COMPARING HPS TO LED SIDE-BY-SIDE IN MICHIGAN INDOOR GROW: WHY LED WON

Scott Asiala | Fluresh
Brady Nemeth | Fluence Bioengineering
Rachel Fredrickson | Consumers Energy
INTRODUCTIONS

Moderator:
Gillian Giem, Program Manager,
Grand Rapids 2030 District

Speakers:
Scott Asiala, Vice President of Cultivation & Extraction, Fluresh
Brady Nemeth, Utility Rebate Coordinator, Fluence Bioengineering
Rachel Fredrickson, Indoor Agriculture Specialist, Consumers Energy
IT'S HERE!
GRAND RAPIDS CANNABIS ENERGY MANAGEMENT
BEST PRACTICES GUIDE
PHOTOSYNTHETICALLY ACTIVE RADIATION
The range of light that drives photosynthesis. It ranges from 400 to 700 nanometers on the electromagnetic spectrum. While light outside of this range (i.e. UV and Far Red) is conducive for other photobiological activity such as development and photoperiod, PAR is primarily responsible for plant growth/yield.
HOW TO EVALUATE HORTICULTURE LIGHTING

Speaking the Same Language

There are numerous variables that factor into the overall performance of a horticulture lighting solution, and thus the overall performance of a controlled environment horticulture facility. Understanding these factors and their impact will ensure a more educated purchase decision to achieve your goals.

PPFD & DLI
Photosynthetic Photon Flux Density and Daily Light Integral

EFFICACY
Energy Efficiency

PPF
Photosynthetic photon flux

SPECTRUM
What do your plants need

FORM FACTOR
High Application Fit
EVIDENCE-BASED Design
Legacy Lighting Technology Vs PhysioSpec Indoor™

Measurement of Normalized Photosynthetic Photon Flux

PhysioSpec Indoor™
Fluence Resources

Photobiology Guide

https://fluence.science/guides/photobiology-guide/

Cultivation Guide

https://fluence.science/guides/cannabis-cultivation-guide/
## VYPR 2p SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPF</td>
<td>1700 µmol/s</td>
</tr>
<tr>
<td>Input Power</td>
<td>631W</td>
</tr>
<tr>
<td>Efficacy</td>
<td>2.7 µmol/j</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>Autosensing 100-277V, 347V, 400V &amp; 480V</td>
</tr>
</tbody>
</table>
Flower Room 123

VYPR 2p

<table>
<thead>
<tr>
<th>PPFD (units: µmol/m²/s)</th>
<th>0.00</th>
<th>112.50</th>
<th>225.00</th>
<th>337.50</th>
<th>450.00</th>
<th>562.50</th>
<th>675.00</th>
<th>787.50</th>
<th>900.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height from canopy</td>
<td>4’</td>
<td>4’</td>
<td>4’</td>
<td>4’</td>
<td>4’</td>
<td>4’</td>
<td>4’</td>
<td>4’</td>
<td>4’</td>
</tr>
</tbody>
</table>

134 VYPR 2p

- Fixture Quantity: 134
- Power per Fixture: 631 watts
- Total Electrical Input: 84,554 watts
- 4’ from canopy

1000W DE HPS

- PPFD Average: ~ 902 µmol/m²/s
- Power per Fixture: 1,080 watts
- Total Electrical Input: 144,720 watts
- 4’ from canopy
### Flower Room 126

**VYPR 2p**

<table>
<thead>
<tr>
<th>Fixture Quantity</th>
<th>PPFD Average</th>
<th>Power per Fixture</th>
<th>Total Electrical Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>185 VYPR 2p</td>
<td>~ 895 µmol/m²/s</td>
<td>631 watts</td>
<td>116,735 watts</td>
</tr>
<tr>
<td>185 1000w DE HPS</td>
<td>~ 908 µmol/m²/s</td>
<td>1,080 watts</td>
<td>199,800 watts</td>
</tr>
</tbody>
</table>

- **PPFD (Photosynthetic Photon Flux Density)** units: µmol/m²/s
- **Height 4' from canopy**

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**1000w DE HPS**

- **PPFD: Photosynthetic Photon Flux Density** units: µmol/m²/s
- **Fixture Mounting Height 4' from canopy**
Flower Room 135

VYPR 2p

- 129 VYPR 2p Fixture Quantity
- ~ 885 µmol/m²/s PPFD Average
- 631 watts Power per Fixture
- 81,399 watts Total Electrical Input
- 4' from canopy Fixture Mounting Height

1000w DE HPS

- 129 1000w DE HPS
- ~ 920 µmol/m²/s PPFD Average
- 1,080 watts Power per Fixture
- 139,320 watts Total Electrical Input
- 4' from canopy Height

Fluence Bioengineering | 31 August 2020
SPYDR 2x Flexible | Scalable | Uniform

SPYDR 2x SPECIFICATIONS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PPF</strong></td>
<td>860 µmol/s</td>
</tr>
<tr>
<td><strong>Input Power</strong></td>
<td>342W</td>
</tr>
<tr>
<td><strong>Efficacy</strong></td>
<td>2.5 µmol/j</td>
</tr>
<tr>
<td><strong>Input Voltage</strong></td>
<td>Autosensing 100-277V, 347V, 400V &amp; 480V</td>
</tr>
</tbody>
</table>
Veg Room 136

**SPYDR 2x**

**SPYDRx PLUS**

### PPFD: Photosynthetic Photon Flux Density (units: µmol/m²/s)

<table>
<thead>
<tr>
<th>PPFD (µmol/m²/s)</th>
<th>PPFD (µmol/m²/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>540.00</td>
<td>473.00</td>
</tr>
<tr>
<td>408.00</td>
<td>338.00</td>
</tr>
<tr>
<td>270.00</td>
<td>203.00</td>
</tr>
<tr>
<td>135.00</td>
<td>68.00</td>
</tr>
<tr>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

### Veg Room 136

- **SPYDR 2x | 9 SPYDRx PLUS**
  - Fixture Quantity
  - PPFD Average: ~ 540 µmol/m²/s
  - Power per Fixture: 342 watts | 660 watts
  - Total Electrical Input: 32,616 watts
  - 1’ from canopy

- **T5HO**
  - Fixture Quantity
  - PPFD Average: ~ 515 µmol/m²/s
  - Power per Fixture: 432 watts | 540 watts
  - Total Electrical Input: 93,312 watts
  - 0.5’ from canopy
### VYPR 2x SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPF</td>
<td>900 µmol/s</td>
</tr>
<tr>
<td>Input Power</td>
<td>342W</td>
</tr>
<tr>
<td>Efficacy</td>
<td>2.6 µmol/j</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>Autosensing 100-277V, 347V, 400V &amp; 480V</td>
</tr>
</tbody>
</table>
Mom Room 138

VYPR 2x

1000w SE HPS

<table>
<thead>
<tr>
<th></th>
<th>24 VYPR 2x</th>
<th>Fixture Quantity</th>
<th>24 1000w SE HPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPFD Average</td>
<td>~ 330 µmol/m²/s</td>
<td>PPFD Average</td>
<td>~ 368 µmol/m²/s</td>
</tr>
<tr>
<td>Power per Fixture</td>
<td>342 watts</td>
<td>Power per Fixture</td>
<td>1,030 watts</td>
</tr>
<tr>
<td>Total Electrical Input</td>
<td>8,208 watts</td>
<td>Total Electrical Input</td>
<td>24,720 watts</td>
</tr>
<tr>
<td>Fixture Mounting Height</td>
<td>4' from canopy</td>
<td>Fixture Mounting Height</td>
<td>4' from canopy</td>
</tr>
</tbody>
</table>

PPFD: Photosynthetic Photon Flux Density (units: µmol/m²/s)

330.00
289.00
248.00
206.00
165.00
124.00
83.00
41.00
0.00
### Energy Savings Summary

<table>
<thead>
<tr>
<th>Room</th>
<th>Legacy kWh</th>
<th>Proposed kWh</th>
<th>Annual kWh Saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flower 123</td>
<td>633,874</td>
<td>370,347</td>
<td>263,527</td>
</tr>
<tr>
<td>Flower 126</td>
<td>875,124</td>
<td>511,299</td>
<td>363,825</td>
</tr>
<tr>
<td>Flower 135</td>
<td>610,222</td>
<td>356,528</td>
<td>253,694</td>
</tr>
<tr>
<td>Veg 136</td>
<td>613,060</td>
<td>214,287</td>
<td>398,773</td>
</tr>
<tr>
<td>Mom 138</td>
<td>162,410</td>
<td>53,927</td>
<td>108,484</td>
</tr>
<tr>
<td></td>
<td><strong>1,388,302</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

That’s equivalent to the consumption from 126 American homes each year!
MORE QUESTIONS? CONTACT:
brady.nemeth@fluencebioengineering.com

CONNECT WITH BRADY:
www.linkedin.com/in/brady-nemeth
We are Here to Help
Comprehensive Business Incentives

Prescriptive Incentives
• Over 300 measures in total
• 45 measures specific to agriculture

Custom Incentives
• Incentives are determined on a case-by-case basis
• Must be between a 1 and 8 year payback period

Note: Incentives are paid upon project completion and final engineering approval.
How Do I Qualify?

- Consumers Energy business account number (natural gas, electric or combination)
- Federal tax ID number
- New construction projects must be located within our territory and be using Consumers Energy as their energy provider
Incentive Application Process

1. **Check Customer and Equipment Eligibility**
2. **Submit pre-notification application and receive Reservation Letter**
3. **Install equipment/perform project work**
4. **Submit a final application**
5. **Receive Rebate Check**
## Incentive Caps and Limits

<table>
<thead>
<tr>
<th>Facility Incentives</th>
<th>Cap per Program Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescriptive</td>
<td>75% of the total project cost</td>
</tr>
<tr>
<td>Custom</td>
<td>50% of the total project cost</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Limits</th>
<th>Cap per Program Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Natural Gas</td>
<td>$1M across all facilities per customer</td>
</tr>
<tr>
<td>Large Electric</td>
<td>$2M across all facilities per customer</td>
</tr>
</tbody>
</table>
Program Effective Dates

December 1 → November 30
Incentive Resources
ConsumersEnergy.com/startswithaving

Business Energy Efficiency

Let’s Save Energy Together
Saving energy saves your business money. Discover the many ways your business can save, or tell us a little about your business to find the solutions best suited to you.
Trade Ally Program

- Contractors that have been trained by Consumers Energy on how to use the efficiency program
- Third party payment release
- Find a contractor
- Consumersenergy.com/business/energy-efficiency/select-a-contractor
Additional Specialty Programs

- New Construction
- Buy Michigan Bonus
- Steam Trap Express
- Network Lighting Controls
- Business Instant Discount
- Michigan Saves
Energy Efficiency Success

T REX Enterprises
Energy Efficiency Success

Fluresh
QUESTIONS?

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GRAND RAPIDS 2030 DISTRICT
CANNABIS WEBINAR SERIES

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TWEAKING THE MARGINS: HOW CONTROLS SET YOU UP FOR A BETTER YIELD AND A LEANER OPERATING BUDGET

Please fill out our 2 minute survey at the end of this webinar. Thank you!

Thank you to our Visionary Supporters!