Data Analytics: Key Strategies to Manage Energy Costs in Cannabis Grow Facilities

By Leighton Wolffe, President of GrowFit Analytics

Energy Supply & Cannabis Grow Facilities

Cannabis grow facilities are one of the highest energy-intensive segments across regulated and competitive markets in North America. With energy for lighting, HVAC and other systems costing up to 50% of total operational spend, it is a significant containable cost. The savvy owner needs to know how to leverage energy information to create advantageous power management and purchasing strategies.

Beyond efficient design and equipment, much depends on the ability of the energy consuming systems to operate in context of the Power Purchasing Agreement (PPA). Grow operations are unique and equipment schedules that are based on distinctive grow recipes often conflict with standard-rate structures causing unexpected demand charges. To cover both sides of the supply-and-demand equation, grow practices and equipment operations need to align with the business rules contained in the supply contract.

To accomplish this, the modern energy buyer will have an information management platform that monitors energy, while also monitoring the HVAC and grow system activities that drive consumption and demand. In this way, identifying and correcting inefficiencies and demand spikes enable the consumer to position themselves for an improved supply-side contract through demonstrated ability to self-manage usage. The energy supplier will view these capabilities as a positive, knowing it has less risk to cover. So, unless your facility is 100% renewable energy, there is an electricity bill every month, and you are likely getting charged for things you had no idea were happening.

Other factors causing energy issues are due to increasing demand on the grid. In many locations, electrical distribution zones are not able to handle these new peak load requirements, and this has caused some areas to impose efficiency standards, increase rate charges, and place additional responsibility on the owner to implement efficiency measures and provide reports to show compliance.

When grow facilities are at peak load, exposure to market conditions are at their highest. Price x Quantity (P x Q) is the first part of the equation energy suppliers look at to determine how they'll cover the customer load. One piece of that information is captured in a Load Duration Curve.

The chart in Figure 1 below shows levels of demand during the total number of hours per year. Energy suppliers use this chart to determine demand and consumption 8760 hours per year. Demand charges account for 40-50% of each monthly bill with the highest peak within the billing period setting the monthly demand charge. Placing demand limit thresholds on the top 100 hours can significantly reduce annual energy spend. In this case, if the facility was able to eliminate the top 100 hours of demand, this would reduce the annual energy bill by up to 9%.

The second piece of information is provided by daily Load Profile Charts. These charts show the patterns, deviations and anomalies in daily usage that originate from equipment operation. When demand exceeds a rate threshold, additional costs occur. When load profile information is analyzed in context of the PPA rate structure, determinations can be made on optimizing schedules, sequences of events and energy strategies.

In this chart, each line is a day's usage. Note the outlier on the single day that increased monthly demand by 30%. That resulted in a 12% increase on the total energy spend for the month – and could have been avoided. This chart shows the one day that drove demand charges to its new high.

It goes without saying that any professional grow operation will pay attention to energy efficiency – but there is a larger game to be played by fully leveraging your PPA from knowing how to manage your equipment. Efficiency measures do not address supply-side scenarios in the same way as demand strategies that live in 15-minute windows. Careful sequencing of equipment can mean the difference between paying 10-20% extra every month versus 10-20% in cost avoidance. This operational chart in Figure 3 shows the actual equipment and systems that are driving consumption and demand.

Figure 1: Energy Demand and Consumption with Top 100 Hours of Demand

Managing Grow Costs

In addition to monitoring the equipment and systems that serve the entire site, more granular data can be developed by monitoring individual grow rooms. This calculates energy consumption costs for each phase of the grow process. As shown in Figure 4, this particular room has energy density of 50 watts per square foot, which is higher than the mandates in several U.S. States of 36 watts per square foot.

What Can I Do in My Facility?

If your facility is in a regulated market, where the pricing models are fixed and subject to Public Utilities Commission (PUC) approval for any rate changes, having a platform as described above will allow consumers to adjust energy usage to best fit their current PPA. Improvements over time to demand and consumption can be used to evaluate and negotiate alternate rate structures that match the new energy profile.

If your facility is in a competitive energy market, there are numerous options to customize and negotiate PPAs based on your specific load profile. Energy suppliers will assess historical interval metre data to make assumptions of future consumption and to calculate risk for over/under use. If a facility has the data and can demonstrate its ability to manage itself and not create unexpected demand spikes, it opens the door to negotiate lower risk supply contracts. It is not just about lowering kWh pricing: instances of reducing annual spend by 5-10% are not uncommon when addressing demand charges first.

If you have a new facility with no energy history, the energy supplier will determine a rate profile based on load calculation estimates, but even so, once the site is operational, the data will reveal areas of the PPA that can be revised.

Summary

The real challenge to achieve control over energy costs is to align the requirements of grow processes with often complex energy cost structures. The grow site needs to know its PPA pricing model, know its energy use profiles and the consumption as well as demand levels across its grow cycles. In addition, it must know what systems are responsible for energy use and costs. When this level of energy information is attained, facility operators are better able to manage energy costs, control overhead, better monitor and protect their investments, while enabling cultivators to replicate future crops with known costs.

Leighton Wolffe is President of GrowFit Analytics, a data analytics company providing information & energy management services that guarantees growers achieve consistently higher plant quality and crop productivity. Leighton was formerly the VP of Strategy at Constellation NewEnergy, an energy supplier serving two-thirds of the Fortune 100 with electricity. Leighton has more than two decades of experience in designing building automation systems and implementing data science applications across multiple industries, along with his passion and enthusiasm for the budding cannabis industry.

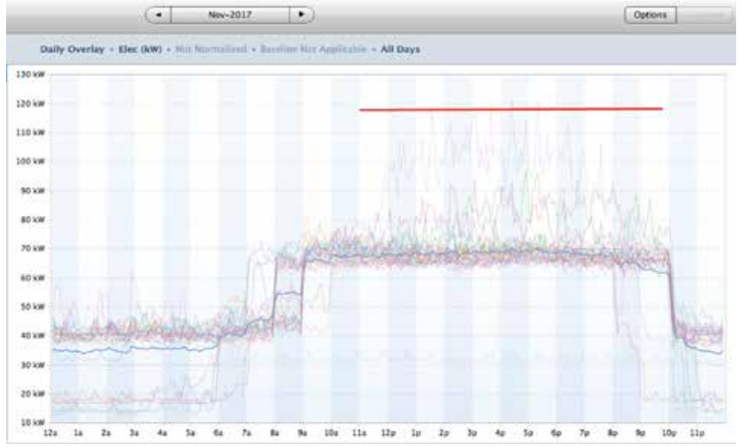

Figure 2: Daily Load Profile Chart

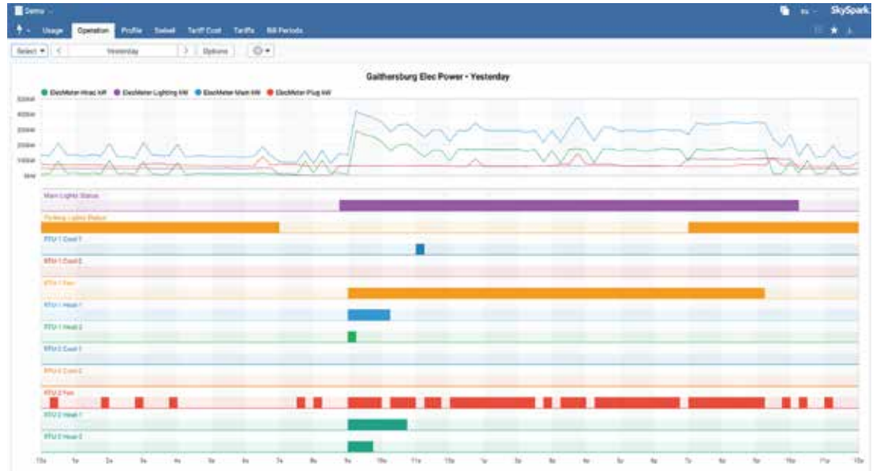

Figure 3: Operation Chart – Energy Consumption of Equipment/Systems

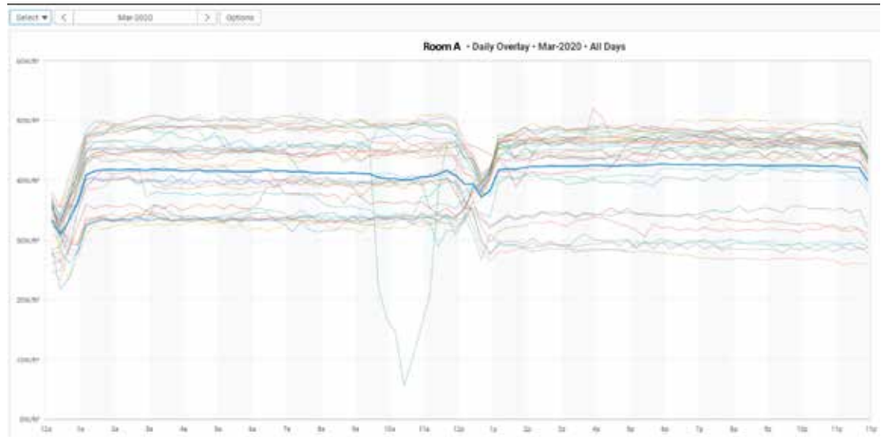

Figure 4: Energy Consumption Costs – March 2020