Lightbulb Efficiency

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Comparison

Today we shall compare 4 lightbulbs: 150 W and 40 W filament bulbs, an 23 W compact floures-cent tube bulb, and a 2 W LED bulb.

Bulb	measured power / W	illuminance (30 cm) / lx	mean lifetime / hr	cost / £
150 W filament			1000	0.50
40 W filament			1000	0.30
23 W CFT			15 000	9.00
2 W LED			50 000	17.00

Economics

1. (a) How much electrical energy (in kWh) does a 100 W filament bulb use in 3 hours?
   (b) How much electrical energy will the bulb use in a year if it is used for this amount of time each evening for a year?
   (c) If electrical energy costs 10p per kWh, how much will it cost to use this bulb for a year?
   (d) After how long will it need replacing, at this rate of use?
2. (a) How much electrical energy (in kWh) does a 20 W CFT bulb use in 3 hours?
   (b) How much electrical energy will the bulb use in a year if it is used for this amount of time each evening for a year?
   (c) If electrical energy costs 10p per kWh, how much will it cost to use this bulb for a year?
   (d) After how long will it need replacing, at this rate of use?
3. Using suitable approximations, plot a graph of cost of running both bulbs (in 10s of £) on the y-axis against time (in years) on the x-axis for the first 15 years.