

# Road lighting in the light of the future

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*IDA Board*

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# Background for future guidelines

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## Why Road Lighting?

**Quality and Quantity of light, Where light, When light?**

# Why Road Lighting?

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- **traffic safety**
- **traffic flow**
- **personal security and orientation**
- **identity and prestige**

# Why: Road Safety

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## Visibility of objects



# Luminance concept

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# Own car lighting

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## visibility of objects



# AFS: Adaptive Front lighting System

## visibility of objects

conventional beam

dipped beam



motorway beam

town beam



long beam



wet weather beam

oncoming traffic beam

curved in-turning beam

source: Audi, Nissan, Hella, Philips

# IR night vision assistance

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*source: Mercedes*

# Why: Neurological aspects

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*source: Alain Muzet, 2003*

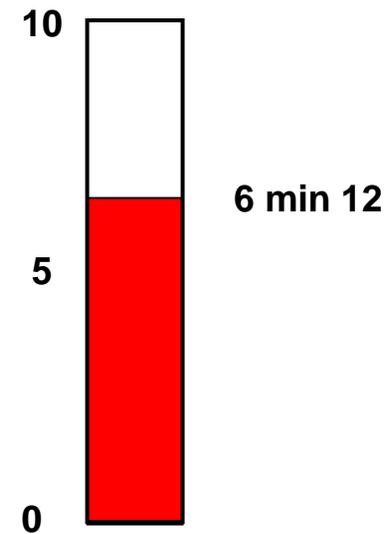
# Neurological aspects

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**micro sleep**



**Cumulative  
Minutes**



no rest before drive

**Motorway Brussels-Lyon: 440 km**

*source: Régis Mollard, 2003*

# Why: Traffic flow

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# Why: Personal security

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## recognition of faces



*source: van Bommel, Caminada, 1980*

# Why Road Lighting?

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***Move from:***

- **motorized traffic safety**

***towards***

- **traffic guidance and traffic flow**
- **personal security and orientation**
- **identity and prestige**

# Quality and Quantity

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## Visual ergonomics



**30 % cleaner**  
*source: Sphinks*

*source: Vos, Padmos, 1979*

# Visual ergonomics: more light or ....??

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# Visual ergonomics: more light or ....??

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## Alert Zebra (Pilot Rotterdam)

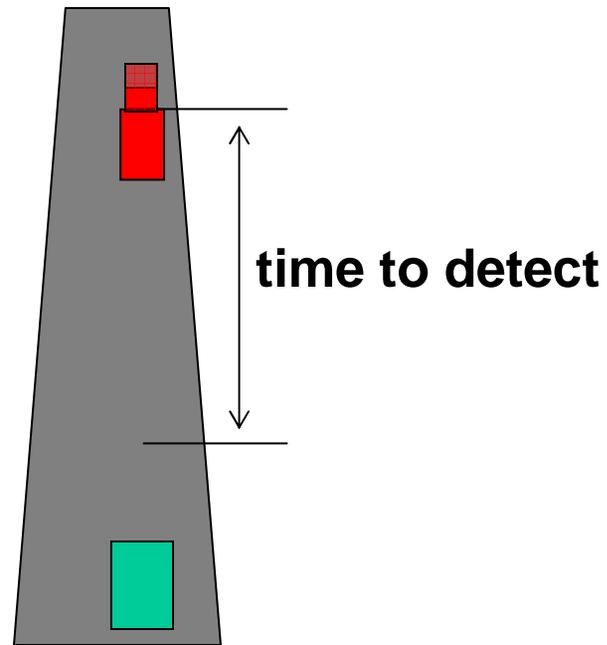


*source: Anke Padmos, 2008*

# Quality and Quantity

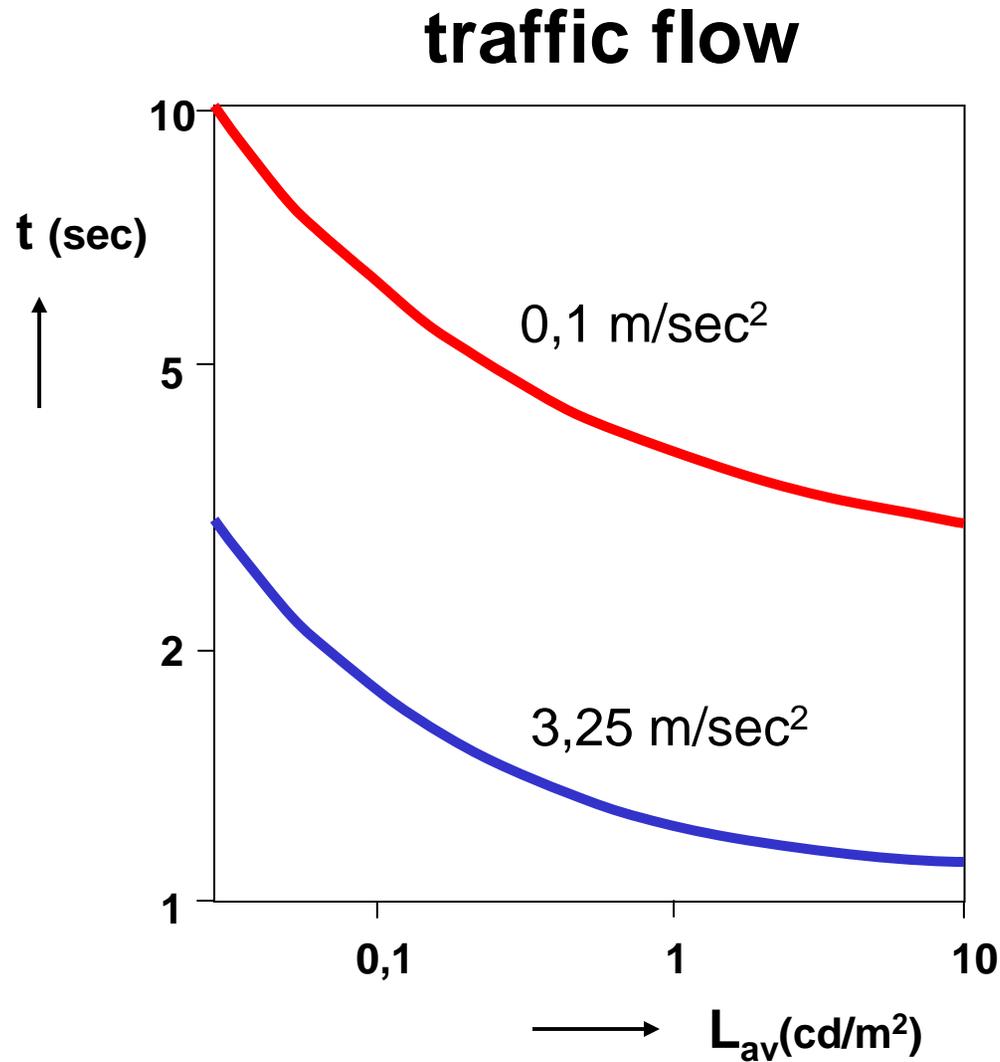
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## traffic flow



*source: Fisher, Hall, 1986*

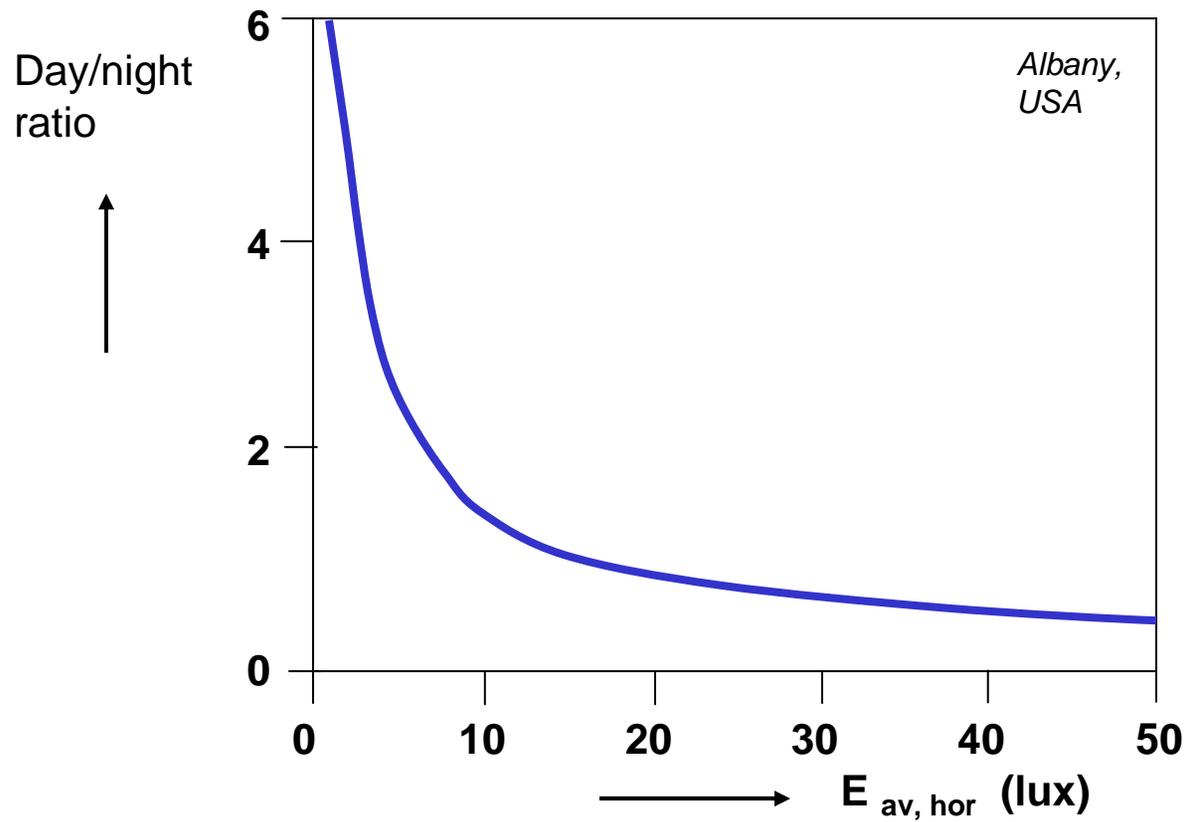
# Quality and Quantity



source: Fisher, Hall, 1986

# Personal security

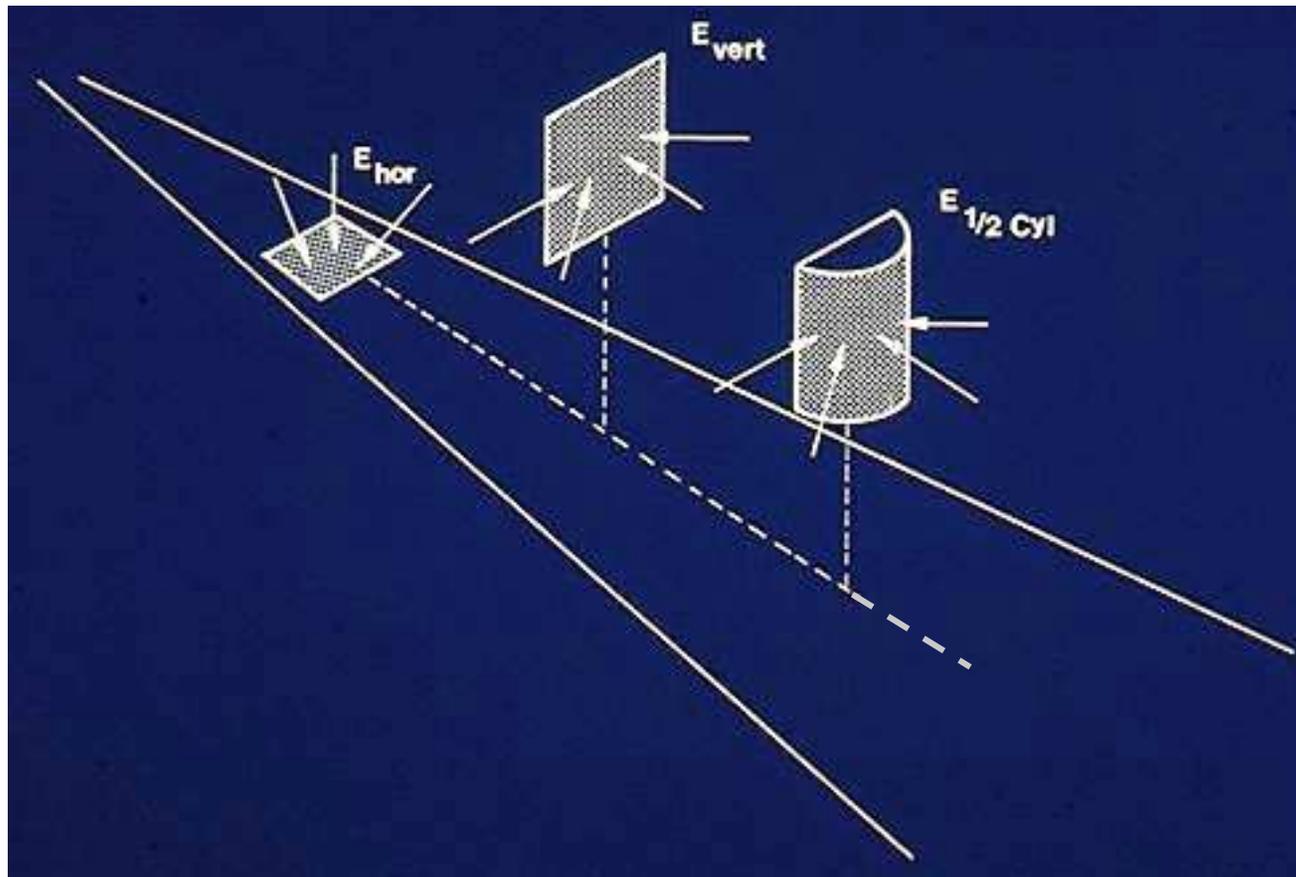
## feeling of security at a parking area



source: Boyce, 2000

# Quality and Quantity

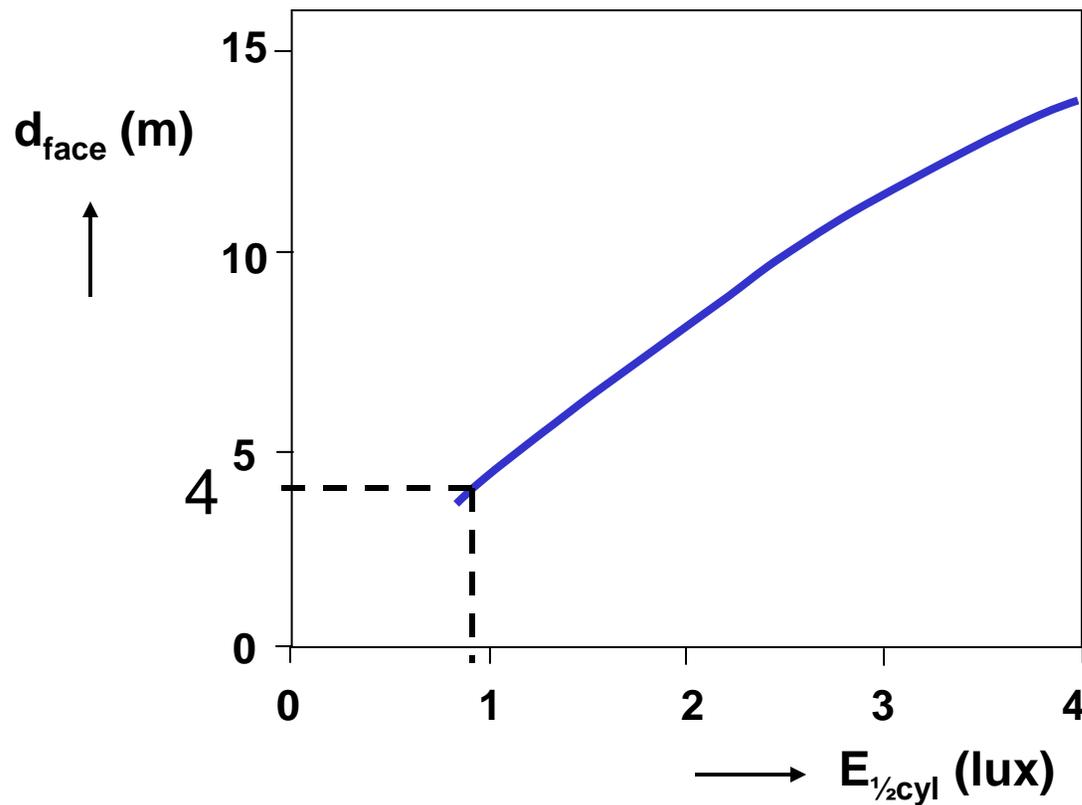
## recognition of faces



source: van Bommel, Caminada, 1980

# Quality and Quantity

## recognition of faces

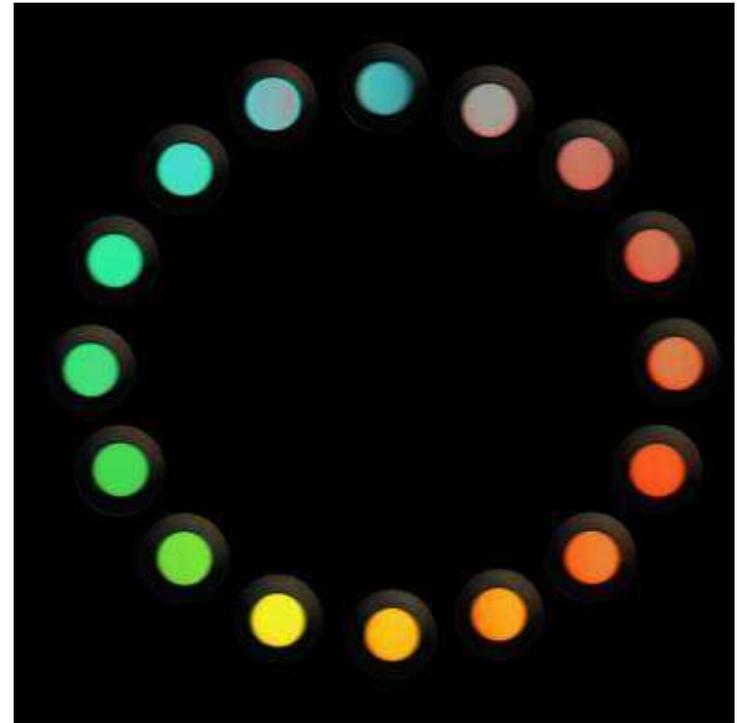
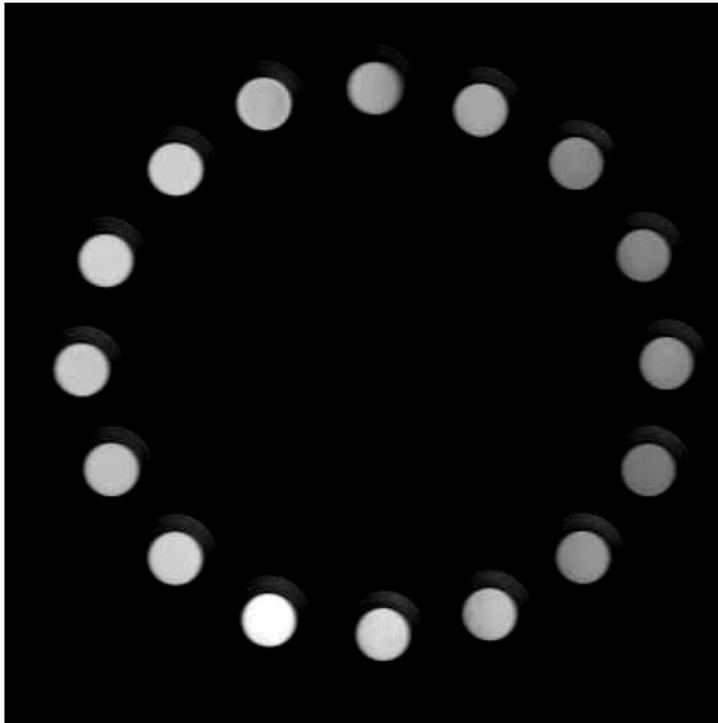


source: van Bommel, Caminada 1980

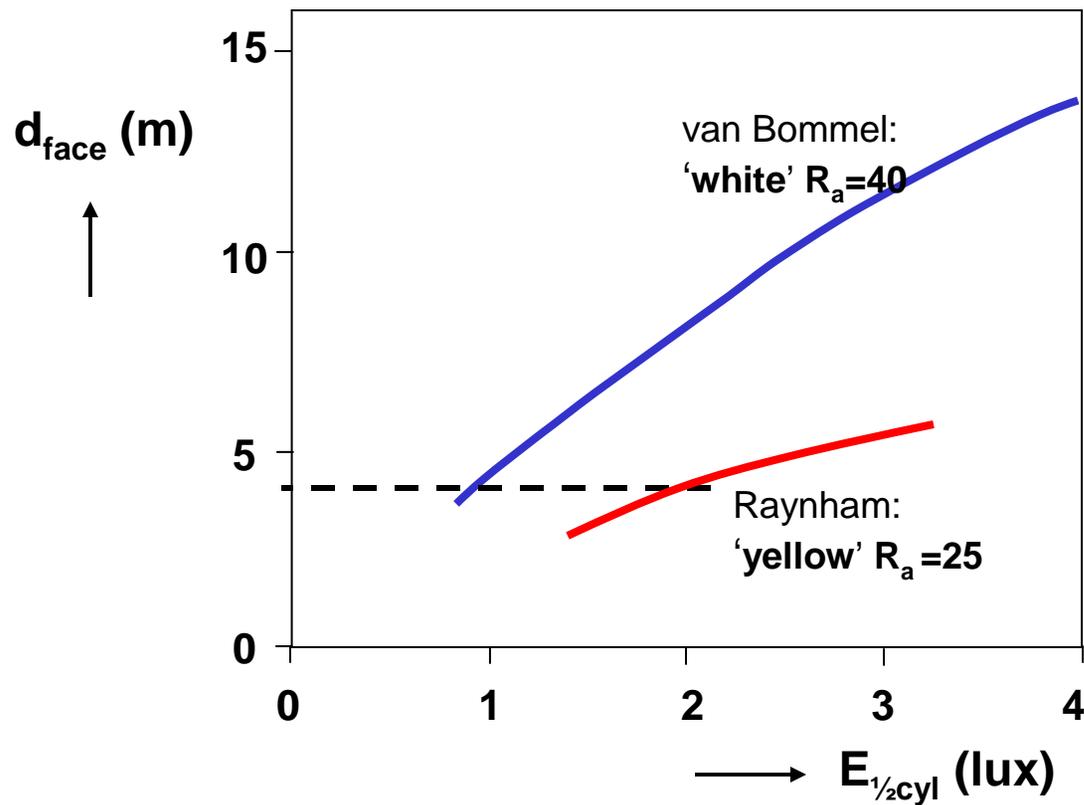
# Colour of light

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## White light and colour rendering



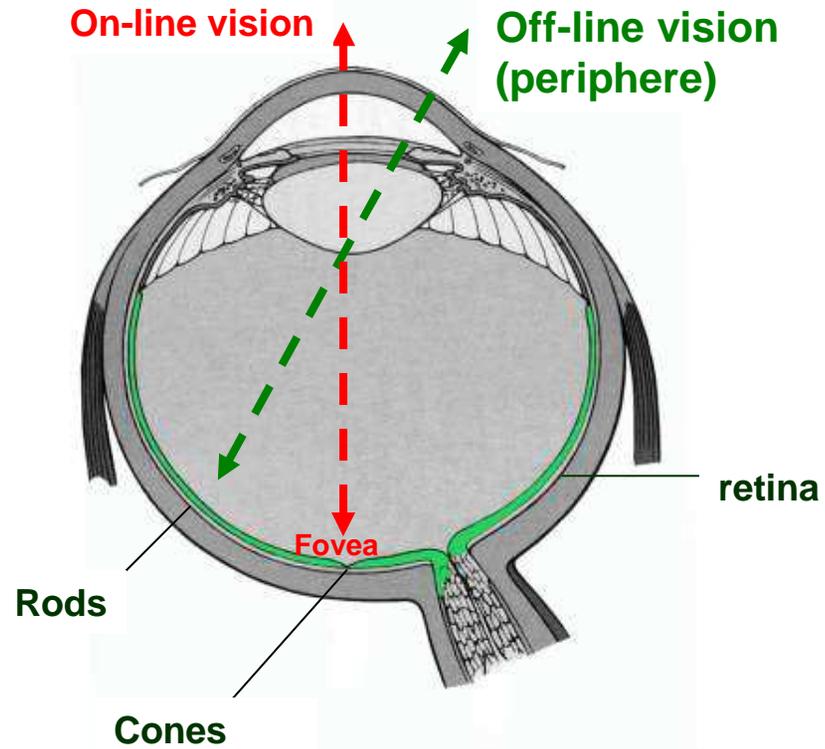
# Colour rendering and recognition of faces



source: Raynham, 2003

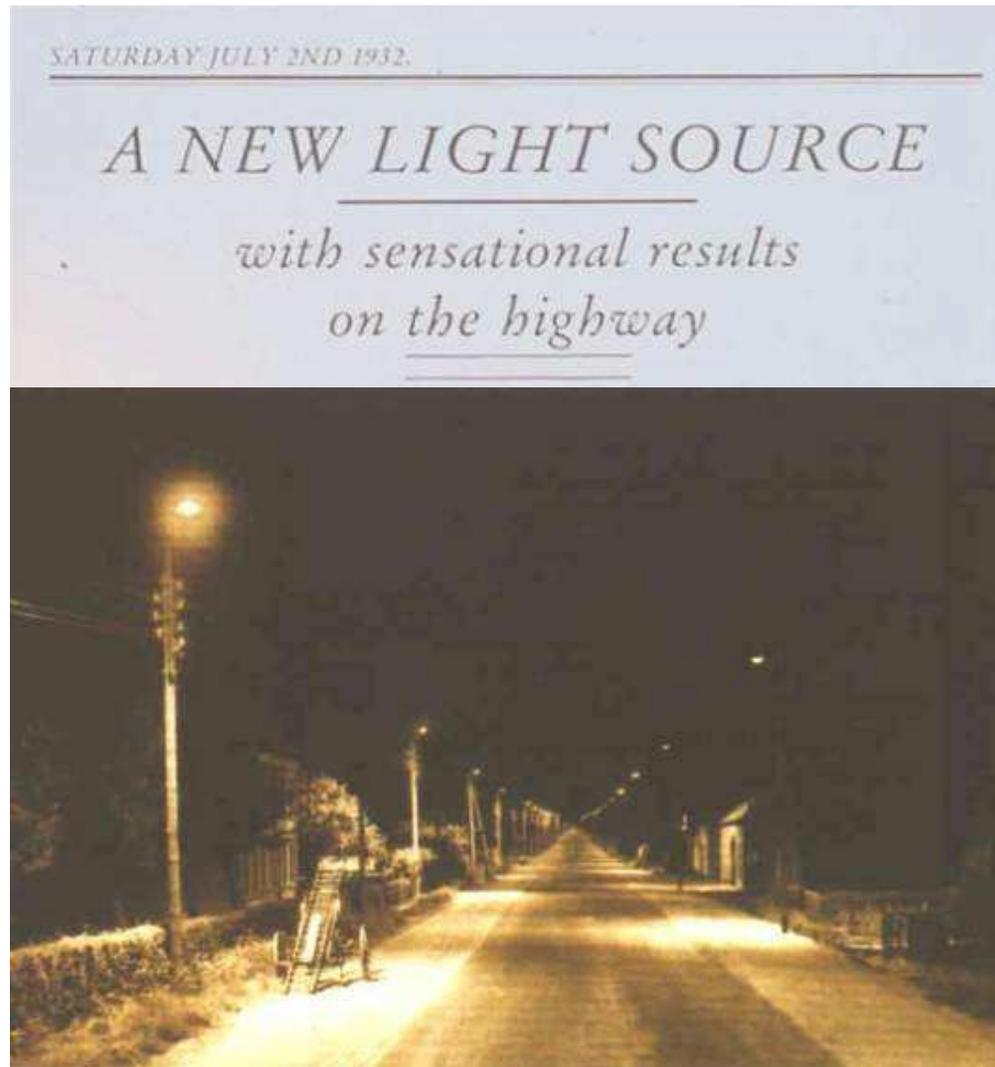
# Cones and rods

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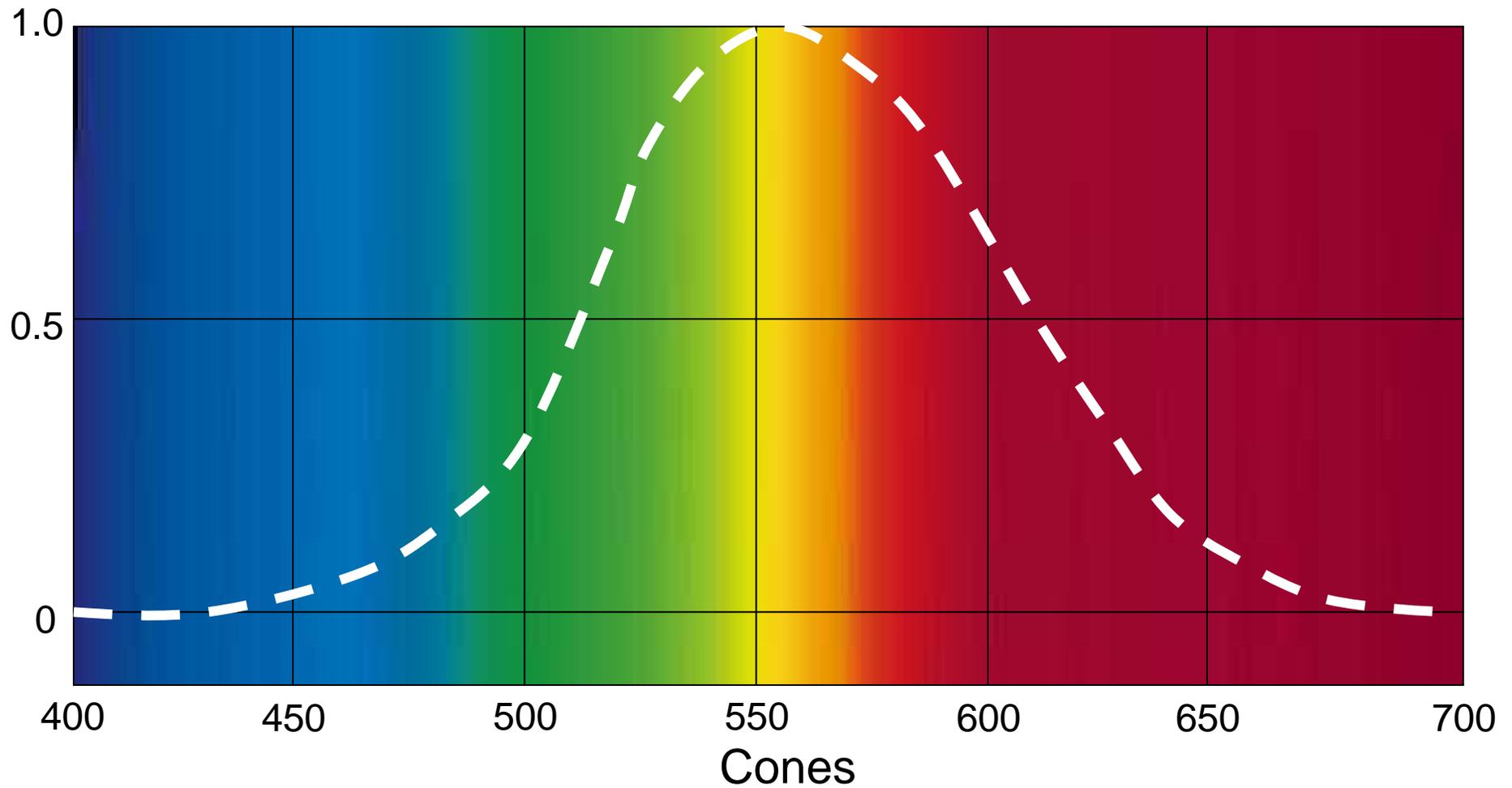
# Quantity and Quality Colour of light

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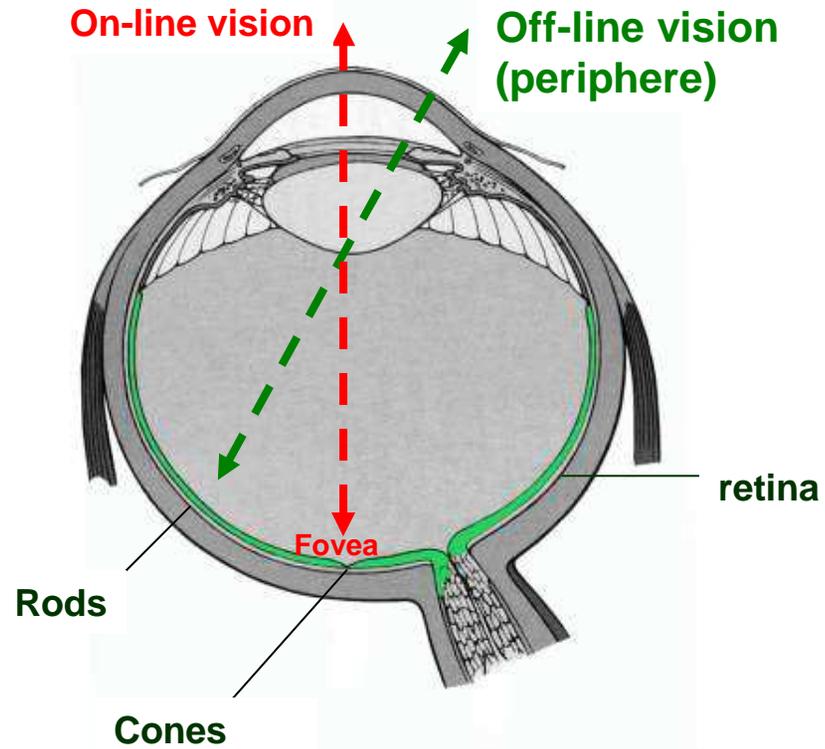
*Beek – Geleen  
Netherlands*

# Colour of light and efficiency

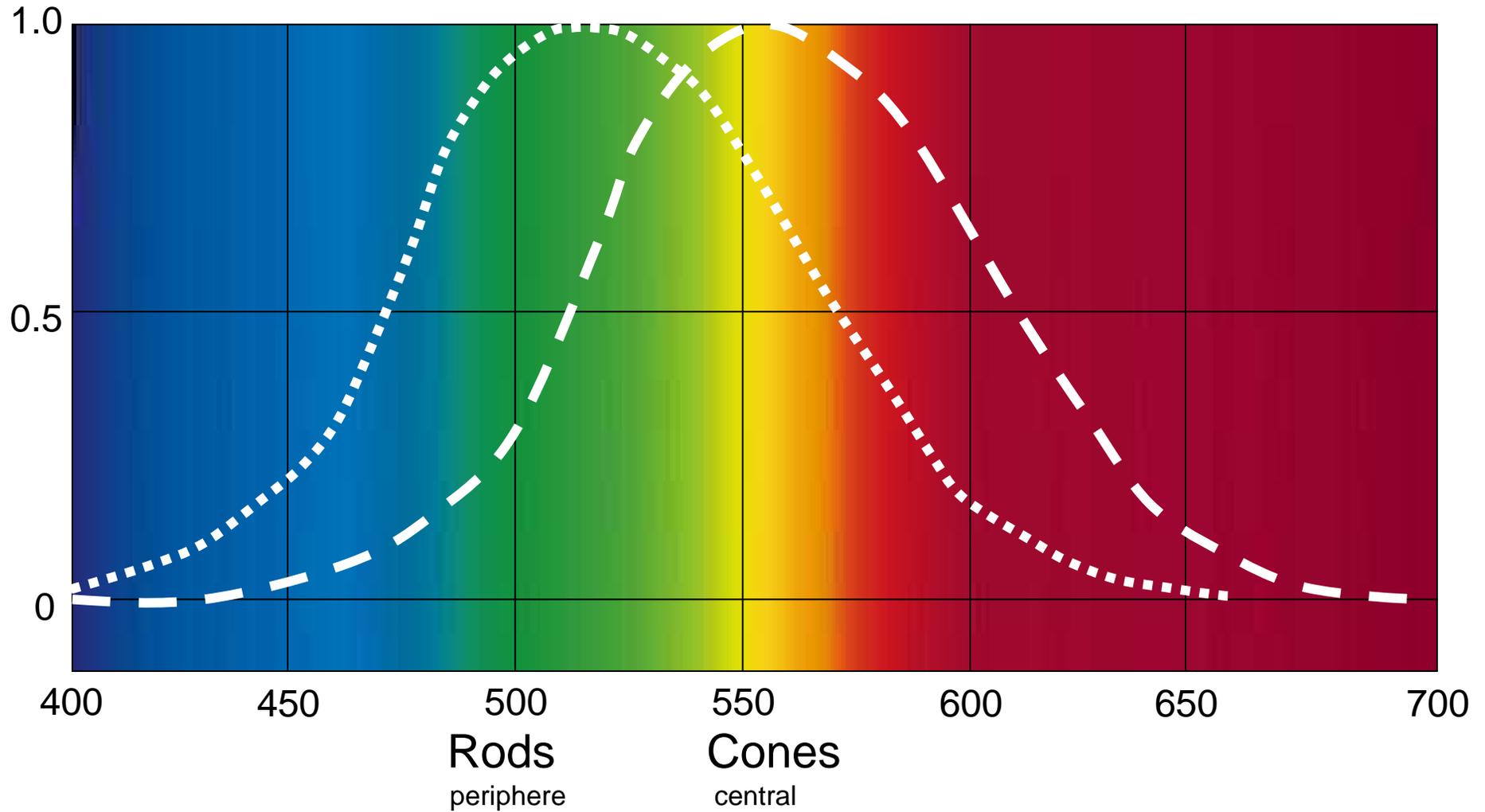


# Cones and rods

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# Colour of light and efficiency



Blue and green: better peripheral vision  
Blue + Yellow = white

# Where light

3D



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LEDs: new possibilities to control and direct the light

residential street lighting luminaire

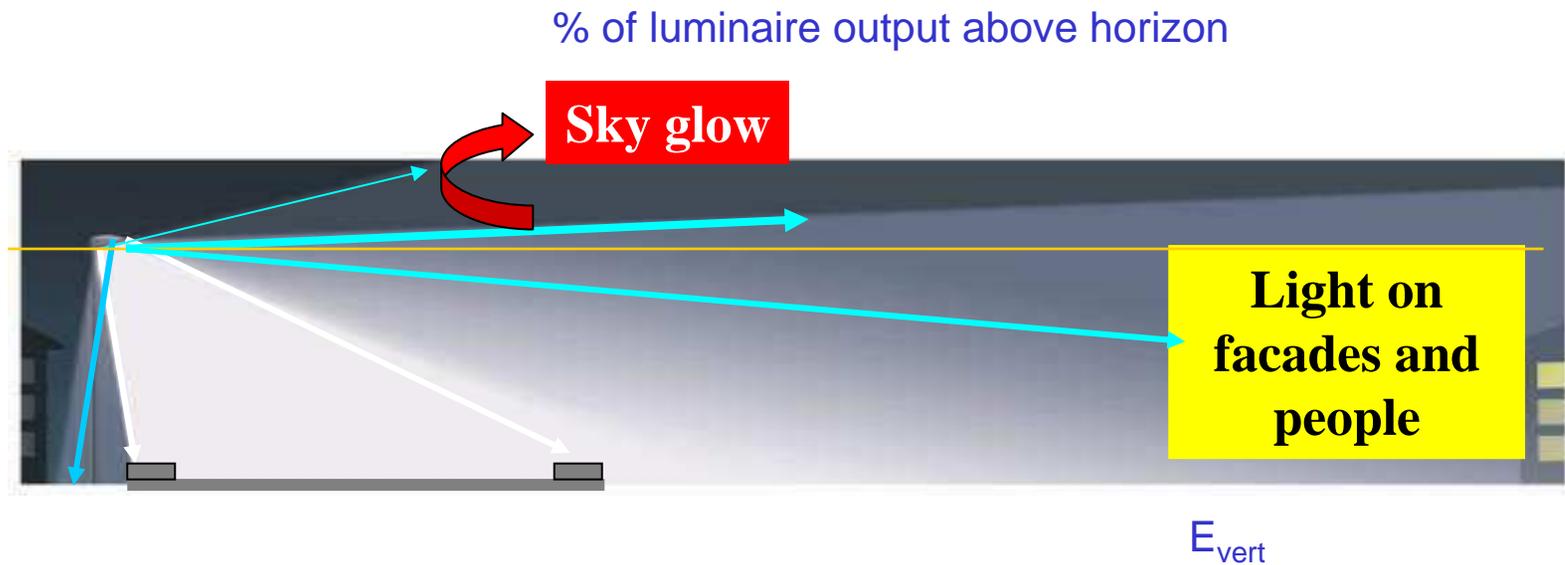


# Where light

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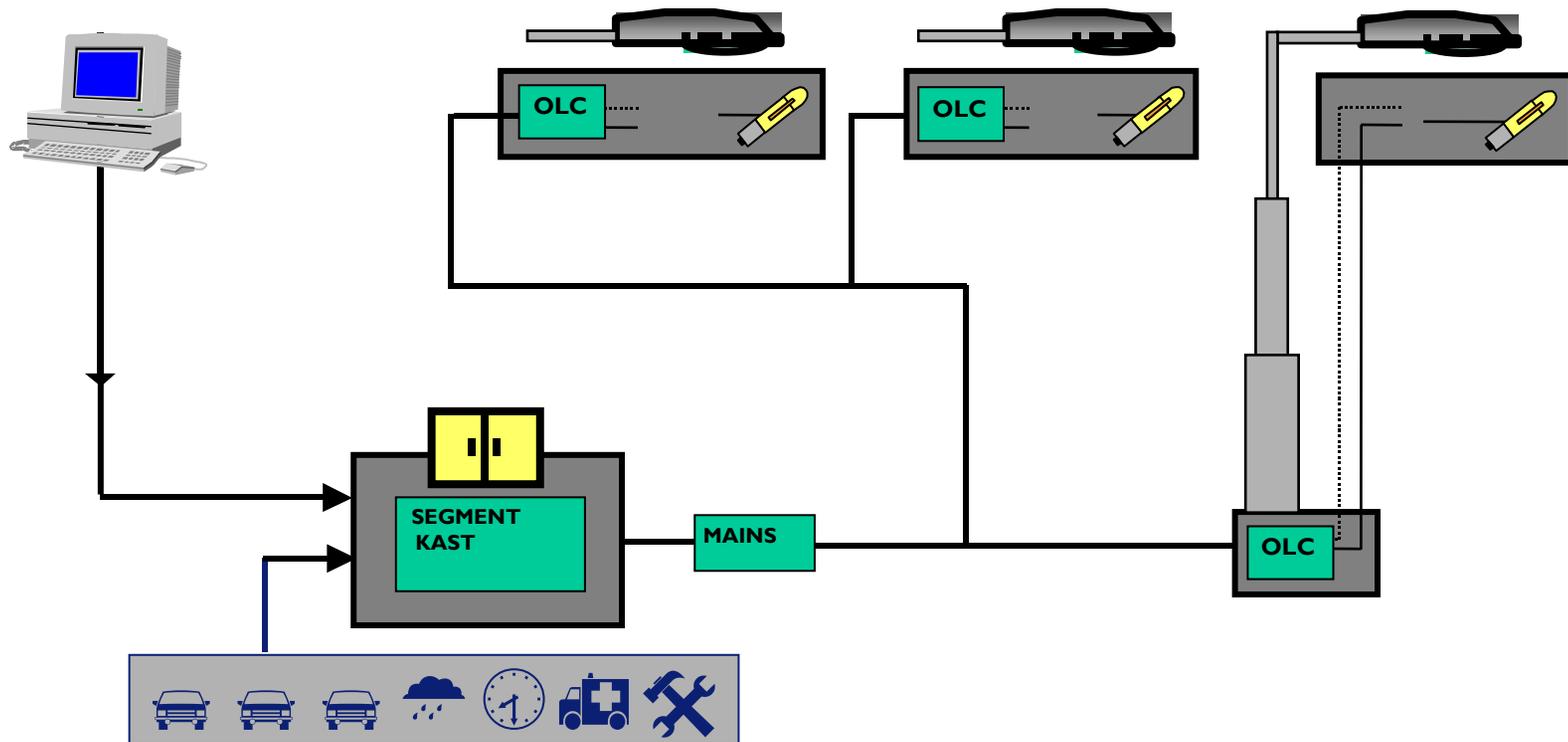
# Light pollution



Limits: CIE Publication

# When light

## Intelligent, dynamic lighting



# CIE draft Publication 115: Road Lighting: weighting factors

| Parameter           | Options                                     | Weighting Factor WF |
|---------------------|---------------------------------------------|---------------------|
| Speed               | Low                                         | 1                   |
|                     | Very low (walking speed)                    | 0                   |
| Traffic volume      | Very high                                   | 1                   |
|                     | High                                        | 0.5                 |
|                     | Moderate                                    | 0                   |
|                     | Low                                         | -0.5                |
|                     | Very low                                    | -1                  |
| Traffic composition | Pedestrians, cyclists and motorized traffic | 1                   |
|                     | Pedestrians and motorized traffic           | 0.5                 |
|                     | Pedestrians and cyclists only               | 0.5                 |
|                     | Pedestrians only                            | 0                   |
|                     | Cyclists only                               | 0                   |
| Parked vehicles     | Present                                     | 0.5                 |
|                     | Not present                                 | 0                   |
| Ambient luminance   | Very high                                   | 1                   |
|                     | High                                        | 0.5                 |
|                     | Moderate                                    | 0                   |
|                     | Low                                         | -0.5                |
|                     | Very low                                    | -1                  |

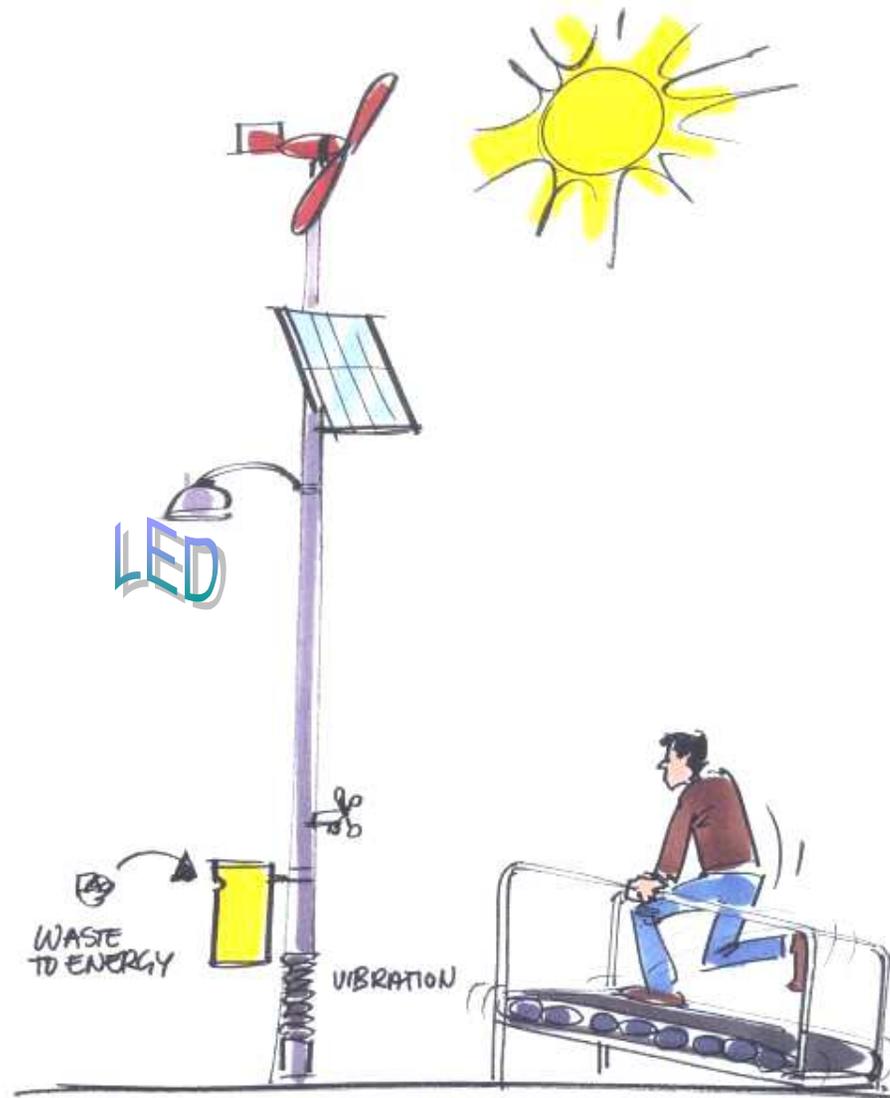
in Europe:  
Intelligent lighting  
according CIE 115:

**- 7**  
**Power stations\***

\* of 2 TWh/yr

# Thank you for your attention

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# Thank you for your attention

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[www.woutvanbommel.eu](http://www.woutvanbommel.eu)