LED iBOND

Vertical Farming White Paper

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LOOK AT ENERGY EFFICIENCY OF GROWTH LIGHTS AND CUT COSTS

The economical savings of choosing Growth Light Panels designed on LEDs with market leading energy efficiency is in many cases seriously underestimated.

Growth Light panels with market leading LEDs gives an absolute maximum light generation from the electricity used, and significantly reduces electricity cost, which often stands for more than 50% of the total annual costs to operate a vertical or indoor farm.

Save cost choosing the right Growth light panels and reduce the electricity cost with up to 40%.

LED Growth Light - An energy efficient technology

Light emitting diodes (LED lights) were first introduced to the market to replace the traditional incandescent and fluorescent lights for a more sustainable and energy saving solutions. With LED becoming a standard for lighting in homes and offices, the horticulture industry can also benefit highly from this technology, and it can become a great differentiator for a profitable business.

Highly developed LED growth lights have become extremely energy efficient versus old traditional growth lights that use HPS (high-pressure sodium) or CMH (ceramic metal-halide).

Energy Efficiency - A key metric

Energy efficiency for Growth Lights is measured in µmol/Joule which means that for each Joule of electrical Energy used, a certain number of light photons are being produced. The higher number the better. For commercially available LEDs the energy efficiency is typical 2.5-3.5 µmol/J.

For comparison an HPS light has much lower efficiency (typical more than 50% lower) due to the inefficient technology and due to light photons being lost, as HPS spread light in all directions, that can't be directed towards the plants.

Even for different LED Growth light panels on the market, the energy efficiency varies enormously and will lead to huge difference in cost of operation due to the increased price of electricity.

Save costs - Focusing on energy efficiency

The energy consumption should be minimized and is very important as a light panel normally are turned on for up to 12-16 hours per day. In any comparison of energy efficiency, the energy consumption to be considered shall be wall-plug-consumption and shall therefore include the energy loss in the electrical driver (typically 7-10% energy is lost).

With year-round production using lighting daily, the efficiency of the growth lights is even more important than in a greenhouse where natural light is also available. The impact of choosing the right Growth Light panels designed on LEDs with high energy efficiency are in many cases seriously underestimated from an economical point of view.

Numbers show performance - an example:

Take an average production facility with light turned on 16 hours per day, that makes approximately 5.840 burning hours of the Growth light panels in a full year.

For a production facility fabricating lettuce, a light intensity from the growth light panel of approximately 250-300 µmol/s/m² is typically required. Notice that with 250-300 µmol/s/m² measured right below the light panel, an intensity of approximately 200 µmol/s/m² will be attained at the crops 20-40 cm below the light panels.

Comparison of two Growth light panels with different Energy efficiency:

System 1: Growth Light Panel 1 – Energy efficiency of 2.2µmol/J	System 2: Growth Light Panel 2 – Energy efficiency 3.0µmol/J
The panel 1 will utilize 150.00 watts per m² (10% loss in driver) Annual utilization per m² = 5.840hrs x 150.00W = 876.0 kWh At a cost of 0.10€ per kWh, the cost becomes **87.60€** per m²	The panel 2 will consume 110.00 watts per m² (10% loss in driver) Annual consumption per m² = 5.840hrs x 110.00W = 642.4 kWh At a cost of 0.10€ per kWh, the cost becomes **64.24€** per m²

Conclusion:
The difference for growth light panel 1 and 2 pr year in pure electricity cost is 23,36€ pr m² per year.

Consider that the initial cost (CapEx) of light panels typically is on the order of 150-250 € per square meter which corresponds to 20-30€ per year if depreciated over its lifetime.

The cost of operation (electricity) is therefore much higher than the cost of the panel, and the focus in choosing growth lighting for vertical farming should therefore clearly be at on minimizing OpEx and energy consumption, more than on the CapEx and the economical depreciation only.

Just on energy saving, system 2 compared to system 1 saves 23.36€ extra per square meter per year: that is a 36% higher energy cost with panel 1.

Market leading Energy efficiency combined with optimized spectrum

Focus on a high-energy efficiency is important to reduce the electricity, but an optimized spectrum is at the same time also important for maximizing specific growth results and production yield.

LED iBond offers Growth Light panels with market leading energy efficiency and at the same time with customized and optimized spectrum leading to higher production yield.

For more information about Growth Light solutions for vertical farming or advice on investing in vertical farming, please visit ledibond.com or send an email to sales@ledibond.com.