



COMPARING LUMENS TO WATTS IN INCANDESCENT BULBS

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There are a lot of tables and converters on the internet that tell you how many lumens you need to get the same light you are used to seeing from incandescent bulbs. The problem is, they don't all agree.

So, we went to Amazon and checked out the manufacturer's specifications for 30 LED bulbs, ranging from 15 lumens to 6500 lumens. Well, just like our internet search, manufacturers don't even agree about the relationship between lumens and the equivalent watts in incandescent bulbs.

For example, four manufacturers claimed their LED bulbs were the equivalent of 25-watt incandescent bulbs. But all four bulbs had different lumen outputs: 180, 200, 240, and 280 lumens. Another manufacturer had a 200 lumen LED and their specs said it was equivalent to a 15-watt incandescent bulb. We found the same inconsistencies all along the lumen scale. Maybe the way they measure lumens and watts varies. Or maybe the way they make their bulbs impacts efficiency.

Regardless, we need to have an easy-to-use reference so we can understand what kind of light to expect from an LED, at least for those of us who still think in terms of watts and incandescent bulbs. Plus, our Amazon search also showed us that efficiency varies a lot from manufacturer to manufacturer.

The table on the left is from the International Dark Sky Association (IDA). It gives a reasonable comparison between lumens and incandescent watts. The table on the right is a forecast based on manufacturer specifications for the 30 LED bulbs we found on Amazon. The forecast generates results that are close to the IDA table.

Lumens	Watts (Energy Used)		
	Incandescents	CFLs	LEDs
200	25	6-8	2-3
450	40	9-13	6-8
800	60	13-15	9-13
1100	75	18-25	12-15
1600	100	25-30	16-20
2600	150	30-35	25-28

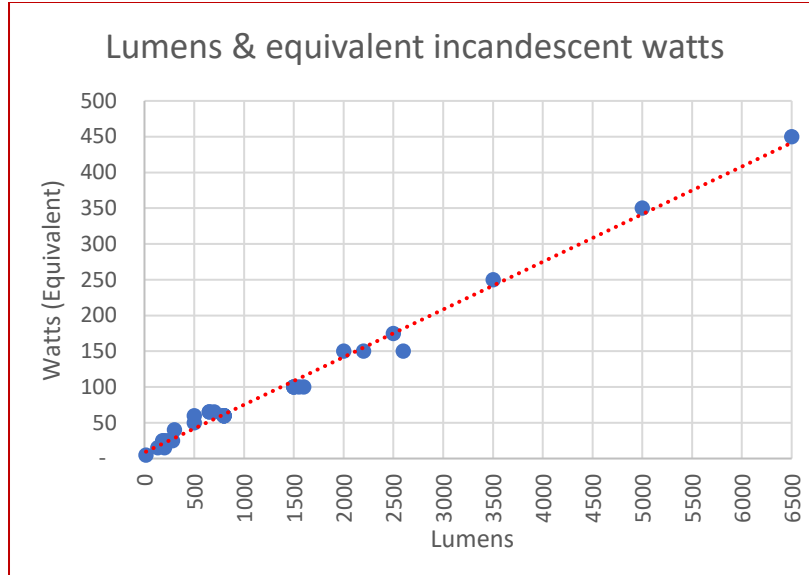
FORECAST	
Lumens	Equiv. watts
200	22
450	39
800	62
1100	82
1600	115
2600	182

The graph below shows the equivalent incandescent bulb wattage for LED ranging from 15 lumens to 6500 lumens. That's a broad range, which makes it hard to see the equivalent wattage for LEDs below 1000 lumens.

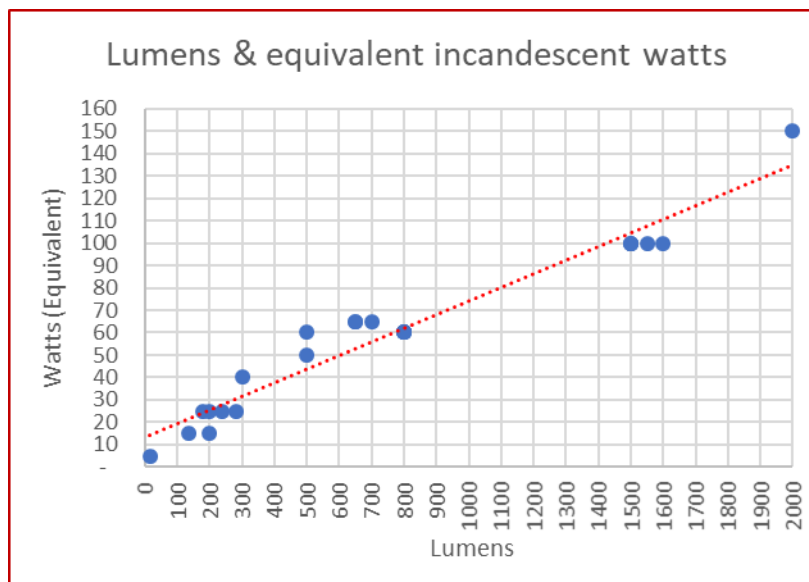


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The next graph shows manufacturer data for LED bulbs up to 2000 lumens. There is a clear, almost linear trend, but you can see there's a lot of variation as well.



So far, we've been comparing lumens to the equivalent wattage in incandescent bulbs. That is just a comparison to give us an idea of how much light we can expect from an LED based on what so many of us know best, incandescents and their wattage. Now let's look at the actual watts consumed by LEDs.

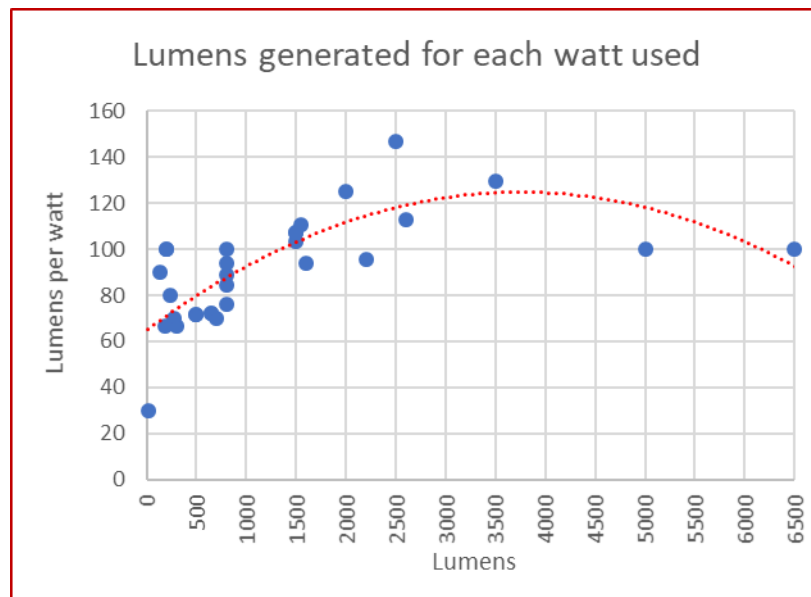


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It looks like higher lumen LEDs are more efficient than lower lumen LEDs, at least up to somewhere between 2500 and 3500 lumens. Looking at the red trend line, a 500 lumen LED generates about 80 lumens per watt used. That's a generalization.

You can see from the graph that efficiency jumps all over the place, from about 70 lumens per watt to 100 lumens per watt for LEDs under 1000 lumens. At 2500 lumens, bulbs generate around 120 lumens per watt, actually 115 to 145.



If you have more information, please share it with us. Send us an email: mike@IvinsNightSky.org.