

# **Cannabis Producer Energy Estimates**

## **Presentation to Joint Task Force on Cannabis Environmental Best Practices**

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# Outline

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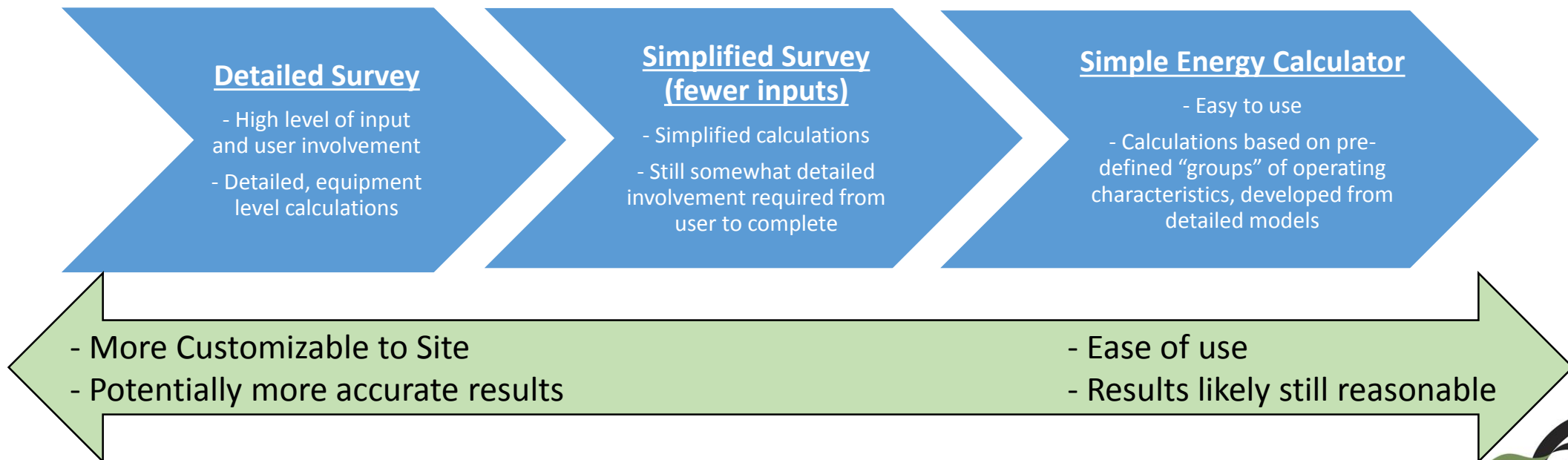
1. Background
2. Development of Indoor Cannabis Cultivator Energy Estimator
3. Analysis of Applicant Energy Estimates
4. Next Steps

# Background

- Industry with largely unknown energy usage, and lack of comprehensive data across sector. Mostly anecdotal, with potentially wide variation
- Potential for energy-intensive operations, but also incentivized to reduce energy and operating costs to improve margins
- Energy intensity can vary widely between various grow operations and types
- Desire to better quantify and understand the energy usage of cannabis industry

# Indoor Cannabis Cultivator Energy Estimator

- In response to a requirement for estimation of applicant energy usage, ODOE worked in collaboration with OLCC and industry workgroup to develop a tool to estimate the energy consumption of an indoor grow based on canopy size and general operating characteristics
- As with any calculator, there is a trade-off in simplicity/ease-of-use and ability to customize for specific characteristics
- The Calculator evolved:



# Indoor Cannabis Cultivator Energy Estimator

- Models showed a general range of 20 – 200 kWh/ft<sup>2</sup>, based on operational characteristics and equipment
- Based on canopy size, lighting density, and operating characteristics, indoor grow operations could be placed within one of four “buckets” across the spectrum of low to high energy usage
- Simplified user input – only need to input grow area square footage and select which of 4 “Equipment Descriptions” best match your operating characteristics (Low, Medium-Low, Medium-High, High)
- General estimate, but provided potential growers with a tool to estimate magnitude of electricity usage
- Could be supplemented or replaced with actual energy consumption, if numbers exist (preferred). Also, ODOE was available to assist if growers wanted a more detailed estimate of use

Please contact the Oregon Department of Energy at 503-378-4040 if you have any questions or need additional assistance in estimating your energy use.

Cultivator Name	ABC
Estimated total grow area (sq. ft.)	5000
Estimated total plants in continuous grow	
Please select the Energy Use Equipment Description from the right that best describes your operations	2
Estimated <b>Monthly</b> Energy Use (kWh / mo)	33,333
Estimated <b>Annual</b> Energy Use (kWh / yr)	400,000
Actual energy use, if known (kWh / yr)	

After you have entered and finalized all fields above, click Finish to see a printer-friendly summary of your results that you may keep for your records. Clicking Finish will also send a copy of your information ODOE

**Finish**

<b>Estimated Annual Energy Use (KWh /yr)</b>	<b>Estimated Monthly Energy Use (KWh /mo)</b>
Your Estimate: 400,000	Your Estimate: 33,333

The chart below shows a range of estimated annual energy usages and costs for a facility with a similarly sized grow area as yours

100,000 1,000,000

# Applicant Energy Use Estimate Analysis

- ODOE has been working in collaboration with OLCC to manually harvest energy use data from Applicant forms
- Sample size of data analyzed (applicant counts as of 6/15/16, more data will be incorporated as it is available)
  - Grower applicant count: 736
  - Growers “assigned” by OLCC, processed, and given an Applicant ID: 387
  - Growers with both complete energy usage and canopy size: 230 \*

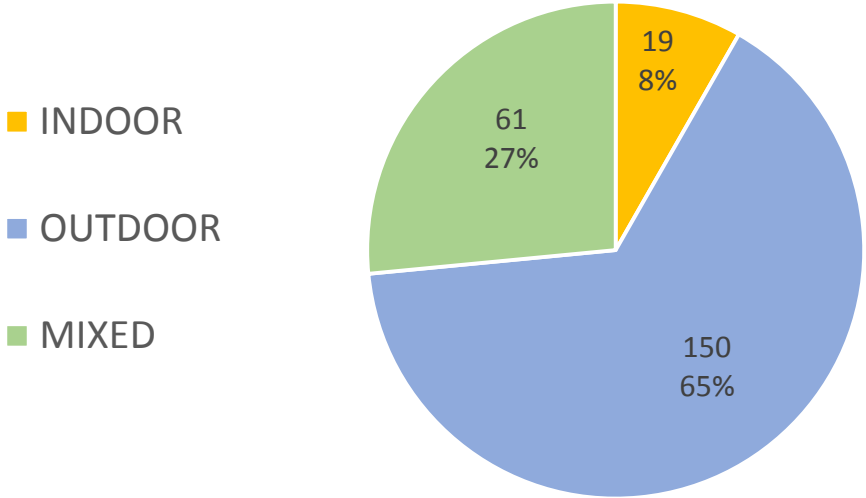
\* Some outliers removed due to energy estimates greatly outside of expected range.

# Applicant Energy Use Estimate Analysis

## Production Type – Indoor vs. Outdoor

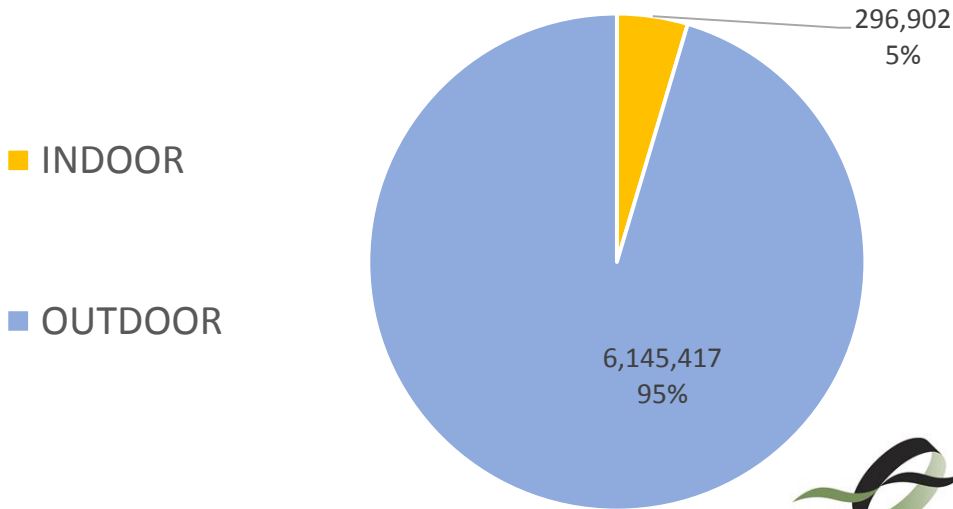
Majority of applications are classified as “Outdoor” grow

Applications Included in Analysis (n=230)



Similarly, the great majority of canopy square footage is related to outdoor grow

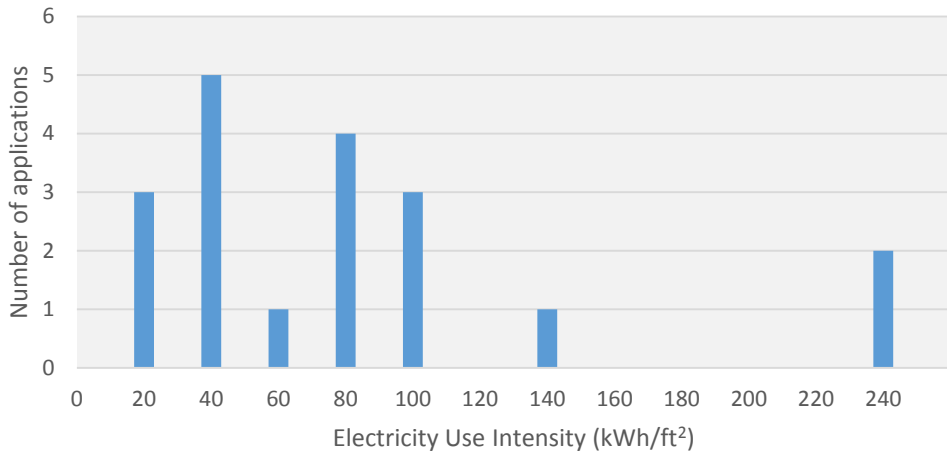
Canopy Totals, by Grow Type (sq. ft.)



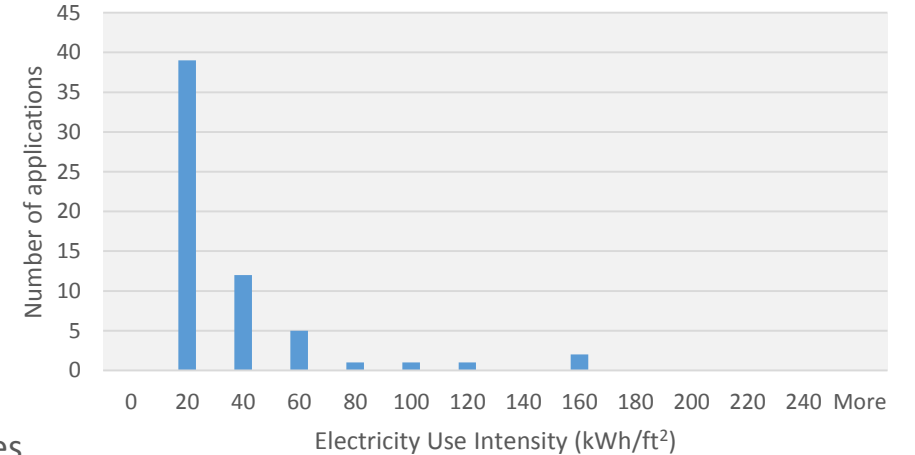
# Applicant Energy Use Estimate Analysis

## Energy Use Intensity (EUI), kWh/ft<sup>2</sup>/yr across Production Types

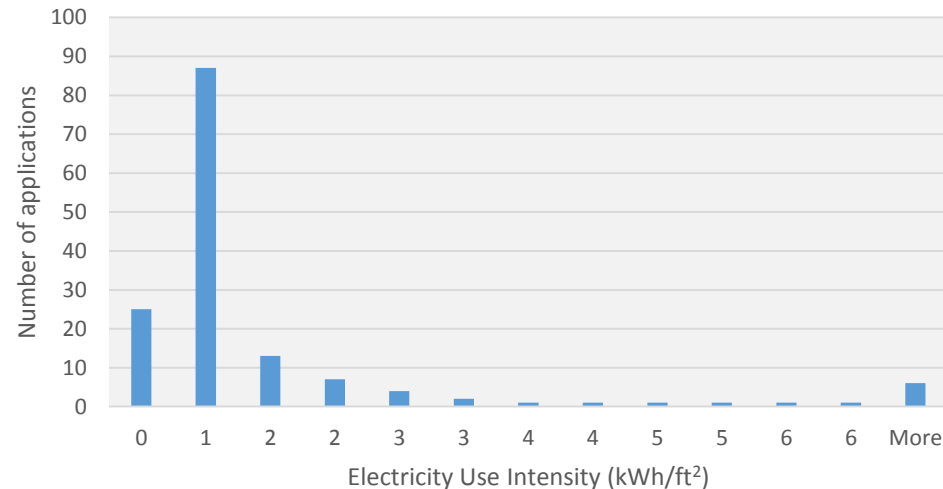
Indoor Producer Electricity Estimates



Indoor/Outdoor Producer Electricity Estimate



Outdoor Producer Electricity Estimates

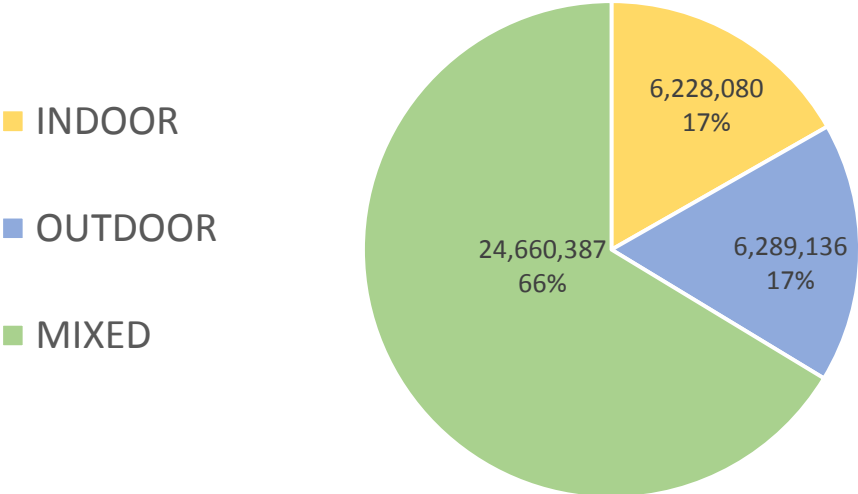




# Applicant Energy Use Estimate Analysis

## kWh Totals

Energy Use Totals, by Grow Type (kWh)



	INDOOR	OUTDOOR	MIXED	TOTAL
<b>Count</b>	19	150	61	<b>230</b>
<b>Electricity (kWh)</b>	6,228,080	6,289,136	24,660,387	<b>37,177,603</b>
<b>Indoor Canopy</b>	108,195	0	188,707	<b>296,902</b>
<b>Outdoor Canopy</b>	0	4,987,763	1,157,654	<b>6,145,417</b>
<b>Total Canopy (ft2)</b>	108,195	4,987,763	1,346,361	<b>6,442,319</b>
<b>kWh/ft2</b>	58	1.26	18	<b>6</b>
<b>aMW</b>	0.71	0.72	2.82	<b>4.2</b>

# Applicant Energy Use Estimate Analysis

- How much is 37,000,000 kWh?
  - About 0.08% of Oregon annual electricity usage
  - Approximately equivalent to a large hospital
- Potential to scale up analysis to full amount of expected grower applicants (700+ currently)

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# Next Steps

- ODOE will continue to work with OLCC to harvest data from remainder of applications and analyze the data for energy usage characteristics and trends
- Future reporting after Year 1 and beyond of actual electricity consumption will be critical for analysis and benchmarking
- Actual data will provide a great opportunity to compare estimates vs. reality and refine models
- ODOE, OLCC, ETO, and other industry personnel are currently working with Northwest Power and Conservation Council to develop and distribute a detailed survey to better understand specific operating characteristics of growers in Oregon

# Thank You

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