



White Paper

Marijuana Industry Embraces Greenhouses

Major Energy Cost Reductions by Moving Away from Indoor Grows

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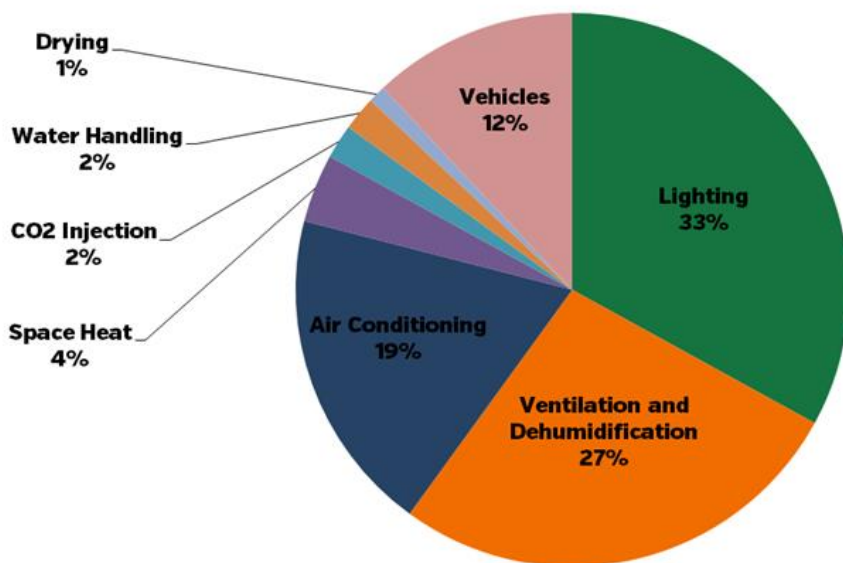
When marijuana cultivation was mostly illegal or confined to limited medical production, growers often preferred the privacy of using warehouses to grow the plants with a wide range of indoor lighting options. Without outdoor markings, few people knew about the internal operations of the warehouse. Security was not a major concern due to a small number of entrances protected by security guards or video cameras. These indoor facilities provided the ability to grow in a secret, private environment secluded from the risk of theft and even law enforcement.

Energy Usage Decrease

As marijuana cultivation for expanded medical and recreational use becomes legal in an increasing number of states, the transition towards greenhouse cultivation is evolving rapidly. There is a substantial energy use reduction with greenhouses. A 120,000 sf warehouse using 22,320 kilowatt hours of energy usage can be **\$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, which corresponds to 1% of the overall national energy consumption. In California, indoor marijuana growing accounts for 3% of all electricity usage.

According to Albin Sray, Nexus Corp. Midwest Sales Manager, "Growing cannabis in an indoor grow 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."

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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Natural Sunlight – Light Deprivation

Greenhouses 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.

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 perhaps 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,” said Patricia Dean, CEO Wadsworth Control Systems, Boulder, CO.

Security

Protecting the privacy of the grow operation remains a concern for most marijuana growers. With metal siding and secure structures, a greenhouse can be as safe as any indoor building or warehouse.

As the marijuana industry continues to develop through legal changes and increased public acceptance, the growing practices are becoming more conventional, which benefits not only the marijuana grower, yet the nation overall with more efficient energy usage and consumption

patterns. The trend is unmistakable – use a modern growing approach without trying to simulate a growing atmosphere inside a building, which was not intended for agricultural production.

Nexus Corporation

Nexus Corp. has been serving the greenhouse industry since 1967. The company operates their headquarters and main production facility in Northglenn, Colorado near Denver. This location includes engineering (professional engineers licensed in 49 states), customer service, sales, and operations. In 1990 Nexus purchased National Greenhouse Company based in Pana, Illinois. This acquisition gave Nexus a base in the institutional and residential markets in addition to expanding their commercial product offerings.

In 1996 Nexus constructed a new plant in Pana for both aluminum and steel frame production, which includes advanced manufacturing processes. In 2012 Nexus doubled the size of the Pana plant for additional manufacturing capacity and new automated CNC machinery. Significant investments are regularly made in robotic welding and cutting machinery to maximize efficiency.

Nexus is privately owned by Cheryl Longtin and Mike Porter, who purchased the business after 40 years of combined experience in top international corporations. With executive business and legal experience for major automotive companies, including Borg Warner Automotive and ITT Automotive, they began using their business experience to enhance the growth and technical leadership of Nexus within the greenhouse industry.

New product development has been a significant part of Nexus' success over the years with a focus on helping customers advance their growing systems and improve their cost structure. Recognizing a consumer need for natural ventilation, Nexus introduced the Zephyr Greenhouse™. To continue ventilation improvement and to identify versatile enhancements that would help growers and retailers, the company released the Atrium™ and Dual Atrium™ structures. These structures are designed to enhance natural ventilation options at a most affordable price by using 50% less rack and pinions, motors, gutters, and downspouts than other open roof style greenhouses leading to lower initial cost, less maintenance, and lower energy consumption.

The next step was to offer the vertical guillotine vent window systems (with no external mechanical or structural parts) allowing for full opening of the window size with no obstructions. The following product was the EDDG (Exterior Drop-Down Guillotine) vents that provide the option of a clear vent opening incremented to the desired dimension and offered with a variety of coverings. Nexus maintains its U.S. manufacturing base while seeking additional vertical supplemental products to provide customers with the highest quality parts and products.

The company's engineering and business expertise has been instrumental in building greenhouse systems for nearly any weather environment. Heavy snow loads in the Northeast or high humidity in the Southeast require specialized modifications. Unique customer specifications can arise, such as designing a structure for the roof of a building. Collaborating with an industry partner, Nexus built a greenhouse on a store roof of a major grocery chain in Brooklyn, N.Y. In addition, Nexus is also becoming increasingly involved in the vegetable, marijuana, and water treatment industries.

Nexus employees are proud of the company and the products they represent resulting in a high employee retention rate. This longevity translates to a competitive advantage for the company, which benefits customers due to cumulative product knowledge, technical expertise, and industry relationships. The company believes that people are their strongest assets and best source of social capital. Nexus has financially invested in employees with tuition assistance programs in an effort to compete effectively in attracting and retaining talented young employees. Investing in scholarship programs insures that the industry has a strong new generation of growers.

For more information on greenhouses from Nexus Corporation, [click here](#).