

Light Quality and Energy Efficiency

The CIE Approach

Overview

COMMISSION INTERNATIONALE DE L'ECLAIRAGE
INTERNATIONAL COMMISSION ON ILLUMINATION
INTERNATIONALE BELEUCHTUNGSKOMMISSION

- Introduction of CIE
- Energy efficiency in lighting
- Light quality
- CIE work to provide energy efficiency and light quality

Overview

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CIE Objectives

COMMISSION INTERNATIONALE DE L'ECLAIRAGE
INTERNATIONAL COMMISSION ON ILLUMINATION
INTERNATIONALE BELEUCHTUNGSKOMMISSION

- to provide an international forum for discussion and the interchange of information
- to develop basic standards and procedures
- to provide guidance in the development of international, national and regional standards
- to provide publications
- to maintain liaisons and technical interaction with other international organizations working in similar subject areas

CIE Activities

COMMISSION INTERNATIONALE DE L'ECLAIRAGE
INTERNATIONAL COMMISSION ON ILLUMINATION
INTERNATIONALE BELEUCHTUNGSKOMMISSION

- Information and Research
- Publications
- Conferences

CIE Organisation

COMMISSION INTERNATIONALE DE L'ECLAIRAGE
INTERNATIONAL COMMISSION ON ILLUMINATION
INTERNATIONALE BELEUCHTUNGSKOMMISSION

- 37 National Committees (country members)
- 17 Supportive Members
- 7 Technical Divisions
- 125 Technical Committees

CIE National Committees

COMMISSION INTERNATIONALE DE L'ECLAIRAGE
INTERNATIONAL COMMISSION ON ILLUMINATION
INTERNATIONALE BELEUCHTUNGSKOMMISSION

 Austria

 Australia

 Belgium

 Brazil

 Bulgaria

 Canada

 China

 Croatia

 Czech Republic

 Denmark

 Finland

 France

 Germany

 Great Britain

 Greece

 Hungary

 Hong Kong

 India

 Israel

 Italy

 Japan

 The Netherlands

 New Zealand

 Norway

 Poland

 Romania

 Russian Federation

 Serbia

 Slovakia

 Slovenia

 South Africa

 South Korea

 Spain

 Sweden

 Switzerland

 Turkey

 USA

CIE Liaisons

COMMISSION INTERNATIONALE DE L'ECLAIRAGE
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- ISO
- IEC
- CEN
- BIPM
- PLDA



- Vision and Colour
- Measurement of Light and Radiation
- Interior Environment and Lighting Design
- Lighting and Signalling for Transport
- Exterior Lighting and Other Applications
- Photobiology and Photochemistry
- Image Technology

- Scientific Heart of the Organisation
- Semi-permanent Units
- Clear Terms of Reference, Workplan and Schedule
- Aims at Publication of a Standard, Technical Report or Guide

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CIE Statement on Energy Conservation

August 2007

“Energy Conservation Requires Smart Lighting”

Electrical energy requirement for illumination:

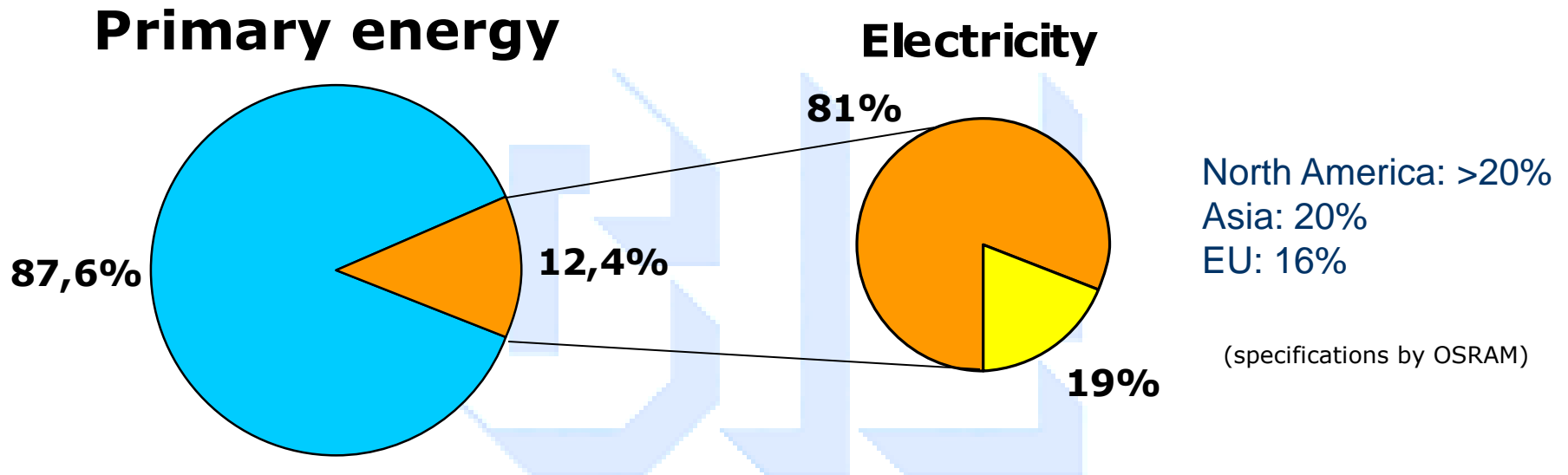
in industrial countries 5% to 15%

in developing countries up to 86%

worldwide approximately 19%

Energy Efficiency

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2,35% of the primary energy are being spent for illumination.

Effective Lamps:

- Luminous efficacy [lm/W]
- Lamp lifetime [h]

Energy Efficiency

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- Incandescent Lamps
- Halogen Lamps
- Fluorescent Lamps
- Compact Fluorescent Lamps
- High Pressure Discharge Lamps
 - Mercury Vapour Lamps
 - Sodium Vapour Lamps
 - High Intensity Discharge (HID) Lamps
- LED (Light Emitting Diodes)

Effective Luminaires:

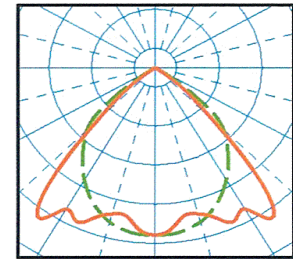
- Luminous flux distribution
- Luminous intensity distribution
- Light output ratio

$$LOR = \frac{\Phi_{\text{Luminaire}}}{\sum \Phi_{\text{Lamp}}}$$

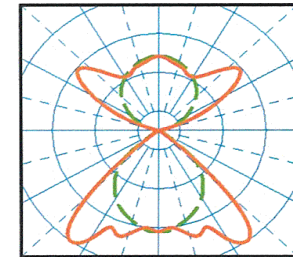
Energy Efficiency

Luminous flux / intensity distribution

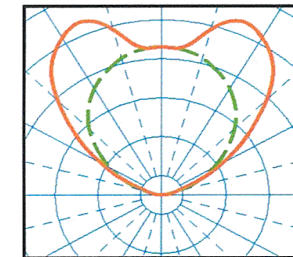
➤ direct



➤ direct / indirect



➤ indirect



Effective Control Gears:

- Transformers
- Ballasts
- Ignitors



Energy Efficiency

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- Effective Use of Controls (adaptive lighting)
- Effective Use of Daylight
- Avoidance of Light Pollution
- Sensible Maintenance

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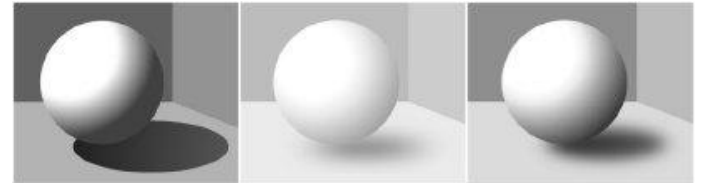
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Lighting design criteria:

- Luminance distribution
- Illuminance level
- Uniformity
- Avoidance of glare (direct, reflected)

Lighting design criteria:

- Directionality of light
- Colour rendering and colour appearance of the light
- Avoidance of flicker
- Photobiological safety



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- CIE/ISO Standard on LED Intensity Measurements
- Measurement of the Optical Properties of LED Clusters and Arrays
- Measurement of LED Radiance and Luminance
- Optical Measurement of High-Power LEDs
- High Speed Testing Methods for LEDs

TCs on Energy Efficiency

- Management and Maintenance of Road Lighting
- Application of LEDs in Transport Signalling and Lighting
- White Light on Road Lighting
- Photobiological Safety of LEDs
- Guide for Architectural and Decorative Lighting

- Joint ISO/CIE Standard: Spatial Distribution of Daylight - CIE Standard General Sky
- Guidelines for minimizing sky glow
- Guide on the limitation of the effects of obtrusive light from outdoor lighting installations

- Maintenance of indoor electric lighting systems
- Maintenance of outdoor lighting systems
- Tubular daylight guidance systems
- Colour rendering of white LED light sources

Advancing knowledge and
providing standardisation to
improve the lighted
environment.

So that life will be brighter.