



Best Practice	REPLACEMENT OF LUMINARIRE, LAMPS	LIGH-04				
Application	Lighting Systems					
SME sector	All					
SME Sub-sector	All					
Technical description	<p>Lighting system consist of non-led lamps such as (from lower to higher efficacy): lightbulbs, halogen-lamps, fluorescent lamp. In general, for the same lighting intensity, LEDs consume less energy than these ones.</p> <p>Replacing the old lamps by LED allows reducing the energy consumption from 10 % to more than 50%.</p> <p>Moreover, if useful lumens (or “luminaire efficiency”), which describes the amount of light emitted in the relevant target area (lm/W describes the total amount of light emitted by the bulb in all directions) are considered, LED lamps have even higher efficiency than other lamps which emits generally light for 360° and hence, only a smaller part of the light in the wrong direction can be reflected.</p>					
Recommendation for optimisation	<p>For the replacement of luminaires, in general, two options can be considered:</p> <ul style="list-style-type: none">▪ Changing only the bulbs or the tubes: generally, bulbs can directly be replaced by LED. For tube the situation must be evaluated more carefully, as tubes generally are equipped with starter or ballast. Hence in some cases the ballast or starter has to be short-circuited. Recently, LED tube are available on the market that can directly replace tube lamps (e.g., T5) with HF ballast with no wires to replaces or driver to change.• Changing the whole luminaire/lamp <table><tr><th>Changing only bulbs or tube (retrofit)</th><th>Changing whole luminaire</th></tr><tr><td>The investment is generally lower (+) Easy replacement no need of an electrician (+) The global efficacy is generally slightly lower than by changing whole luminaire (-) Same lamp positions must be used. Dimmability compatibility must be checked The insurance of the installation is in question</td><td>In most cases the total number of luminaires can be reduced (+) Depending on the configuration the position of the luminaire can be optimized (+) Generally higher efficacy (+) Higher investment costs (-) Easy Dimmable (+)</td></tr></table>		Changing only bulbs or tube (retrofit)	Changing whole luminaire	The investment is generally lower (+) Easy replacement no need of an electrician (+) The global efficacy is generally slightly lower than by changing whole luminaire (-) Same lamp positions must be used. Dimmability compatibility must be checked The insurance of the installation is in question	In most cases the total number of luminaires can be reduced (+) Depending on the configuration the position of the luminaire can be optimized (+) Generally higher efficacy (+) Higher investment costs (-) Easy Dimmable (+)
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Economics	Unit cost of LED bulbs or tubes: 10-20 EUR	
Energy savings	LED lamps, with the same light emitted, consume up to 50% less energy than fluorescent lamps and have a lifetime of over 100,000 hours against the 10,000 of a fluorescent lamp.	
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	3-10 years By considering the age of the old luminaire, the payback time generally ranges from 3 to 10 years depending on essentially on the age and type of old lamp and total number of lamps to be replaced (scaling effect), and on the use time of the lamps.	
Emissions	This measure does not involve further emissions.	
Environmental benefits	Reduction of CO ₂ emissions for a reduction in electricity requirements.	
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	The service life of LED lamps is generally higher than the others, so maintenance (the change of bulbs or pipes) is reduced. In addition, the modernisation of a lamp can be used to optimize the light quality of the workstation and consequently the comfort of employees.
Replicability	High This optimization measure can be applied for each sector.	
Related measures	<ul style="list-style-type: none"> • LIGH-01: Optimization of day-light use • LIGH-02: Optimization of lighting-control • LIGH-03: Optimisation of a room 	
Case study	Replacing lamps with LEDs (Switzerland, 2018) <ul style="list-style-type: none"> • Initial Situation: 146 T8 fluorescent tubes with a unit power of 58 W are installed. • Description of the optimisation: replacement of 55 LED luminaires. Estimated energy savings of 21,680 kWh/y • Implementation costs: 26,000 EUR • Payback Time: 2.7 years 	
References	https://en.wikipedia.org/wiki/Electric_light	



	<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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