

Saving energy in marijuana cultivation with propane chillers

SEE HOW THIS INNOVATIVE TECHNOLOGY CAN HELP INDOOR CULTIVATORS CUT ENERGY COSTS BY 50 PERCENT.

High energy costs for marijuana growers

Indoor marijuana cultivation is surprisingly energy-intensive – about 10 times as much as an office building per square foot.¹

It's not just the lighting used to help the plants grow, although that makes up 30-40 percent of the energy use. The largest energy use, often making up 50-60 percent of the demand, is for cooling and dehumidification. That's because cannabis plants are sensitive to moisture and can grow mildew if the air is too humid.

The high energy demand for dehumidification can send energy costs soaring for marijuana-growing facilities and even require expensive and time-consuming electrical infrastructure upgrades. That's why some growers are turning to an innovative, cost-saving alternative technology: chillers driven by propane or gas.

What is a gas-driven chiller?

Gas chillers are really a form of combined heat and power, or CHP, says Steve Lafaille, vice president of business development for Tecogen, manufacturer of the Tecochill gas chiller. The system uses a propane- or gas-powered engine to drive the compressor in a chiller machine to create chilled water while the waste heat from the engine is recovered to create hot water.

Powering these energy-intensive chillers with more affordable propane or natural gas instead of electricity can reduce utility costs by 50 percent, Lafaille says. Perhaps just as importantly, these systems can help growers quickly and affordably retrofit industrial buildings for growing marijuana when the existing electrical infrastructure is insufficient.

Solving electrical constraints

That was the case for a marijuana grower in Douglas, Massachusetts, that converted an old factory building that made envelopes to more lucrative cannabis cultivation. Many of these old buildings are electrically constrained and at the mercy of the electrical utility to upgrade.

"These people have been told 18 months, 24 months, 36 months to upgrade the power," Lafaille says. But growers don't have time to wait. "If you look at what's happening in cannabis, in three years, the price is going to be cut in half on the market. So time is money in the business."

Instead, the Douglas grower brought in Tecochill units that eliminated the need for additional power from the utility. With natural gas lines eight miles away, the facility used the existing 30,000-gallon propane tank to fuel the units.

¹Walton, R. (2019, May 1). Marijuana prices have collapsed, forcing growers to focus on energy efficiency. *Utility Dive*. Retrieved July 28, 2022, from <https://www.utilitydive.com/news/marijuana-prices-have-collapsed-forcing-growers-to-focus-on-energy-efficie/553287/>



Applications in agriculture and beyond

Marijuana cultivation is a smart application for gas-driven chilling because facilities use cooling year-round. The chilled water takes humidity out of the air before it is reheated with hot water created by the unit's waste heat and a propane boiler – a process that's common in buildings such as hotels and hospitals.

Marijuana growers can even capture the CO₂ from the engine exhaust and inject it back into the facility to provide enrichment for the plants. The captured CO₂ both reduces emissions generated and saves money from purchasing CO₂ in bulk.

Gas chillers have long played a role at buildings such as universities and hospitals for comfort cooling, Lafaille says. But he foresees the technology playing a larger role in facilities that use process cooling all the time, such as food and beverage manufacturers. "We've really proven that the product can run 24/7, 365 days a year and have a really high degree of uptime and reliability," Lafaille says. "And that's what those other process-cooling customers really want to see."

By proving the real-world performance and efficiency of gas-driven chilling, marijuana growers may provide the innovative spark that spreads the cost-saving technology throughout the building industry.

3 KEY TAKEAWAYS

1. PROPANE CHILLERS PROVIDE COST SAVINGS AND RESILIENCE.

Gas-driven chillers can help reduce not only the amount of electrical infrastructure a facility needs but also the size of their backup power generation equipment. Given their intensive energy demand, many marijuana growers are installing 2-megawatt or 4-megawatt generators to protect the crops they're growing, which may be worth up to \$10 million at any given time. By shifting some of the electrical demand to propane or gas, businesses can cut the size of the generator in half, saving millions of dollars by purchasing a more affordable unit.

2. CONSIDER PROPANE CHILLING FOR OTHER AGRICULTURAL AND COMMERCIAL MARKETS.

Any facility with large year-round cooling loads should explore the return on investment of propane- or gas-driven chilling. Agricultural operations – especially growers of lettuce, leafy greens, and herbs – are also using these types of systems, although their plants aren't quite as dependent on dehumidification as the cannabis plant.

3. GROWERS AND OTHER BUSINESSES CAN MINIMIZE THEIR CARBON FOOTPRINT.

Powering the chilling with high-efficiency propane can help to reduce greenhouse gas emissions in many parts of the country where the power grid comes from plants burning fossil fuels such as coal. Tecogen hopes to put even more control in the hands of building operators with the 2023 launch of a hybrid-drive chiller that can run on propane, gas, or grid power, future-proofing the system by allowing the operator to choose which fuel system to use based on energy costs or carbon footprint considerations.



A marijuana grower in Douglas, Massachusetts, installed three Tecochill propane-driven chillers to meet the facility's large cooling and dehumidification needs without the need for electric utility upgrades.