



Best Practice	OPTIMISATION OF ROOM	LIGH-03
Application	Lighting Systems	
SME sector	All	
SME Sub-sector	All	
Recommendation for optimisation	<p>To increase “utilance” (maintenance factor or room efficiency, it means "light utilization factor") and therefore reduce the need for light, the following efficiency measures can be implemented:</p> <ul style="list-style-type: none"> • Replacement of luminaires: use new lighting systems with an adapted light intensity distribution and/or use luminaires that can be switched off instead of ceiling lamps. In general, it is good to consider two options: <ul style="list-style-type: none"> - Only change the bulb or tube: usually the bulb can be replaced directly with the LED. For tubes, the situation needs to be assessed more carefully, since tubes usually have a starter or ballast. In some cases, therefore, the ballast or starter must be short-circuited. Recently, LED tubes have appeared on the market and can directly replace old tubes (for example T5) with wireless HF ballast to replace or driver to change. - Change the entire equipment/lamp. • Changing the room configuration: Optimize the layout of the desks and use temporary partitions. Optimize the use of natural light. • Surface treatment: Choose reflective (white) furniture and/or repaint the surfaces 	
Schemes and diagrams	<div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;"> <p>Ceiling lamp</p> </div> <div style="text-align: center;"> <p>Low-intensity ceiling lamps with office lamps</p> </div> <div style="text-align: center;"> <p>Floor lamps (with sensors for daylight and presence)</p> </div> </div> <p style="text-align: center;">Example of different lighting configuration for an office</p>	



	<p>Efficacy and luminaire efficiency (considering the light intensity distribution)</p> <table> <tr> <th>Lamp</th><th>Nominal efficacy [lm/W]</th><th>Luminaire type</th><th>Luminaire efficiency</th></tr> <tr> <td>Light bulb</td><td>4 ÷ 17</td><td>Ceiling lamp</td><td>0.55</td></tr> <tr> <td>Low voltage halogen lamp</td><td>24</td><td>Spots</td><td>0.75</td></tr> <tr> <td>Fluorescent lamp 55W +HF</td><td>67</td><td>Suspended luminaire</td><td>0.85</td></tr> <tr> <td>Fluorescent tube T5</td><td>95</td><td>Ceiling lamp</td><td>0.9</td></tr> <tr> <td>LED</td><td>85 ÷ 150</td><td>Ceiling lamp</td><td>1</td></tr> </table>			Lamp	Nominal efficacy [lm/W]	Luminaire type	Luminaire efficiency	Light bulb	4 ÷ 17	Ceiling lamp	0.55	Low voltage halogen lamp	24	Spots	0.75	Fluorescent lamp 55W +HF	67	Suspended luminaire	0.85	Fluorescent tube T5	95	Ceiling lamp	0.9	LED	85 ÷ 150	Ceiling lamp	1
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Economics	Unit cost of LED bulbs or tubes: 10-20 EUR																										
Energy savings	<p>20-50%</p> <ul style="list-style-type: none"> Low luminance ceiling lamps combined with table or floor lamps save energy compared to higher luminance ceiling lamps. Repainting a surface saves up to 50% energy 																										
Economic savings	For 500 hours of activity, an LED bulb consumes 3 kWh and an energy-saving one 75 kWh (approx. 0.08 EUR/kWh)																										
Average Payback Time	<p>Less than 3 years</p> <p>3-6 years (depending on the application)</p> <p>The payback time depends strongly on the local configuration and the use time of lamps.</p>																										
Emissions	This measure does not involve further emissions.																										
Environmental benefits	Reduction of CO ₂ emissions due to lower energy needs.																										
Main NEBs (Multiple benefits)	<input type="checkbox"/> Environmental benefits <input type="checkbox"/> Increased productivity <input type="checkbox"/> Work environment/ Health/Safety <input type="checkbox"/> Increased competitiveness <input checked="" type="checkbox"/> Maintenance	<p>Less lamp operating time implies lower maintenance needs. A good room configuration increases employees' comfort.</p>																									



Replicability	<p>High</p> <p>This optimization measure can be applied for each sector.</p>
Related measures	<ul style="list-style-type: none"> • LIGH-01: Optimization of day-light use • LIGH-02: Optimization of lighting-control • LIGH-04: Replacement of luminaire, lamps
Case study	<p>Replacement LED luminaires (Switzerland, 2018)</p> <ul style="list-style-type: none"> • Initial Situation: 146 T8 fluorescent tubes 58 W • Description of the optimisation: replacement of 55 LED luminaires. Energy savings estimated at 21,680 kWh/y • Implementation costs: 26,000 EUR • Payback Time: 2.7 years
References	<p>https://en.wikipedia.org/wiki/Electric_light</p> <p>Leitfaden für Energieaudits von Beleuchtungssystemen, klimaaktiv, Austrian Energy Agency, 2017</p> <p>Catalogue éco21 de produit LED efficients 2018, SIG</p> <p>UNEP, 2006 Lighting, www.energyefficiencyasia.org</p>

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