

# White Paper

## Cannabis Industry Embraces Greenhouses *Major Energy Cost Reductions*

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When marijuana cultivation was confined to limited medical production, growers preferred the privacy of using warehouses to grow the plants with a wide range of indoor lighting options. Without outdoor markings, few people knew about the internal operations of the warehouse. Security was not a major concern due to a small number of entrances protected by security guards or video cameras.

### **Energy Usage Decrease**

As marijuana cultivation for expanded medical and recreational use and increasing in number of states, the transition towards greenhouse cultivation is evolving rapidly. There is a substantial energy use reduction with greenhouses. A 120,000 sq. ft. warehouse using 22,320 kilowatt hours of energy usage operations costs are **\$38,100 per month vs. \$9,525** for the same size greenhouse using 5,580 kilowatt hours – **reducing the utility bill by 75%**. According to research from the University of California, indoor cannabis production results in energy expenditures of \$6 billion per year, corresponds to 1% of the overall national energy consumption. In California, indoor cannabis growing accounts for 3% of all electricity usage.

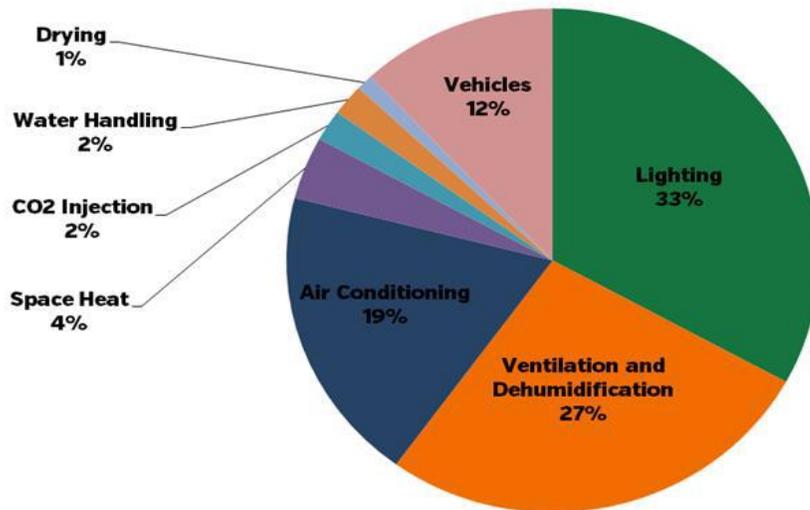
"Growing cannabis in an indoor facility using only artificial light uses a tremendous amount of energy. Using a greenhouse and natural available light can decrease that usage by up to 60 or 70%, depending on the region. That's vital as more and more states come online with legal medicinal and recreational cannabis programs. If all of that new cultivation is grown indoors - it will be extremely taxing on this country's electrical grid."

### **Natural Sunlight – Light Deprivation**

*Healthmed Services Ltd.* will build and lease greenhouses that make use of free energy from the sun, which is the best source of natural fuel for plants. The implementation of light deprivation techniques for cannabis greenhouses has become increasingly common in the United States. This farming method reduces the light cycle of flowering plants to deprive the crops of a prolonged photoperiod. For cannabis cultivation, this process ensures that plants stay in the flowering stage – a growth phase that requires 12 hours (or less) of light.

Once the photoperiod exceeds 12 hours, flowering cannabis plants may revert back to their vegetative stage of growth. Thus, light deprivation techniques are crucial for cannabis farmers who rely upon crop schedules to meet consumer demand. An additional benefit of using these techniques is the opportunity to obtain an extra harvest during the summer months, when the sun naturally provides extra light. By using blackout curtains and limiting the light that plants receive to 12 hours, greenhouse growers can force a crop to flower at an earlier time in the summer and complete an extra harvest before the fall crop harvest.

**Energy Usage Breakdown of a Commercial Marijuana Grow Facility\***



\*Chart reflects a "central estimate" using a wide range of types and sizes of grow facilities.

Source: Energy and environmental systems analyst Evan Mills

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**Environmental Management**

The ability to control temperature, humidity, lighting, and air-quality control systems is a strong benefit of greenhouse cultivation. Greenhouse climate control is highly automated. Sensors can monitor these environmental conditions, especially temperature, and trigger operational controls to make the best adjustments. When a greenhouse gets too warm, motorized windows, vents, or larger fans are used to circulate or expel the hot air.

Temperature is the most important aspect of environmental control in greenhouses. These structures are built to allow sunlight in and trap the sun’s radiant heat (known as the *greenhouse effect*). Ideal daytime temperatures in a greenhouse fluctuate between 65°F and 80°F, depending on the strains (most strains prefer between 72°F and 78°F). Nighttime temperatures will generally be cooler and range from 55°F to 65°F, which can vary due to the latitude of the greenhouse and the season. Greenhouses provide the ability to raise temperatures in the winter and reduce temperatures in the summer.

“Growers use the free sun and supplement with lights, then adjust the day length using light deprivation curtains. Greenhouses don’t have the heat buildup issues that happen when the lights are running for long periods in a warehouse grow. A greenhouse can manage the heat using natural ventilation and mechanical cooling strategies resulting in a huge reduction in energy costs”.