LED Lighting Retrofit Energy Saving and Payback

Power, energy, cost and CO2 saved by replacing light fittings with LED, with simple payback from the fitting cost and any maintenance saving.

Method: Lighting retrofit energy balance; Lighting Handbook practice (lumen method, maintenance factor components)

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of fittings	200.00	
Present power per fitting (with control gear)	0.072000	kW
LED power per fitting	0.036000	kW
Operating hours per year	3,000.0	h
Electricity price per kWh	0.15000	
Installed cost per LED fitting	60.000	
Maintenance saving per fitting per year	2.0000	
Grid emission factor (kg CO_2/kWh)	0.70000	

Calculated results

Parameter	Value	Unit
Power saved	7.2000	kW
Energy saved per year	21.600	MWh
Cost saved per year	3,640.0	
Simple payback (years)	3.2967	
CO_2 avoided per year (t)	15.120	

Notes for this case

• Saving = N(P_1 − P_2)·hours; include control gear losses in the present power (a 2 × 36 W fluorescent with magnetic ballast draws about 80–90 W). Check that the LED fittings still meet the illuminance; adding dimming or occupancy controls saves more.

Formula and method

$$\Delta E = N(P_1 - P_2)t, \quad t_{pb} = \frac{NC_f}{c_e \Delta E + N c_m}$$

Variables

N	Number of fittings	-
P_1	Present power per fitting (with control gear)	W
P_2	LED power per fitting	W
t	Operating hours per year	s
c_e	Electricity price per kWh	-
C_f	Installed cost per LED fitting	-
c_m	Maintenance saving per fitting per year	-
EF	Grid emission factor (kg CO_2/kWh)	-
ΔP	Power saved	W
ΔE	Energy saved per year	J

ΔC	Cost saved per year	-
t_{pb}	Simple payback (years)	-
m_{CO_2}	CO_2 avoided per year (t)	-

Method and standards

Retrofit saving.

Assumptions and limits

- Constant hours and tariff; simple payback.

References

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Report details

Report reference	FCC-Q6EC-V1TY (the same inputs always give the same reference)
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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/electrical/lighting/led-retrofit-saving

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.