Powering Cannabis Cultivation

COGENERATION FOR CROP SECURITY

Cultivators who invest in high-efficiency climate control systems coupled with cogeneration, where appropriate, will enjoy a competitive advantage and higher valuation over time.

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INTRODUCTION

The emerging cannabis industry is big business with the potential for high returns. However, as supply begins to catch up with demand, market prices will tighten and cost control will become increasingly critical to continued success.

CHALLENGE

Lighting and tight control of temperature and humidity required for high productivity and quality make indoor cannabis cultivation an energy-intensive proposition. Electricity use must be carefully managed to avoid high utility demand charges. Costly utility transmission and distribution upgrades are often required to serve facilities of increasing scale, and in some cases the utility simply cannot supply enough power at all. Grid outages have been in the news with rising frequency as an aging electrical infrastructure faces new stresses from severe whether due to climate change. And even if these energy costs and risks can be managed, the industry must be careful to avoid negative public perception of a ballooning carbon footprint.

Climate management in a grow room is not a matter of conventional space heating and cooling, but should instead be approached as an industrial process control problem. Many small facilities have achieved quasi-stable – if sub-optimal – climate control using standard equipment and dehumidifiers. However, these technologies do not scale cost-effectively to the large operations currently in development and construction.

SOLUTION

As part of a suite of technologies, integrated combined heat and power (CHP) systems – also called cogeneration – minimize energy costs, reduce carbon footprint, and ensure energy security for maximum competitiveness over the long-term. A combined heat and power system is a generator located on-site and designed to operate continuously as your primary source of electric power. All generators produce more heat than electricity, which would normally be lost to the atmosphere through a radiator and in the hot exhaust. A CHP unit, however, is equipped with a heat recovery system that captures this energy and makes it available for use in the facility. By utilizing the generator waste heat, a CHP system puts more of the energy of the fuel to useful work, increasing fuel efficiency and lowering utility costs. In regions where electric utility costs are high and gas prices are lower, it can be less expensive to generate your own power than to purchase it from the utility.

In addition, CHP systems typically operate on natural gas, the least carbon-intensive fossil fuel available. By reducing fuel consumption and utilizing lower carbon fuels, CHP systems reduce greenhouse gas emissions by 10% or more. CHP systems are normally interconnected to the electric utility grid, and work in parallel with the utility to supply the facility's electric load. But the CHP system can also operate independently. If power from the utility is lost, the CHP system will isolate the facility from the grid and shift into "island mode" operation. When reliable utility power is once again available, the CHP system can automatically synchronize and reconnect with the grid. Fueled by reliable pipeline, on-site compressed or liquefied natural gas, the CHP system seamlessly maintains continuity of power and prevents operational disruption. This feature is often referred to as resiliency.

In order to deliver maximum value and produce a high return on investment, however, the mechanical and electrical systems of the facility must be compatible with CHP.

We call this integrated energy infrastructure design and operation. In the following series of brief papers, we will explain:

1. How you can determine whether CHP may fit and deliver value to your facility.

2. What options are available for grow room temperature and humidity control, and how the selection of air handlers affects the design of CHP and the overall efficiency and energy consumption of the facility.

3. How to design CHP heat recovery with an absorption chiller at facilities that need less heat and more chilled water. We'll explain how absorption chillers work, under what conditions they work best, and how to integrate them into the HVAC system design.

4. What to consider in the selection of electric chillers to supplement and back up an absorption chiller, and design implications for the CHP.

5. What else do you need to complete a CHP project, including air permitting, utility interconnection, integration with other generating technologies in microgrids, financing, and project timing.