Lighting Retrofit Saving and Payback

Energy, cost and CO_2 saving from replacing light fittings with more efficient ones, and the simple payback, from fitting counts, wattages, hours and prices.

Method: $\Delta E = n\,(P_0 - P_1)\,t$

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of fittings	400.00	
Old fitting power (with gear)	0.072000	kW
New fitting power	0.036000	kW
Operating hours per year	4,000.0	h
Electricity price per kWh	8.0000	
Installed cost per new fitting	1,800.0	
Grid factor (kg CO_2 per kWh)	0.72000	

Calculated results

Parameter	Value	Unit
Energy saved per year	57.600	MWh
Cost saved per year	460,800	
Simple payback (years)	1.5625	
CO_2 avoided per year	41.472	t

Notes for this case

- Check that the new fittings still give the required illuminance (see the lumen method).

Formula and method

$$\Delta E = n(P_0 - P_1)t, \quad t_{pb} = \frac{nC_f}{\Delta E c}$$

Variables

n	Number of fittings	-
P_0	Old fitting power (with gear)	W
P_1	New fitting power	W
t	Operating hours per year	s
c	Electricity price per kWh	-
C_f	Installed cost per new fitting	-
EF	Grid factor (kg CO_2 per kWh)	-
ΔE	Energy saved per year	J
ΔC	Cost saved per year	-
t_{pb}	Simple payback (years)	-
Δm	CO_2 avoided per year	kg

Method and standards

Energy difference.

Assumptions and limits

- Same hours before and after. With no saving the payback is not shown.

References

- $\Delta E = n\,(P_0 - P_1)\,t$

Report details

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Release checks	2 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/environmental/carbon-energy/lighting-retrofit-saving

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.