



International Commission on Illumination  
Commission Internationale de l'Eclairage  
Internationale Beleuchtungskommission



# Technical standards – current trends and future plans (CIE)

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CIE Division 4 Director

Conference Light Pollution 2024

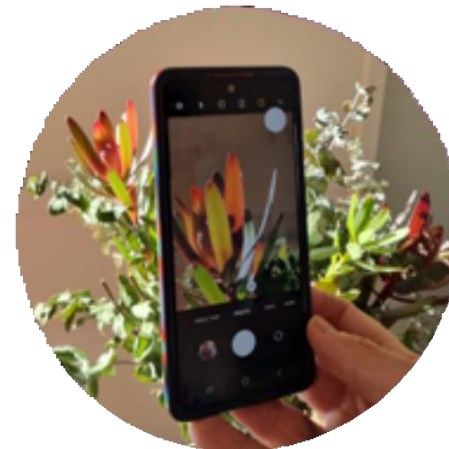
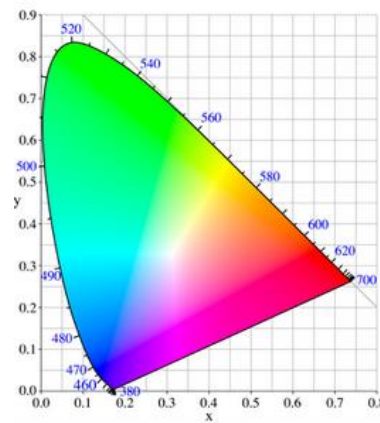
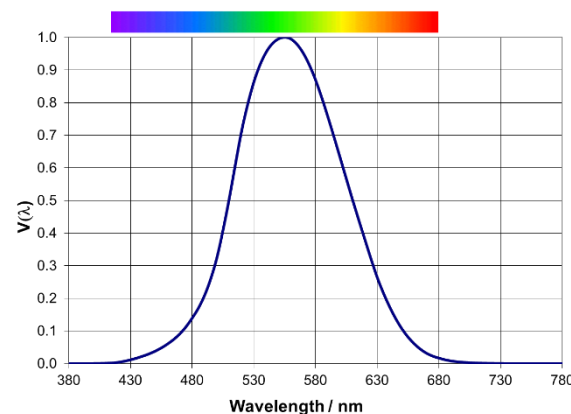
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# Meet the CIE: our mission and objectives

## International Commission on Illumination (CIE):

- **Independent, non-profit** organization with strong technical, scientific and cultural foundation
  - Highest international **scientific authority** in light and lighting
  - Standard developing organization – **standardization** of fundamental aspects in light and lighting
- Many national and regional regulations and norms are based on or refer to CIE publications!
- **Full range of topics:** vision, colour, metrology of optical radiation, photobiology, photochemistry, lighting applications indoors and outdoors, image technology

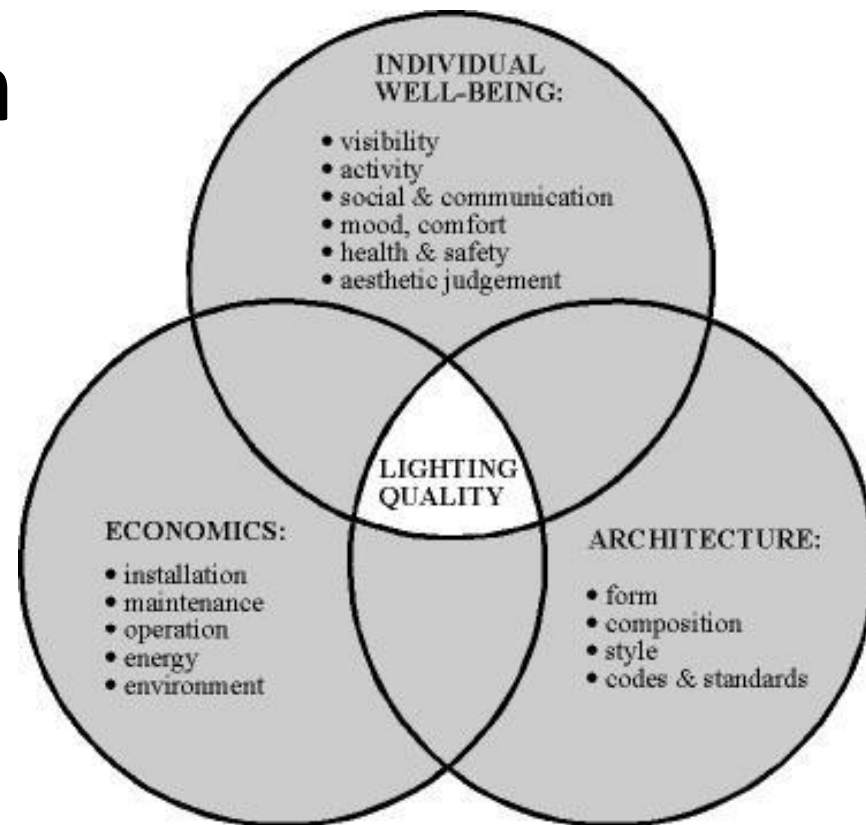


# Lighting quality is our aim

## Lighting quality:

degree of excellence to which the totality of lighting characteristics fulfils user needs and expectations or other applicable requirements

**THE PROPER LIGHT  
IN THE PROPER TIME  
AT THE PROPER PLACE**



*Lighting quality model (J. Veitch, 1998)*

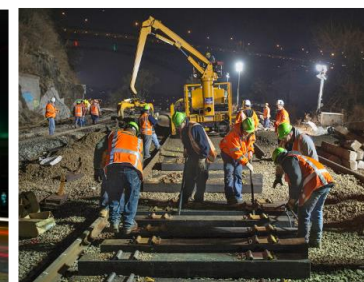


# Division 4: outdoor lighting

- Title: **TRANSPORTATION AND EXTERIOR APPLICATIONS**
- Terms of Reference: To study and prepare guides for the design of exterior lighting and light signaling



- 36 Division Members (countries)
- 10 Technical Committees
- 5 active reporterships
- 7 liaisons (including IAU)





# Digest of most relevant publications

- CIE 234:2019 A Guide to Urban Lighting Masterplanning
- CIE 115:2010 Lighting of Roads for Motor and Pedestrian Traffic
- CIE 236:2019 Lighting for Pedestrians: A Summary of Empirical Data
- CIE 136-2000 Guide to the lighting of urban areas
- CIE 150:2017 Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations, *2<sup>nd</sup> Edition*
- CIE 001-1980 Guidelines for minimizing urban sky glow near astronomical observatories (Joint publication IAU/CIE)
- CIE 126:2019 Guidelines for minimizing sky glow
- CIE 206:2014 The Effect of SPD on Lighting for Urban and Pedestrian Areas
- CIE 243:2021 Discomfort Glare in Road Lighting and Vehicle Lighting

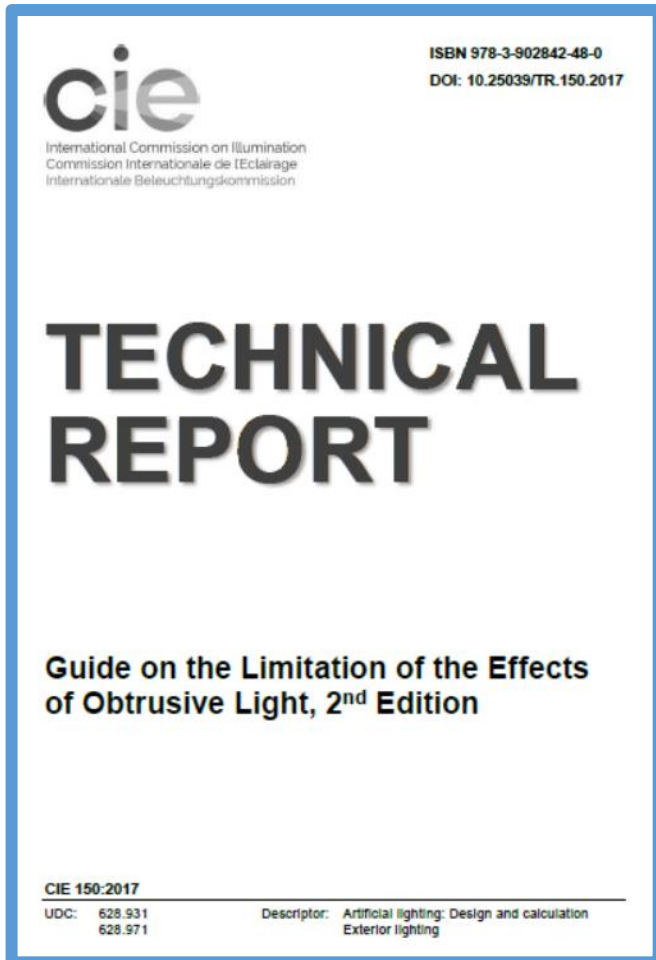


# Current Technical Committees and Reporterships

- **TC 4-61** Artificial Lighting and its Impact on the Natural Environment
- **TC 4-58** Obtrusive Light from Colourful and Dynamic Lighting and its Limitation
- **TC 2-95** Measurement of Obtrusive Light and Sky Glow
- **DR 4-53** Environmental Aspects of Obtrusive Light from Outdoor Lighting Installations
- **TC 4-62** Adaptive Road Lighting



# Pivotal guide on mitigation of obtrusive light

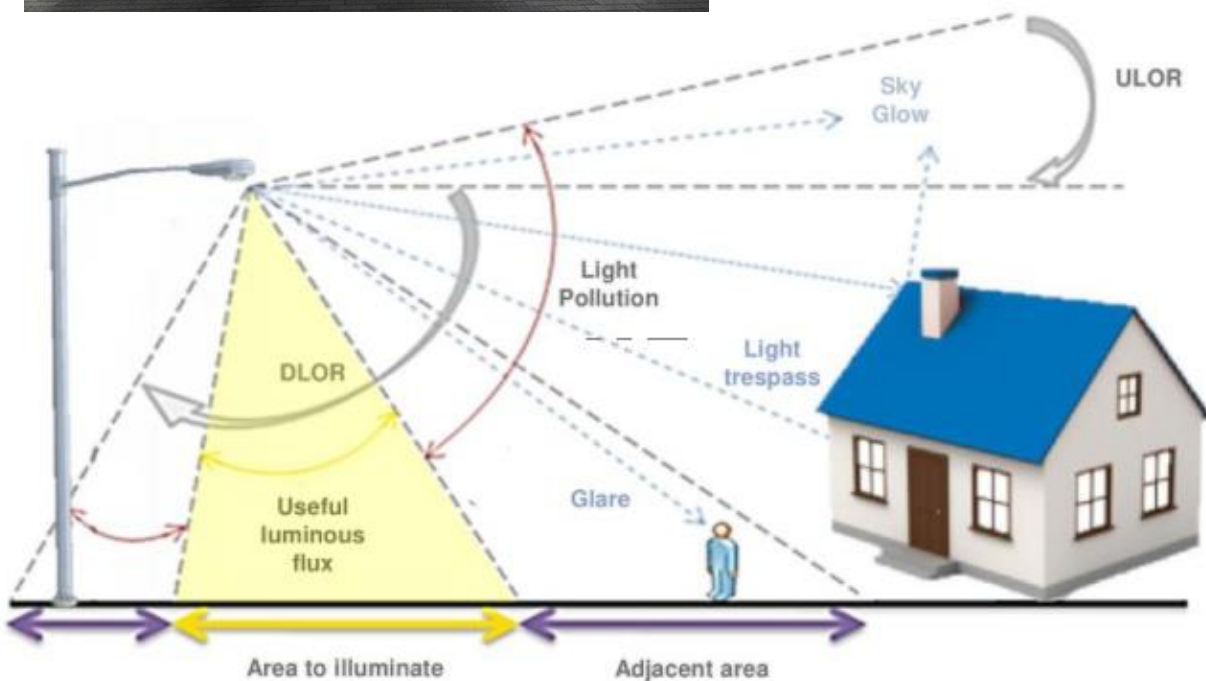


## CIE 150:2017

- Affected subjects and potential obtrusive effects
- Classification of environmental zones
- Recommended limits (ULR, UFR...)
- Eco-friendly lighting design objectives and guidelines
- Remedial measures for existing installations... *and more*







Zone	Lighting Environment	Examples	Additional recommendations
E0	Intrinsically dark	UNESCO Starlight Reserves, IDA Dark Sky Parks, Major optical observatories	All locations within 100 km of a major optical astronomy observatory regardless of the level of urban development
E1	Dark	Relatively uninhabited rural areas	
E2	Low district brightness	Sparsely inhabited rural areas	Locations within 30 km of an operating urban optical astronomy observatory and locations between 100 km and 300 km from a major optical astronomy observatory regardless of
E3	Medium district	Well inhabited rural and urban settlements	
E4	High district brightness	Town and city centres and other commercial areas	

## ULR AND UFR

Light Technical Parameter	Type of installation	Environmental Zone				
		E0	E1	E2	E3	E4
Upward Light Ratio (ULR)		0 %	0 %	2,5 %	5 %	15 %
Upward Flux Ration (UFR)	Road	N/A	2 %	5 %	8 %	12 %
	Amenity	N/A	N/A	6 %	12 %	35 %
	Sports	N/A	N/A	2 %	6 %	15 %





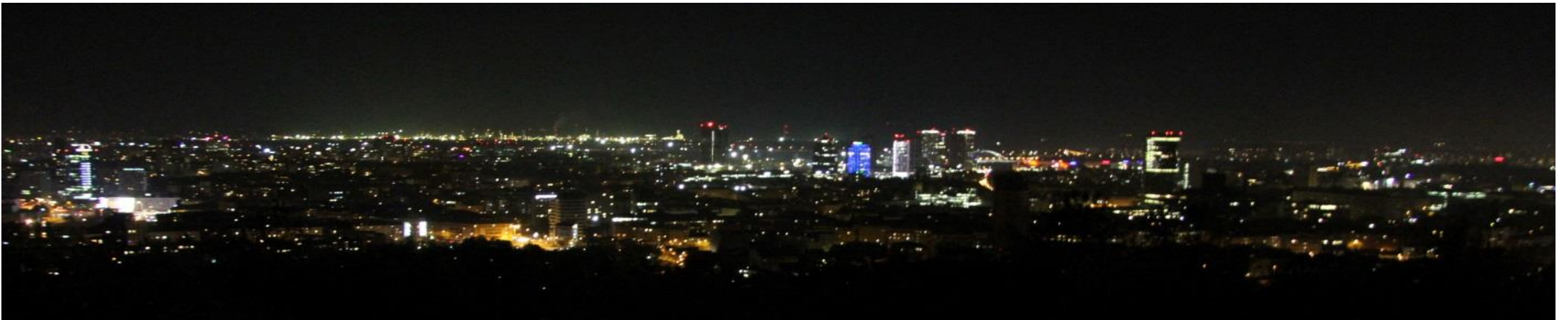
# Known problems and need for research

- **Identification of the major contributor:** not road lighting but outdoor workplaces (intensively lit large areas!), and transportation
- **Massive diversity of receptors:** astronomers, humans, fauna and flora with large variety of species (action spectra) and food-chains
- Little known about **intrusive light** through building envelopes
- Comprehensive **integration into adaptive road lighting** (obtrusive light is a strong motivation for adapting!)
- **Closer collaboration and coordination:** IAU, IDA, WHO, IUCN
- **Many studies lack** for proper metrics (SI traceability) and boundary conditions, have gaps in methodology – interdisciplinary review needed



## Plans and motions (new work items)

- CIE Position Statement on Obtrusive Light
- New Research Forum Obtrusive Light and Buildings
- Update of terminology in the ILV
- Revision of CIE publications
  - obtrusive light: CIE 001 & CIE 126 (merger), CIE 150
  - lighting recommendations: CIE 115, CIE 136





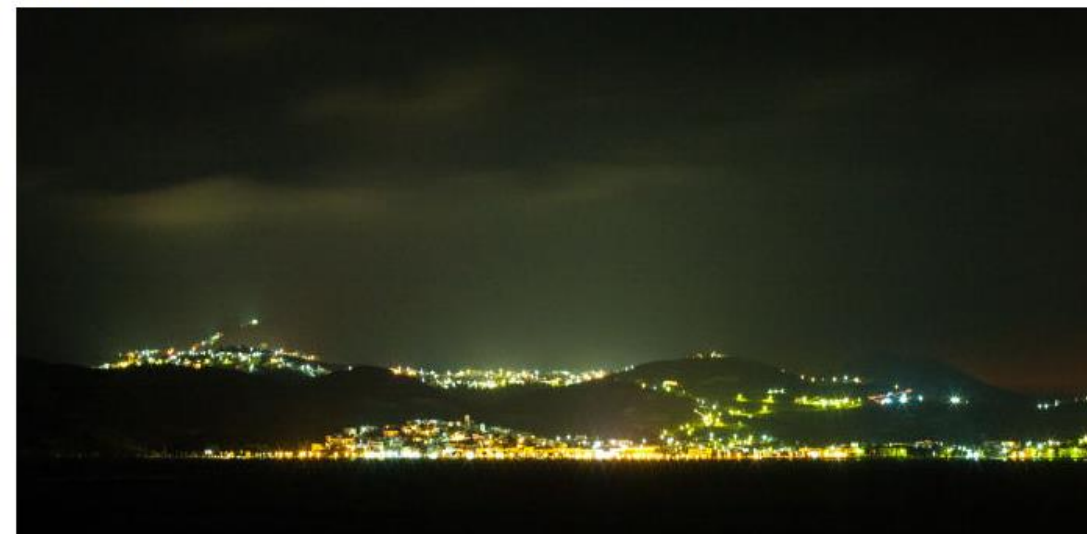
# Conclusions

- CIE pays high attention to the problems of obtrusive light: three published technical reports, four current work items, workshop in 2020, establishment of a new research forum and preparation of a position statement
- Update of lighting recommendations with respect to environmental impacts
- Masterplanning and adaptive lighting as powerful tools for mitigation of unnecessary lighting
- Support for further concerted research across various disciplines

## CIE WORKSHOP ON THE CALCULATION AND MEASUREMENT OF OBTRUSIVE LIGHTING

November 12, 2020 to November 13, 2020

Online with Zoom







# Future events

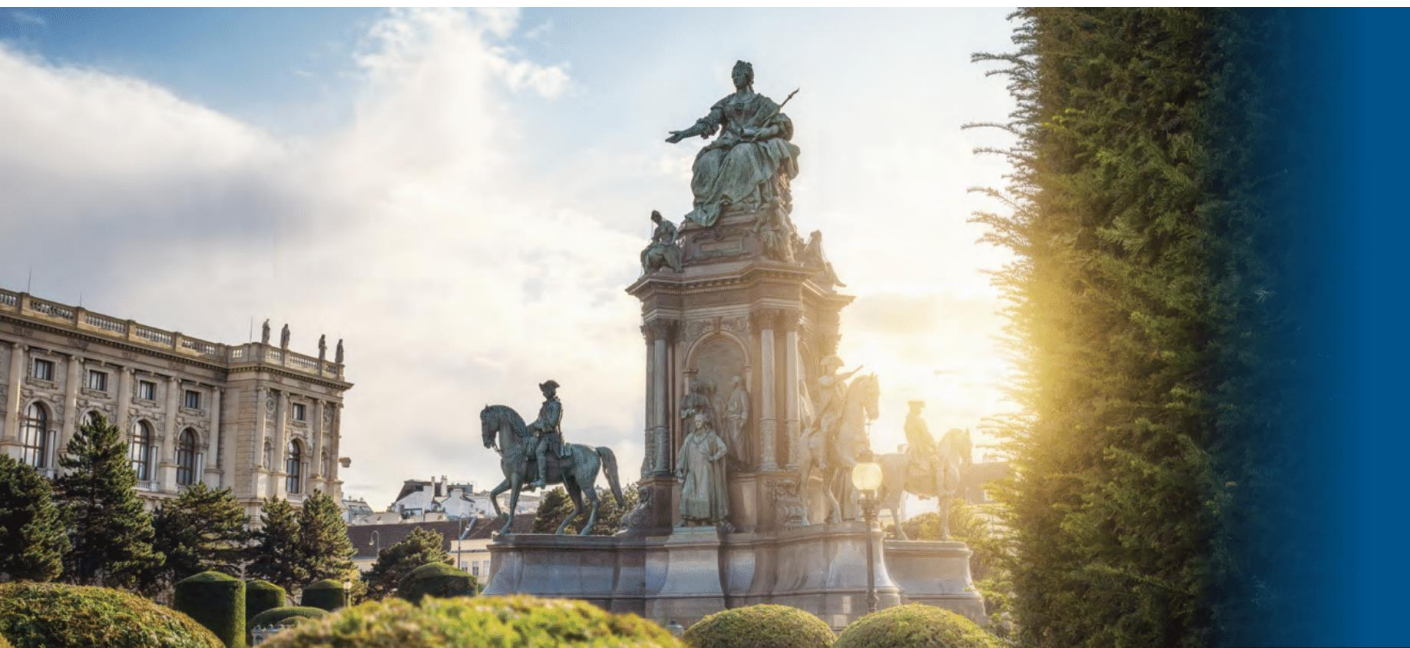
Lighting Up the Cities!

September 2024

Hangzhou, China

Workshop, *in preparation*

Obtrusive light as one of the key topics



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## MIDTERM MEETING VIENNA, AUSTRIA

CIE2025 July 4–11, 2025

# Thank You for attention!



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