

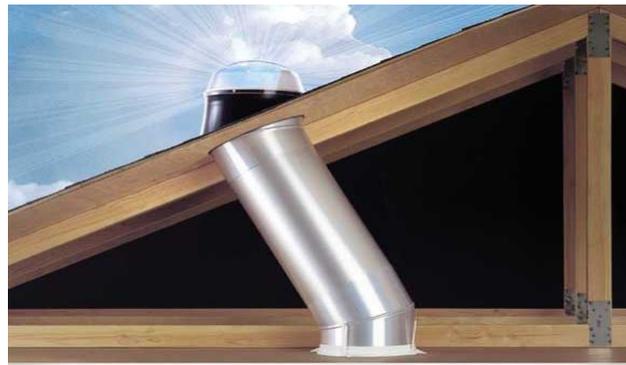
Daylighting and Electric Lighting Solutions - Highlights and results

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Searching for adequate retrofit solutions – how to rate and compare lighting technologies

- Simple retrofits are widely accepted
- Promote state-of-the-art approaches - daylight and electric lighting
- Aim: Support decision process



	Intervention type		
	Upgrade of existing situation	Use new components in existing situation	Redesign
Daylighting Product			
Daylighting Control System			
Electric Lighting Product			
Electric Lighting Control System			
Building Interior			

	Intervention type		
	Upgrade of existing situation	Use new components in existing situation	Redesign
Daylighting Product			
Daylighting Control System			
Electric Lighting Product			
Electric Lighting Control System			
Building Interior			

Catalogue of Criteria

**Catalogue of Criteria
to rate highly differentiated
lighting retrofits technologies**

Technical Report T50.B1

IEA SHC Task 50:
Advanced Lighting Solutions for Retrofitting Buildings

Subtask B: Daylighting and Electric Lighting Solutions

July 2015



daylighting solutions



electric lighting solutions

energy efficiency



lighting quality



thermal aspects

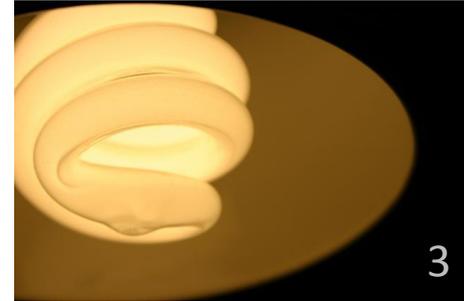


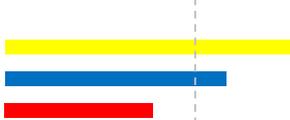
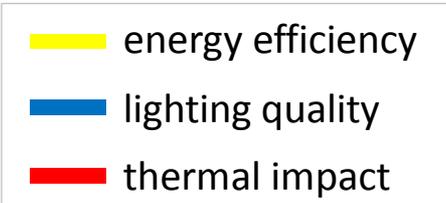
running and initial costs

Comparison to baseline



Comparison to baseline



	Intervention type		
	Use new components in existing situation		
Daylighting Product			
Daylighting Control System			
Electric Lighting Product			
Electric Lighting Control System			
Building Interior			

Technology Viewer

Technology Consultant

State your preferences:

- Show only solutions for sunny climates
- Show solutions for a retrofit upgrade of existing situations
- Show solutions for a retrofit with a use of new components in existing situations
- Show solutions for a redesign retrofit
- Show only low cost solutions

Sorting:

- Sort by energy efficiency
- Sort by lighting quality
- Sort by thermal impact

See the solutions:

Daylighting

Electric Lighting

control system product control system

shutters Lamellae heli... Demand cont...
Task 50

Blinds s_enn® Occupancy c...

Redirecting L... Prisms

See the solutions:

Compare solutions

Daylighting		Electric Lighting		Building Interior
control system	product	control system	product	
shutters	Lamellae heli...	Demand cont... Task 50	LED downlight	
Blinds	s_enn®	Occupancy c...	LED incandes...	
Redirecting L...	Prisms		LED luminair...	

Technology Viewer



- Energy efficiency
- Lighting quality
- Thermal impact
- Costs

- Reduced maintenance due to long life time
- Moderate energy savings
- Possibly weak on lumen output
- Smaller beam angle, affecting room appearance

- Energy efficiency
- Lighting quality
- Thermal impact
- Costs

- Increased visual comfort, no flicker or stroboscopic effects
- Moderate energy savings
- Not for all discharge lamps
- Impact on the electric mark labelling of the luminaire

- Energy efficiency
- Lighting quality
- Thermal impact
- Costs

- Better daylight distribution
- Moderate energy savings potential
- Costs
- Higher maintenance

Source book

3.2.2 SKYLIGHTS



>> Highlights and Lowlights:

- (++) Increased daylight contribution, with resulting physiological, psychological as well as monetary benefits.
- (+) Moderate energy savings potential, to be realized with daylighting harvesting controls.
- (-) Applicability depends on roof structure.
- (-) Retrofit to the building envelop, long payback time.

Description:
Depending on the size of skylights, considerable daylight contribution is possible. Energy is lost offered by the use of daylight can be realized only with a daylight harvesting controls (switchable). Skylights perform best in situations with diffuse skylight. In order to block out to prevent from glare and heat, skylights need to be properly oriented or provided with from a retrofit point of view, the roof structure must allow penetration, which often leads to smaller skylights. These have other advantages as well as better light distribution and high when properly spaced. The US DOE advises to add skylights over 2% of the gross roof area.

Skylights are effective as a retrofit solution for areas in which fluctuation of lighting is not a problem, such as retail, warehouses, restaurants, public areas, transportation areas and resident costs for the system and its installation are relatively high and payback times are typically as long as 5 years. Maintenance cost increase, as skylights need to be cleaned from time to time, to one daylight contribution.

Skylights significantly increase daylight contribution in a building. Studies indicate benefits daylight usage, such as increased well-being, physiological functioning, better circadian rhythm or higher sales.

Skylights can introduce considerable heat gain and losses that may offset the benefits of energy and cause an increase in yearly net energy use. South facing skylights provide the greatest gain, north facing skylights provide illumination without large thermal loads. Horizontal skylight the smallest glazing area to achieve set indoor lighting conditions and provide the lowest heat loss.

References:
Heschong Mahone Group (1999): Skylighting and Retail Sales and Heschong Mahone Group Lights and Retail Sales - CEC RES 2003
Wulfinghoff, D. (1999): Energy efficiency manual.
U.S. Department of Energy (2008): Commercial Building Toplighting: Energy Saving Potential Paths Forward.
U.S. Department of Energy (2011): Advanced Energy Retrofit Guide - Retail Buildings.




Daylighting

ACRYLIC SKYLIGHTS

>> Acrylic skylights

Acrylic skylights are applied to increase daylight contribution in a building use comfort and reduce energy consumption. Skylights are prefabricated and installed in an existing roof construction. Skylights as a retrofit solution affect the building envelop, areas in which fluctuation of lighting is not a serious problem benefits of daylight.

Description:
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Daylighting Systems

LIGHT TUBES

>> Light tubes / Tubular daylighting systems

Light tubes are applied to increase daylight contribution in a building use comfort and reduce energy consumption. Light tubes are prefabricated and installed in an existing roof construction. Light tubes as a retrofit solution affect the building envelop, areas in which fluctuation of lighting is not a serious problem benefits of daylight.

Description:
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Daylighting Systems

Searching for adequate retrofit solutions – how to rate and compare lighting technologies

The work of Subtask B allows to

- an evaluation of large variety of systems product families only,
- make a sensible, first, decision for a selection of lighting retrofit solutions.

Promote solutions that increase lighting quality, especially daylighting solutions

Thank you for your attention

