Clearing the Smoke: The Energy Implications of Legalized Cannabis Cultivation
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"After legalization, we were expecting to see a 10% increase over time from cannabis. Instead, we saw a 62% growth in energy demand in the first three months."
Indoor cultivators consume significant amounts of energy through lighting and HVAC

- Traditional HID lighting: 1000W
- Run times 18-24 hours a day
- 1-3% of total electric usage
Emergence of LEDs

+ Consume 40-60% less energy
+ Require little or no cooling and venting
+ Can be configured closer to plants

- Higher initial price point
- Require alternative growing techniques
- Stigma of lower quality product
Research Topics

- Grow configurations
- Lighting market characterization
- Grower preferences and purchasing habits
- Energy implications and utility strategies
Key Findings

Growers

• Preferences and decision making
• Non-energy benefits
• LED receptiveness

Equipment

• Lighting market characterization
• Lighting purchasing channels
• Ancillary products
Key Findings

Growers
Grower Preferences

- **Indoor**
  - 58% Weather
  - 42% Security/privacy

- **Outdoor**
  - 72% Operating costs
  - 42% Space constraints

- **Greenhouse**
  - 56% Weather
  - 44% Operating costs

Color spectrum (4.3) and Energy efficiency (4.0) most important factors for selecting lighting types
LED Receptiveness

**Then...**
- Strong grower biases against LEDs
- Lack of experience with LEDs
- Less than 10% adoption rate

**Now...**
- Increased awareness of LEDs
- Market actor-reported increase in receptiveness
- High adoption rate; 50% of survey respondents
Non-Energy Benefits

- Maintenance costs
- Product quality/THC concentrations
- Vertical expansion
- Reduced temperature
Key Findings

Equipment
Lighting Market Characterization

- **Fluorescents (56%)**
  - CFLs
  - T5s
  - T8s
  - T12s

- **HIDs (61%)**
  - Metal halides
  - High pressure sodium

- **LEDs (49%)**

Pie chart showing:
- HIDs + Fluorescent: 29%
- HIDs Only: 15%
- HIDs + LEDs: 6%
- LEDs Only: 23%
- Fluorescent + LEDs: 9%
- Fluorescent Only: 7%
Purchasing Channels

For OR retailers, 74% of 2017 lighting sales were from HIDs compared to 17% from LEDs.

LED purchasers typically...

• Special order through retailer
• Order online – 58% of surveyed growers
• Order directly through distributor/manufacturer
Future Market Trends

- Expectations for cannabis markets to grow; consolidate long term
- Emergence of PAR and PPFD
- Adoption of Ceramic Metal Halide (CMH)
- Lower costs for LEDs
Growers using LEDs may be only using these for some of their plants or for only a portion of the growing cycle.

Majority of LEDs purchased online versus a traditional retailer.

Distinguish between recreational and medical use residential growers; include incentives for medical growers.

Provide case studies and resources for growers to learn about energy efficiency.
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