



# Surprising Energy Requirements of the Cannabis Industry

**PART II**

Problems and Potential Solutions

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In the March issue of *Public Utilities Fortnightly*, we noted that the U.S. cannabis industry is experiencing explosive growth. The industry is extremely energy-intensive and is already placing strains on some individual utilities and local grids.

This has surprised utilities, PUCs, and government officials. These problems will only intensify in 2017 and beyond, due to the success of November 2016 cannabis ballot legalization initiatives and impending legislative actions. Here we discuss the implications for utilities and PUCs and explore potential solutions.

### Utilities and Public Utility Commissions Need Data and Policies

The cannabis industry is just emerging from the shadows, and utilities lack adequate experience and data to forecast its future electrical demands. According to cannabis marketing consultant John Morris, who works with growers and utilities, “We don’t have aggregated energy audits from hundreds of grow operations that show us an energy footprint. We have utilities in the Northwest putting in new transformer substations to meet the load. Producers are having to go out and build infrastructure.”

However, cannabis-related energy trends are beginning to influence regulators. At the annual 2015 NARUC conference, participants discussed how to respond to the explosive growth of this energy-intensive crop. Nearly seventy million Americans currently live in jurisdictions where cannabis is legal, an almost three hundred percent increase in recent years. This means rapidly increasing demand for electricity. Cannabis production is already consuming so much energy that electric utilities are belatedly

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### Cannabis-related energy trends are beginning to influence regulators.

beginning to take notice. In Portland, Oregon, Pacific Power reported seven outages directly attributable to cannabis production in the summer of 2016. Portland General Electric experienced similar problems. “We don’t track the numbers specifically related to cannabis producers, but some have created dangerous situations by overloading existing equipment,” according to PGE.

A Seattle utility warned of the potential for three-percent load growth in the coming months, solely from cannabis operations. Forty-five percent of Denver’s load growth is now coming from cannabis growers.

According to the District of Columbia PUC, “We can debate the numbers, but we know it’s high. We know the load growth is real.” Xcel Energy, in Colorado, has seen significant load growth due to the cannabis industry. According to Xcel vice president Alice Jackson, “We now have, on an annual basis, over three hundred gigawatts per hour consumed for growing cannabis.”

Many utilities, due either to ideological aversion or fear of the federal government, have taken a don’t ask, don’t tell approach to handling cannabis-related load growth.

Cannabis is still considered a Schedule 1 controlled substance by the federal government, making utilities apprehensive about being proactive in assisting the industry. Bonneville Power Administration issued guidelines stating that utilities themselves can provide the power to this market, but they cannot provide BPA-funded energy efficiency incentives. Because of this, in areas where there is no private utility available, energy problems are exacerbated.

In Washington, D.C. the situation is even worse. When Congress acted to block the D.C. law legalizing cannabis, it forbade the District government from implementing the law, and threatened to arrest city officials if they attempted to implement it. Congress’ action did not stop cannabis growing in D.C., but it placed local utilities in an impossible position.

When states legalize cannabis, they only establish detailed regulatory and licensing regimes, not energy or climate-related governance. However, regulators are now being urged

by environmentalists to address the industry's climate and energy impacts.

This has resulted in some questionable recommendations. Policymakers should require indoor growers to consume only carbon-free energy or pay a carbon fee. States that lack sufficient renewables to meet the industry's electricity demands should require indoor growers to pay escalating carbon fees. They should require that energy consumed by indoor growers be from renewables via on-site generation.

Some policymakers contend that cannabis production is a lucrative industry that can afford to pay for its impacts on the environment. States want to institute state licensing schemes that assess energy use and climate risk prior to issuing business licenses.

States want to require cannabis growers to install energy-monitoring equipment to allow policymakers to better understand the industry's energy usage and to develop policies to curb its negative impacts. They also want to mandate that indoor growers need to change their existing building use or structure incorporate green technologies. It is even proposed that for-profit industry be prohibited from participating in the cannabis market.

surcharges or growers' fees, in Washington, D.C. legalization is still too recent for utilities to have assessed its implications. The local utility, Pepco, is not preparing for new load growth.

Some utilities in states where cannabis has been legal for the last several years have established new rates for growers. Mason County Public Utility District #3 in Shelton, Washington established a time-of-use rate for indoor growers.

Other utilities have required growers to assume a larger financial stake upfront in their demands for use of the grid. Some utilities in Washington State are requiring growers to pay upfront for transformer upgrades and other equipment.

Some power companies are working to reduce growers' energy use by offering energy efficiency incentives. However, these programs are often inconsistent and not fully funded. In Illinois, ComEd offered energy savings rebates but ran out of money to fund all of the requests, leaving many cannabis facilities without the incentives they were promised.

Both Pacific Power and Portland General Electric have held seminars to discuss best practices and options for energy savings. Unfortunately, these were not well attended and the exposure to best practices was thus minimal.



Many cannabis growers are waiting months, and in some cases, years for new infrastructure to bring them the necessary power. Officials are concerned that escalating cannabis consumption could negate policies implemented to increase energy efficiency and reduce energy use, which has occurred in some areas where cannabis is legal.

The situation should logically provide opportunities for energy efficiency and demand response, but Xcel is not offering specific advice for cannabis growers. "It is an energy-intensive operation; however, we do not have plans to offer tips on how to grow or how to not grow cannabis," the company states.

In fact, Xcel questions whether efficiency dollars collected from ratepayers should be used for the cannabis industry.

Lack of data has led to jurisdictions experimenting with their own policies and regulations, with mixed results. Boulder, Colorado, where cannabis production accounts for about forty percent of energy consumption, enacted licensing regulations that require indoor cannabis cultivators to use energy monitoring technology and report their energy use.

Growers must offset their energy use by utilizing one hundred percent renewables, purchasing renewable energy credits, or paying a carbon fee. Other jurisdictions may follow Boulder's lead.

Oregon has established a task force to study energy and water use for cannabis production. Preliminary indications are that the task force will require growers to follow energy best practices, but it is unclear whether it will mandate this.

While some jurisdictions have opted for cannabis usage

The key is balance. For example, if the upfront cost for grid upgrades is too high, growers may start small and then scale up quickly, creating reliability problems on their local circuits. There is also danger in placing excessive fees and regulations on cannabis operations.

This is a new industry, and there is a concern among growers about negative impacts that could result if fees increase too quickly or onerous regulations are imposed. This would have a much broader impact than simply addressing regional, utility, or environmental concerns. The industry itself could be suppressed and forced to relocate.

In Arcata, California, in Humboldt County, officials are collecting three hundred thousand dollars annually from an

excessive energy use tax. Voters approved the tax in 2012 after police and fire departments spent as much as twenty percent of their time responding to calls at grow operations.

The City Council placed the measure on the ballot after learning that ten percent, or six hundred and sixty-three, of Arcata's households were being used for cannabis cultivation. Ironically, many of these were receiving subsidized rates based on low reported income.



According to Mayor Michael Winkler, "Instead of having our electricity use going down, we had a thirty percent increase in electricity use in five years prior to the tax. We were not meeting our sustainability goals as a result. Now we are." However, the tax also caused the number of large home-grow operations to decline by ninety percent.

Existing regulations can create strange situations. For example, medical cannabis operations usually have a limit on how many plants they can grow, so they grow larger plants, known as trees, to cultivate more cannabis. Those large plants use much more energy than numerous small ones lower to the ground because conventional light and LED light do not filter down to the base of the plants.

Thus, growers use 1000-watt halogen lights for every so-called cannabis tree, with a fan to avoid fires.

In Colorado, cannabis growers potentially face large demand charges. The charge is typically non-coincident, meaning growers are billed based on highest demand in any fifteen-minute interval during a month, regardless of whether that demand occurs during the system peak.

Growers thus attempt to even out their electricity consumption as much as possible, consuming the same amount of energy every hour to minimize their demand charges. However, optimal load profiles differ by state. California has the "duck curve"

phenomenon, with a deep trough of net load in the middle of the day. In that state, it is beneficial to shift cannabis lighting to midday to avoid the evening peak demand.

Competition is driving down cannabis prices, and there are some cost saving measures growers can take relating to energy and water efficiency. Energy usually accounts for twenty-five to thirty percent of cannabis production costs, but can comprise nearly half of the wholesale price of cannabis, depending upon the grower, strain, state, and operating costs.

As prices fall and margins decrease with increased competition, the share of energy in total production costs will increase. Thus, as long as lighting accounts for eighty percent of indoor growers' electricity use, lighting companies will profit and growers will have to seek more efficient and less expensive lighting options.

Some growers are leveraging off-peak use to reduce costs. However, scheduling lighting around a utility's off-peak hours presents operational and cost issues for growers, especially in large facilities with multiple rooms. Accordingly, these efforts have not been as beneficial as anticipated.

Sustainable technologies can assist here, and the industry is well situated to become a leader in technology changes in energy and water usage resulting from the immense demand for its products and profit-making opportunities.

Grower options include solar, wind, and other green technologies, and vendors are constantly asked about the feasibility of incorporating renewables into a grow facility. Given current



renewable technologies, this is difficult with high intensity discharge (HID/HPS) lighting, but may be feasible with other lighting options.

Numerous lighting manufacturers are developing energy-efficient lighting solutions for the cannabis industry. Those include ceramic metal halide fixtures, double-ended high-pressure

sodium fixtures, industrial grade LEDs, and plasma fixtures such as the BIOS Icarus Gi for 1000W HID replacement and Icarus Vi for vertical farming applications. These lighting solutions can provide superior light uniformity and scientifically engineered spectrum light that yield optimal plant growth, enhanced crop yield and quality, and significantly reduced energy consumption.

Fiber-optic energy systems capable of streaming and channeling sunlight into grow facilities are being developed, as are various digital electricity systems, including VoltServer systems. Sustainable, scalable, and controllable green technologies that can enable cannabis load leveling and off-grid operation developed by Cavendish Energy are well along in the research, development and delivery stage.

In addition, various integrated renewable, grid, and storage systems are being developed, including those provided by Intelligent Generation LLC. Further, economizers can be integrated with remote terminal units to draw in cool outside air to reduce cooling energy requirements.

## Conclusions

The energy and regulatory problems facing utilities, public utility commissions, and the cannabis industry are significant and immediate. They are occurring in 2017, not a decade hence.

The increased electricity demand is causing major problems, including brownouts, blackouts, transformer failures, and fires, and these difficulties will only worsen. Utilities and public utility commissions have been surprised by this unexpected growth in electricity demand, but are belatedly beginning to react.

Some regulators are implementing onerous restrictions on the industry, including taxes, surcharges, special rates, RECs, upfront fees, and other ad hoc policies. Environmentalists are concerned because of the large energy footprint of the cannabis industry and are proposing strict regulations and taxes to make the industry more environmentally friendly.

There is immense danger to the industry resulting from inadequate electricity infrastructure, misguided regulations, the revenue requirements of state and local governments, and the hostility of environmentalists. Given a six to twelve-month lag between state cannabis legalization and when the problems arise, the window for proactive initiatives is small and is closing fast.

Public utilities, legislators, and public utility commissions can take advantage of this transitional phase of cannabis production technology, economics, and policy. The vast new demand unleashed by recent legalization and the energy intensity required to grow the product have two important implications.

First, increased competition will mean significant downward

pressure on prices, assuming that the initial licensing schemes do not result in de facto cartels or create permanent barriers to entry. This commodification provides a powerful incentive to decrease input costs to maintain margins.

Energy inputs constitute a large portion of input costs and are a major focus of optimization and disruption. Thus, the industry must increasingly innovate endogenously for production processes and exogenously for new technologies and policies to address energy concerns.

“The cannabis market provides a unique opportunity for energy innovation.”

– Ujval Vyas

Second, the exogenous innovation will become even more disruptive as new energy technologies emerge in response to rapidly escalating demand and revenues. The cannabis market is capable of bearing considerable risk and of facilitating widespread experimentation in crucial areas of energy production, storage, and integration.

The cannabis market provides a unique opportunity for energy innovation if care is taken to provide appropriate policies and incentives. Just as important, dis-incentivization for experimentation must be avoided as policies are implemented.

The cannabis industry can become a valuable incubator for energy solutions that impact other markets, and solutions to the energy problems in the cannabis industry will have significant spillover effects. Importantly, there is currently an intense desire by many growers to get off the grid, and this can be leveraged to everyone's advantage.

If there were a viable alternative to paying the huge sums of money for electricity that going off the grid implies, cannabis growers would gladly utilize it, and they are motivated to seek out new technologies. Much technological experimentation and optimization for energy production has already begun in the cannabis industry.

If acceptable solutions can be devised, sub-optimal regulation can be avoided. If the solutions are sustainable, this will be in the best interests of utilities, regulators, the cannabis industry, environmentalists, and society in general. [PDF](#)