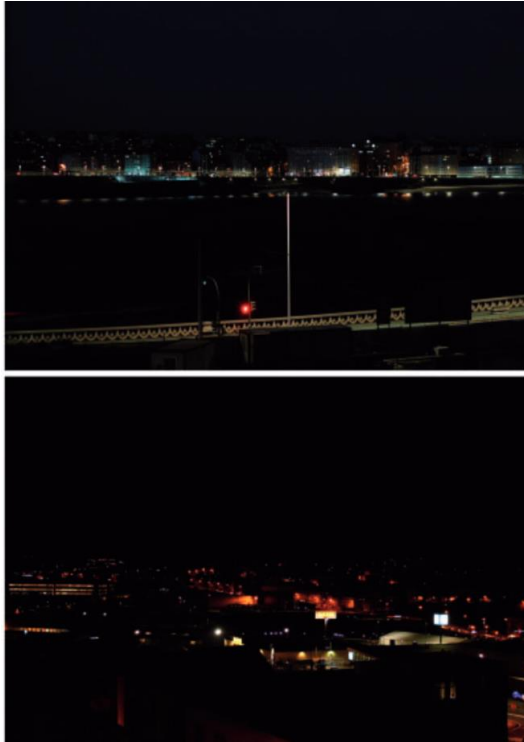
(Daut & Fonken, 2019) (Acosta et al., 2019)



# Effects of light - outdoors

## CHALLENGING CURRENT URBAN LIGHTING POLICIES: CASE FOR A SHIFT OF FOCUS TO ALERTNESS

Richard Jedon, Antal Haans, Yvonne de Kort, *Eindhoven University of Technology*



(Bará et al., 2019)

# Case studies



Visual comfort and non-image-forming requirements for an ageing population

- Renovation of care home in Brussels
- Reduced energy use by implementing daylight control and dimming at night
- Increased daylight exposure of occupants by arranging common spaces by bedrooms with higher daylight availability

(IEA Task 61, 2021)

# Case studies



Optimized lighting energy consumption for non-visual effects: A case study in office spaces based on field test and simulation

Yunyi Zeng<sup>1,2</sup>, Hongli Sun<sup>1,2,\*</sup>, Borong Lin<sup>1,2,\*</sup>

<sup>1</sup> College of Architecture and Environment, Sichuan University, Chengdu, 610065, China

<sup>2</sup> Department of Building Science, Tsinghua University, Beijing, 100084, China

\* Key Laboratory of Eco Planning & Green Building, Ministry of Education, Tsinghua University, China



Article

## A Multi-Criteria Assessment Procedure for Outdoor Lighting at the Design Stage

Piotr Pracki<sup>1</sup> and Krzysztof Skarżyński<sup>1,\*</sup>

Lighting Technology Division, Electrical Power Engineering Institute, Warsaw University of Technology, Koszykowa 75, 00-662 Warsaw, Poland; piotr.pracki@ien.pw.edu.pl

\* Correspondence: krzysztof.skarzynski@ien.pw.edu.pl

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With lighting for NIF effects, energy use increases only under bad daylight conditions

Balance between safety, visual efficiency, comfort, light pollution, energy efficiency can be achieved in design process in outdoor solutions

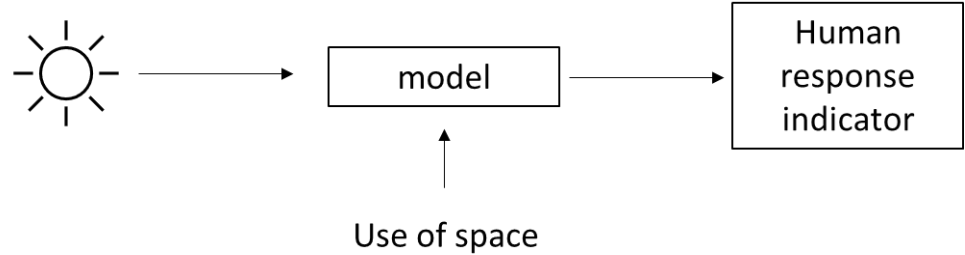
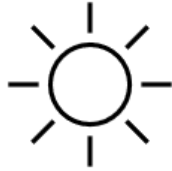
# Current recommendation

<b>Daytime light</b>	<b>Evening light (3 hours before sleep)</b>	<b>Night light (for sleep environment)</b>
<b>Mel. EDI &gt; 250lx</b> (vertical, 1.2m height)	<b>Mel. EDI &lt; 10lx</b> (vertical, 1.2m height)	<b>Mel. EDI &lt; 1lx</b> (at eye)
Use daylight, if available Use blue enriched electric, if needed	Avoid blue light	If vision is needed: <b>Mel. EDI &lt; 10lx</b> (vertical, 1.2m height)

Brown et al., 2022



# Policy proposal



- NOW

- Measure vertically using existing metrics (meEDI)

- FUTURE

- Measurement based on the human occupancy exposure - rather than spatial potential

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