

# E<sup>3</sup>Light



**International Energy Agency  
Energy Conservation in  
Buildings and Community  
Systems Programme**

## Annex 45 Energy Efficient Electric Lighting for Buildings

*The Executive Committee of the Energy Conservation in Buildings and Community Systems (ECBCS) program established a new research project (Annex) in June 2004 called Energy Efficient Electric Lighting for Buildings. Professor Liisa Halonen from the Lighting Laboratory of Helsinki University of Technology was elected for the Operating Agent of the Annex 45.*

*The objectives of Annex 45 are to identify and accelerate the use of energy-efficient high-quality lighting technologies and their integration with other building system, to assess and document the technical performance of existing and future lighting technologies, as well as to assess and document barriers preventing the adoption of energy-efficient technologies, and to propose means to resolve these barriers.*



*“Valotalo”, at Helsinki University of Technology, was built as a demonstration building for lighting research in which the newest technologies for energy-efficient lighting were applied.*

### Background

Lighting-related electricity production for the year 1997 was 2016 TWh, of which 1066 TWh was attributable to IEA member countries. For the industrialized countries, national lighting electricity use ranges from 5 % to 15 %, while in developing countries the value can be as high as 86 % of the total electricity use. The corresponding carbon dioxide emissions were 1775 million tonnes, of which approximately 511 million tonnes was attributable to the IEA member countries.

More efficient use of lighting energy would limit the rate of increase of electric power consumption, reduce the economic and social costs resulting from constructing new generating capacity, and reduce the emissions of greenhouse gases and other pollutants. New aspects of desired lighting are energy savings, daylight use, individual control of light, quality of light, emissions during life cycle, and total costs.

Both the quality of the luminous environment and the lighting installation will be considered. The high efficiency lighting should meet various specifications of the human well-being.

### Objectives

The objectives of Annex 45 are:

- Identify and accelerate the use of energy efficient high-quality lighting technologies and their integration with other building systems.
- Assess and document the technical performance of existing and future lighting technologies.
- Assess and document barriers preventing the adoption of energy efficient technologies and propose means to resolve these barriers.

### Scope

The potential for energy savings are very large and can be further increased by integrating electric lighting, daylighting and HVAC systems. The components that affect the total lighting energy use are:

- The lighting equipment used (lamps, ballasts, luminaires, etc)
- The lighting performance targets and design of lighting
- The control and integration of lighting.

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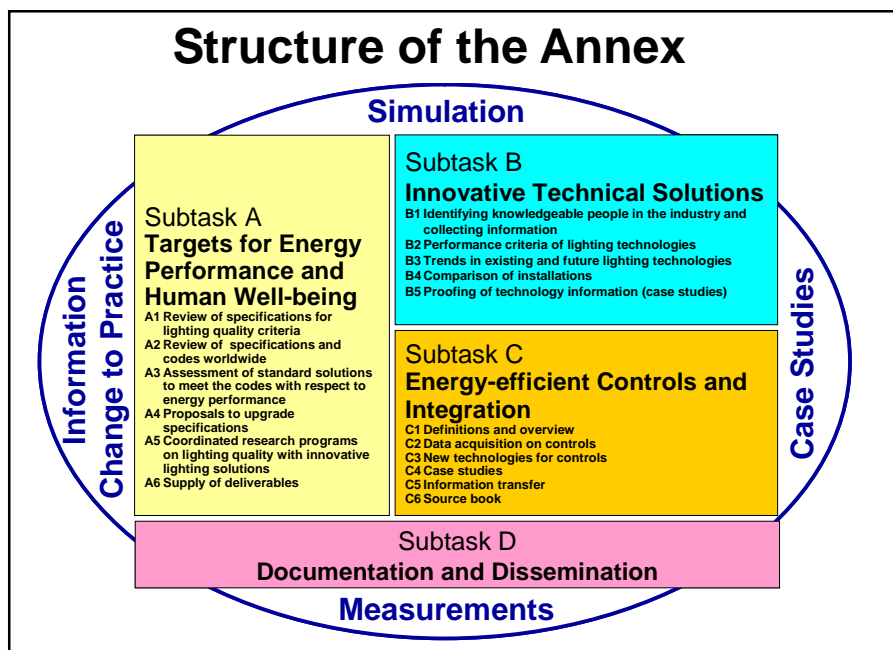
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### Subtask A: Targets for energy performance and human well-being

The objective are to document the effect of design on energy use, lighting quality and human performance as well as to assess barriers preventing the adoption of energy-efficient, human friendly lighting design.

### Subtask B: Innovative technical solutions

The objective is to identify, assess and document the performance, energy and economical criteria of existing promising and innovative future lighting technologies and their impact on other building equipment and systems. The purpose is to reduce the used energy by transferring information on concepts and products to consultants, public authorities and building owners.

### Subtask C: Energy-efficient controls and integration

The task will focus on controls that enable the occupant and facility manager to modify the electric lighting according to personal needs and preferences, within acceptable building operative requirements. Personalisation and integration of these controls with other building systems based on modern communication technology will be an important part of the subtask.

### Subtask D: Documentation and dissemination

The objective is to improve the current lighting practices in a manner that accelerates the use of energy efficient products, improves overall building performance and enhances the occupant's environmental satisfaction.

## Deliverables

- Design Guidebook
- Semi-Annual Newsletter
- Seminars
- Web-site:  
[lightinglab.fi/IEAAnnex45](http://lightinglab.fi/IEAAnnex45)

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### Annex 45 Energy Efficient Electric Lighting for Buildings

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## Management of the Annex

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