

# IEA SHC Task 50:

# Advanced lighting solutions for retrofitting buildings



Daylighting

Electric Lighting

Lighting Controls

January 2013 – December 2015



# Lighting and Energy: Potentials in Retrofitting

Only small volume of new building constructions

**40-50%** of turnover of facade and lighting industry in retrofitting



Geo-reisecommunity

**~3%** retrofit rate

(estimation facade and lighting industry)

**75 %** of appliances outdated (older than **25 a**)



Marquardt



Wikipedia...Apl/e13748

**“Lighting retrofits can save significant amounts of energy costeffectively”**

LIGHT'SLABOUR'S LOST, Policies for Energy-efficient Lighting, IEA, 2006

# Task Structure

The objective is to accelerate retrofitting of daylighting and electric lighting solutions in the non-domestic sector using cost - effective, best practice – approaches, which can be used on a wide range of typical existing buildings.

## ***IEA SHC Task 50***

### **Advanced lighting solutions for retrofitting buildings**

*Operating Agent: J. de Boer, DE*

#### **Subtask A**

*M. Fontoynt,  
DK*

**Market  
and  
Policies**

#### **Subtask B**

*M. Knoop, DE*

**Daylighting  
and Electric  
Lighting  
Solutions**

#### **Subtask C**

*J. Kaempf &  
B. Paule, CH*

**Methods  
and  
Tools**

#### **Subtask D**

*M.-C. Dubois, SE*

**Case  
Studies**

**Joint Working Group: "Lighting Retrofit Adviser"**

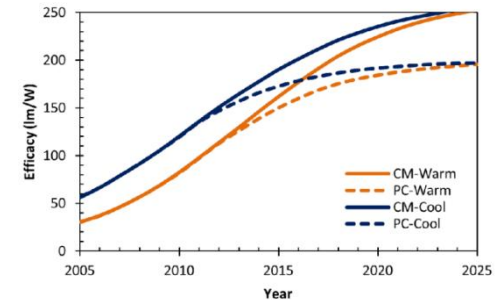
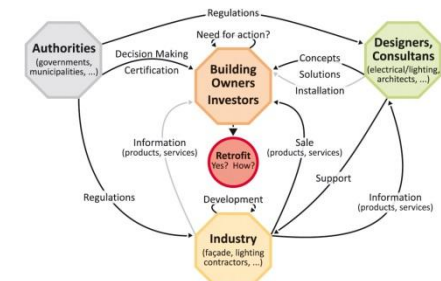
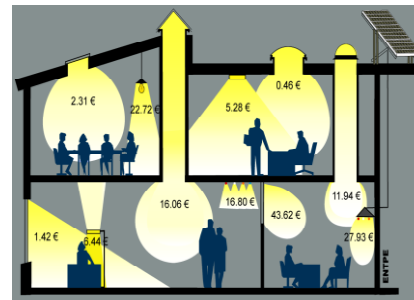
# Subtask A: Market and Policies

[Coordination: M. Fontoyont, SBI, Denmark]



**Objective:** To understand and model the financial and energy impact associated to retrofitting daylighting and electric lighting of buildings.

- A.1 Global economical models
- A.2 Barriers and benefits
- A.3 Building Energy regulation and certification
- A.4 Proposal of action concerning value chain



	Typology / best solutions	TCO of lighting	Value benefit	Energy benefit	Function benefit	Human benefit	Other benefit
1.	Offices New blind system and blind control Ambient task lighting Task lighting Daylight harvesting	€/m <sup>2</sup>	2000 €/m <sup>2</sup> (value) [ref] €/m <sup>2</sup>	2 €/m <sup>2</sup> .yr (lighting) 4€/m <sup>2</sup> .yr (cooling & lighting)	Higher productivity €/m <sup>2</sup>	less stress extra hours of comfortable work €/m <sup>2</sup>	€/m <sup>2</sup>

# Subtask B: Daylighting and Electric Lighting Solutions

[Coordination: M. Knoop, TU Berlin, Germany]



**Objective:** To assess quality of existing and new solutions in the field of façade and daylighting technology, artificial lighting and lighting controls. To identify and structure existing and develop new lighting system technologies.

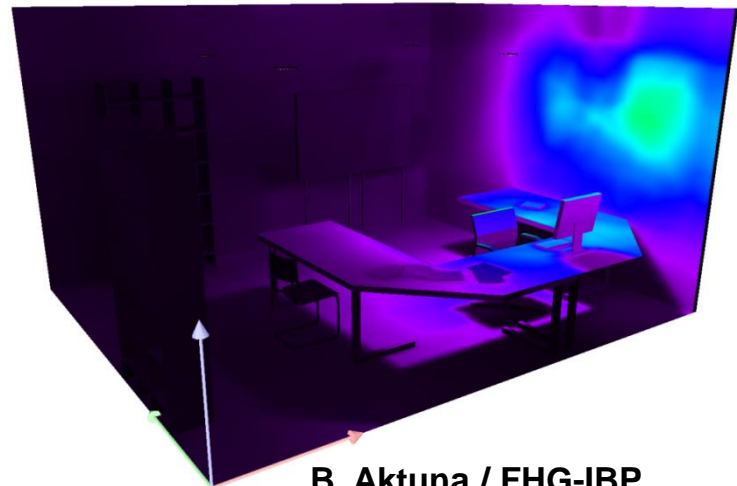
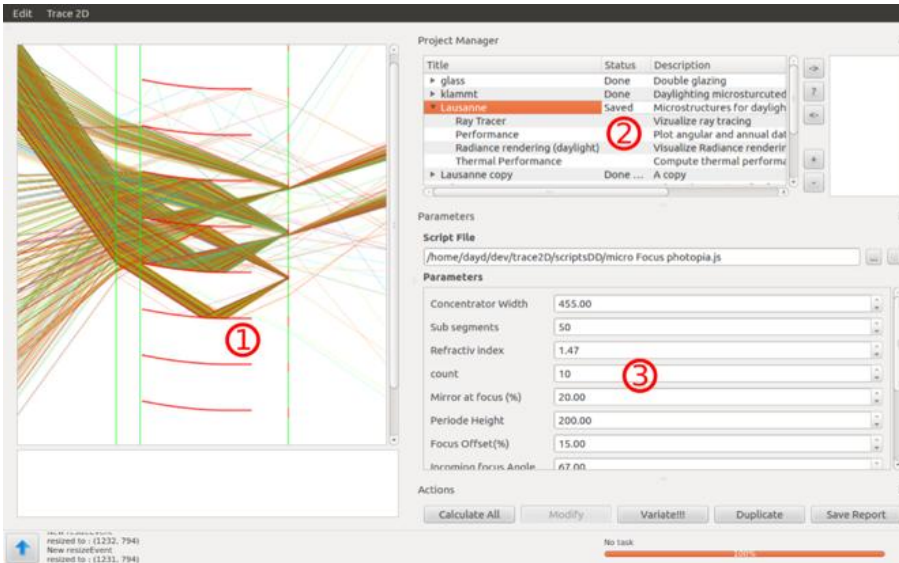
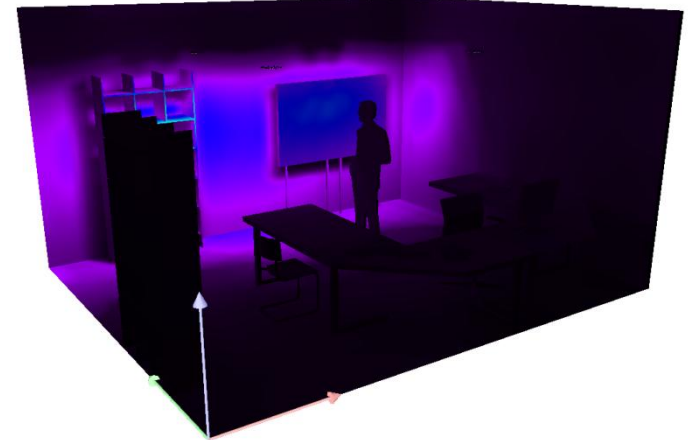
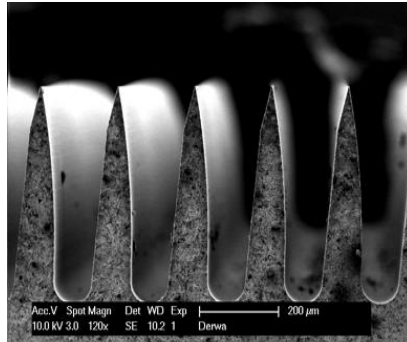
- B.1 Definition - system characterization
- B.2 Definition of (regional) baseline conditions
- B.3 Review of state of the art technology and architectural solutions
- B.4 New technical developments
- B.5 Measurements of selected state of the art and new technologies
- B.6 Source book

The screenshot shows a website page titled "LED Retrofit for T8/T5 lamps". At the top, there is a navigation menu with "Home", "Projekt", "Technologien", and "Kontakt". The main content area is divided into sections. On the left, there is a sidebar with three levels: "Building intervention level" (highlighted in orange), "Building Sk...", and "Building Equipment". The main content area has a header "LED Retrofit for T8/T5 lamps" and a sub-header "LED Retrofit for T8 / T5 lamps". Below this, there is an image of T8/T5 lamps. To the right of the image, there is text describing the retrofit solution and its benefits. Below the image, there are four horizontal bars representing different metrics: Energy efficiency, Maintenance & Costs, Lighting Quality, and Ease of use & retrofit aspects. Each bar has a color gradient from red to green. Below these bars, there are four bullet points with colored circles: a green circle for "Quick replacement possible, long lifetime", a green circle for "Medium reduction of energy consumption (20 - 40%)", a yellow circle for "Possibly weak on lumen output and colour rendering", and a red circle for "The majority of lamps has a smaller beam angle resulting in lower vertical illuminances". At the bottom of the main content area, there is a "BACK" button and a "Link zur Fallstudie..." link. At the very bottom of the page, there is a footer with the text "Fachgebiet Lichttechnik der Technischen Universität Berlin Impressum".



# Subtask B: Daylighting and Electric Lighting Solutions

## B4: New Technologies: Facade Components & Demand Driven Lighting



A. Kostro / Leso-PB/EPFL

B. Aktuna / FHG-IBP

IEA SHC Task 50 *Advanced lighting solutions for retrofitting buildings*

# Subtask C: Methods and Tools

[Coordination: Jérôme Kaempf, EPFL, Bernard Paule, Estia, Switzerland]



**Objective:** Provide methods and tools to make energy efficiency and economics of lighting retrofits transparent to stakeholders.

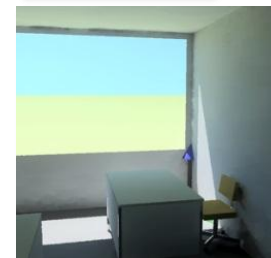
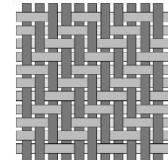
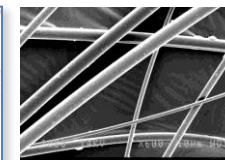
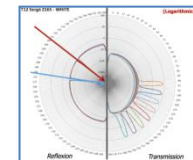
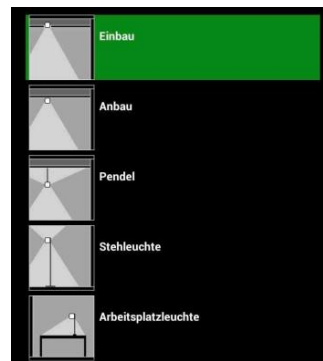
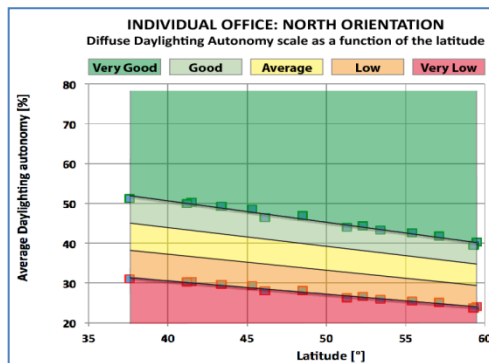
- C.1 Analysis of workflow and needs
- C.2 State of the art review
- C.3 Development of a simple integrated rating model
- C.4 Energy audit and inspection procedures
- C.5 Advanced and future simulation tools



Questionnaire about methods & tools used for lighting retrofit of buildings



\* Options  
 Start  
 More info on IEA-SHC Task 50



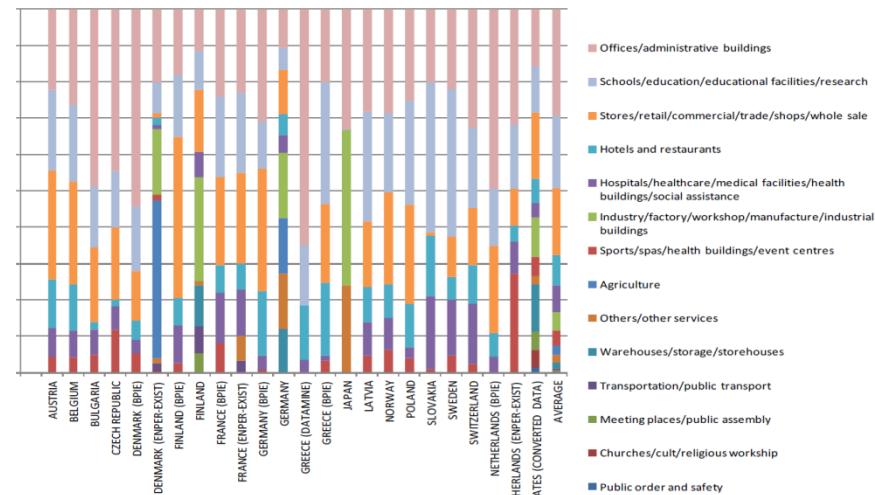
# Subtask D: Case Studies

[Coordination: Marie-Claude Dubois, Lund University, Sweden]



**Objective:** Perform building stock analysis including generation of a building typology for lighting retrofits. Based on this deliver proven and robust evidence on achievable savings and show integrated retrofit strategies for representative Case studies

- D.1 Building stock/typology
- D.2 State-of-the-art review
- D.3 Assessment and monitoring procedure
- D.4 Case study assessment
- D.5 Overall conclusions, lessons learned
- D.6 Case study book / e-documentation





# Subtask D: Case Studies

## D4: Case Study Assessment

NEW Case study buildings, by country

	Country	Category	Name	Location	Notes
<b>Sweden</b>					
1		Education	E-huset	LTH Campus, Lund	
2		Education	V-huset	LTH Campus, Lund	
3		Education	A-huset	LTH Campus, Lund	
4		Office	(see Peter Pertola)	Stockholm	See PP
5		Office	(see Peter Pertola)	Stockholm	See PP
6		Education	School ?	Helsingborg	See NG
<b>Denmark</b>					
7		Office	Horsens Town Hall	Horsens	
8		Industry	Alfa Laval building	Ask WO	
9		Education	School		See WO
<b>Belgium</b>					
10		Office	BBRI	Limelette (Wavre)	Via AD
<b>The Netherlands</b>					
<b>Austria</b>					
<b>Germany</b>					
11		Office	Marquardt Head Office	Rietheim-Weilheim	
12		Education	Uhland-School	Stuttgart	
13		Health Care	Health Care Medical Center	Bad Rappenau	
15		Education	Friedrich-Fröbel-School	Olbersdorf	
16		Office	Ask RJ		
17		Education	School Ask RJ		
18		Retail	Shop Ask RJ		
19		Industry	Workshop Ask RJ		
20		Other	Exhibition space Ask RJ		
<b>Norway</b>					
21		School buildings	???		See BM
22		Office	???		See BM
23		Campus NTNU	For sure		See BM
<b>China</b>					



# Joint Working Group: Lighting Retrofit Adviser

[Coordination: Jan de Boer, Fraunhofer-IBP, Germany]

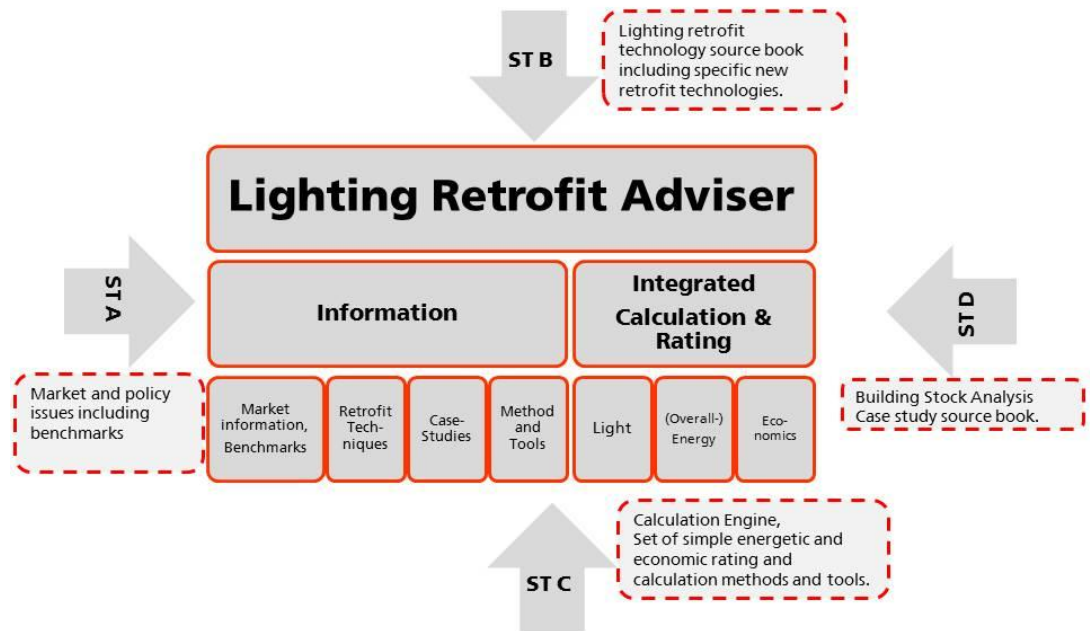
**Objective:** To develop an electronic interactive source book (Lighting Retrofit Adviser) including and presenting all Task results in an user-friendly and target group specific way

JWG.1 Software Specification  
(Concept, Architecture  
and software design)

JWG.2 Concept evaluation  
and proof

JWG.3 Implementation

JWG.4 Quality assurance,  
validation and  
national adaptations



# Lighting Retrofit Adviser

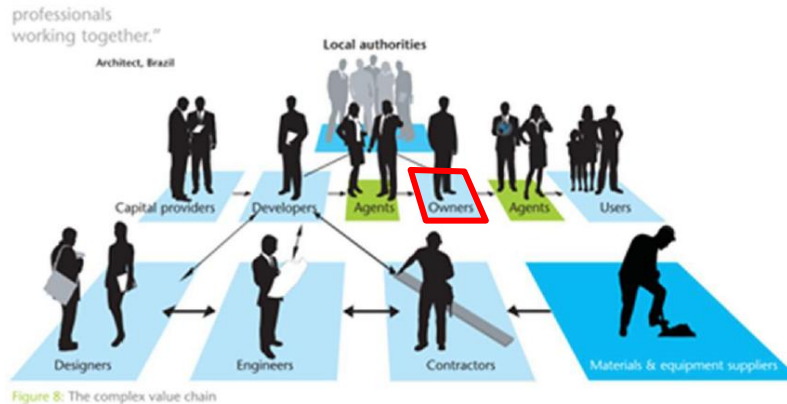
*design inspirations, design advice, decision and design tools for relighting*

Select your Country

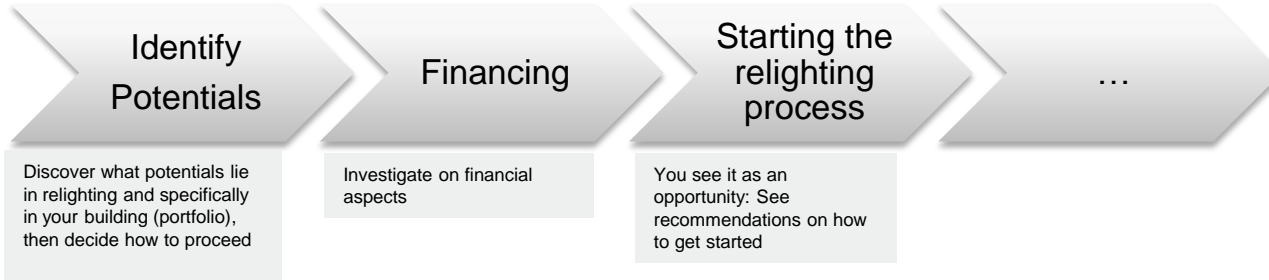


You are

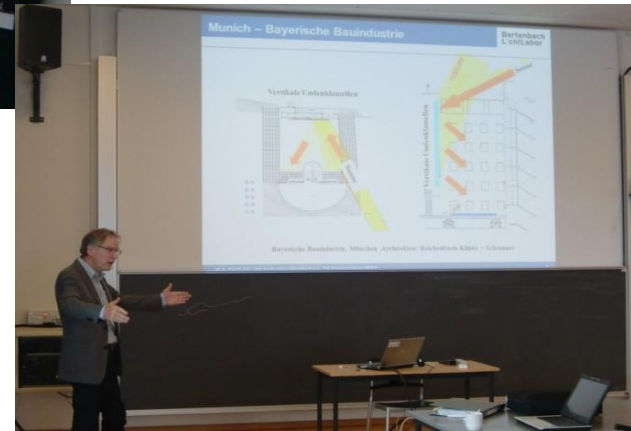
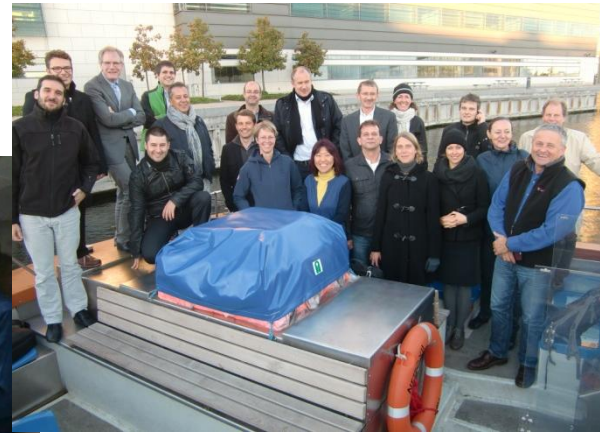
START



- Identify demands by simple question, who the user is
- Configure the contained information (components) into a suited workflows
- Leave access to other information (components) open
- Here a more target group oriented starting page.



# Who is behind the activity ...





30 participants  
18 universities/institutes/companies  
14 Countries



# Information & Dissemination

IEA SHC HOME TASK HOME MEMBER LOGIN SEARCH

**SHC Task 50**  
Advanced Lighting for Retrofitting Buildings

- About Project
- Participants
- Meetings / Events
- News
- Publications
- Related Sites
- Member Area
- Contact

Home > Publications

## Project (Task) Publications

The following are publications developed under Task 50:

### Task 50 Brochure

#### Advanced Lighting Solutions for Retrofitting Buildings

Juli 2013 - PDF 1,45MB - Posted: 7.16.2013

The overall objective is to accelerate retrofitting of daylighting and electric lighting solutions non-residential sector using cost effective best practice approaches, which can be used on typical existing buildings.

Search:  Search

Advanced Search | Clear

Order by: Publication Date Descending Sort



**IEA SHC Task 50**

Advanced lighting solutions for retrofitting buildings

Operating Agent: J. de Boer, DE

<b>Subtask A</b>	<b>Subtask B</b>	<b>Subtask C</b>	<b>Subtask D</b>
<small>M. Fontoynt, DK</small>	<small>M. Knopp, DE</small>	<small>J. Kaempfl, B</small>	<small>M.-C. Dubois, SE</small>
Market and Policies	Daylighting and Electric Lighting Solutions	Methods and Tools	Case Studies

Joint Working Group: "Lighting Retrofit Adviser"



**IEA SHC Task 50**  
Advanced Lighting Solutions for Retrofitting Buildings

Daylighting  
Electric Lighting  
Lighting Controls




The "New Gallery" (Kassel, Germany) before and after refurbishment

PARTICIPATING COUNTRIES: AUSTRIA · BELGIUM · CHINA · DENMARK · FINLAND · GERMANY · ITALY · JAPAN · NETHERLANDS · NORWAY · SOUTH AFRICA · SWEDEN · SWITZERLAND

Example of a simple tool easy and quick to use

### Deliverables

Within the scope of Task 50, the following main deliverables are anticipated:

- Report on the lighting retrofit market, including policy issues and proposals of action
- Source book on daylighting and electric lighting retrofit technologies, covering low-budget and new advanced retrofit solutions
- Toolbox with (simple) methods and tools for energy and economic auditing, rating and performance simulation
- Documentation of realized projects and case studies of lighting retrofits for different building types
- "Lighting Retrofit Adviser"  
An electronic, interactive source book including design advice and recommendations, decision-making tools and design tools for lighting retrofits

Most deliverables will be available on the Website. In addition, Workshops and Newsletters will inform about progress and disseminate important outcomes.

### Structure of IEA SHC Task 50

### Coordination

- Subtask A:** Market and Policies  
Marc Fontoynt, Danish Building Research Institute (SBI), Copenhagen, Denmark
- Subtask B:** Daylighting and Electric Lighting Solutions  
Martine Knopp, Technische Universität (TU) Berlin, Germany
- Subtask C:** Methods and Tools  
Jérôme Kaempfl<sup>1</sup> and Bernard Paule<sup>2</sup>, Switzerland  
<sup>1</sup> Ecole Polytechnique Fédérale de Lausanne (EPFL)  
<sup>2</sup> Estia SA, Lausanne
- Subtask D:** Case Studies  
Marie-Claude Dubois, Lund University, Sweden
- Operating Agent:**  
Jan de Boer, Fraunhofer Institute for Building Physics, Stuttgart, Germany

**Website:** [www.iea-shc.org/task50](http://www.iea-shc.org/task50)  
**Email:** [task50\\_info@iea-shc.org](mailto:task50_info@iea-shc.org)

**Task Duration:** January 2013 – December 2015

<http://task50.iea-shc.org/>

IEA SHC Task 50 Advanced lighting solutions for retrofitting buildings



# „Low hanging fruits“





