



Considerations when Planning a New Greenhouse Facility for Cannabis Cultivation

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Most aspiring greenhouse cannabis producers focus their attention, when building their business plan, by first estimating profits assuming the price of their products; flower and/or extracts, on the wholesale market. In most cases it's easy to get a spot index price for wholesale products. Canada and the US' legal recreational states are moving towards having a fully developed market chain. Many medical states are on their way to the same situation. In these states cannabis is brokered as a commodity based on quantitative grading methods.

Whether planning to start a cultivation facility in a developed recreational market or in an emerging medical state, it's important to consider the profitability of your production methods for your future success. What will happen to your ROI when the price per pound of dried flower drops below \$1,000? What happens if there is over production in your state and the price drops to \$500 per pound?

The next consideration when planning a cultivation business is the amount of capital needed to enter the industry. The CapEx includes (among other items) the costs of the site/buildings, equipment, and construction of the cultivation facility. It's worth noting that the material and hardware costs of many operational light dep greenhouse facilities is roughly half the total CapEx required. Often the cost of building the necessary infrastructure (electrical, fuel, and water) to support the operations along with the costs of construction will overshadow the cost differences between greenhouse manufacturer A vs B, or control option A vs B. Building new greenhouse facilities cost less than new warehouse grow and is commonly turnkey in less time. Many of Nexus' greenhouse customers have a reputation for becoming the first facilities in operation in their state/territory and the first to market.

When estimating the cost of a greenhouse facility there are three primary categories that most greenhouse designs are classified into: 1. passively ventilated, 2. mechanically cooled with evaporative cooling pads and fans, or 3. sealed using only HVAC to condition the space. A combination of multiple categories is possible, but most facilities fall clearly into one category. Option 1 is limited by regulatory considerations due to odor and security concerns but is possible in some jurisdictions. Option 2 is the most commonly built and is proven to be successful in nearly every climate. Option 3 using HVAC is uncommon in large-scale operations. The style of greenhouse system will have huge implications on the length of time to engineer, permit, and construct as well as the amount of electrical infrastructure required to support the facility's equipment.

Less conventional forms of heating, cooling, and dehumidifying the greenhouses using HVAC equipment will increase the costs of the design engineering. It's also important to gauge the availability and



expertise of contractors (mechanical, plumbing, electrical) in your area to be certain that they are suitable selections the more technically complicated a project becomes. Cooling and dehumidifying a greenhouse is nothing like cooling and dehumidifying traditional building spaces.

If the project requires having to bring in contractors from out of state, or even out of country, then the viability of the project's design should be re-evaluated. If the facility is being built in a rural area with limited access to power, then the viability of using HVAC is unlikely. Installing industrial generators to operate lights and chillers is probably a non-starter in most scenarios due to the cost of the equipment, the cost of electricity generated, environmental regulations, and the long lead-times to deliver and permit these power plants.

The length of time a project is estimated to construct, and the amount of technical expertise it requires will compound the build contractors' costs. From low to high, the cost of building passively cooled greenhouses will be the least costly. Mechanically cooled with evaporative pads and fans will be moderate to low. The 100% sealed greenhouses with HVAC control will be the most expensive compared to the other greenhouse options and will have a CapEx closer to indoor/warehouse facilities than other high-tech greenhouses not using HVAC.

Lastly, once the capital expenses have been compiled, it will be essential to consider the operational expenses of running the greenhouse facility. Aside from labor, electricity is typically the largest single cost for a grow facility. In most cases supplemental lighting in the winter months is the largest portion of the electrical expense. Mechanically cooled greenhouses with evaporative pads and fans are very energy efficient, so the cost of temperature control is typically a small fraction of the total electricity used. The OpEx in sealed greenhouses will be much higher than those greenhouses using pad and fan cooling systems.

HVAC costs significantly more to operate than conventional greenhouse cooling methods and unlike supplemental lights, which are used primarily in the winter months, the HVAC systems need to operate year-round. Those growers producing in warehouses or greenhouses using HVAC will have significantly higher cost of goods sold than greenhouse operators using pad and fan cooling systems. If the US federal government ever legalizes cannabis, or allows for interstate commerce, then how financially viable is it going to be to produce in warehouses or sealed greenhouses when other growers move to sunny southwestern climates and grow using low-cost traditional greenhouse methodologies?

There is a considerable amount of argument whether fully sealed greenhouses are necessary in the most extreme climates or whether they will have greater yields than the more traditional styles of light-dep facilities. Simply put, there are not enough sealed facilities operational today to say with certainty. However, there are cannabis growers in every climate type successfully harvesting crops using traditional greenhouse climate control methods. A well designed high-tech greenhouse using traditional climate control methods is capable of producing the highest quality of products when it comes to shelf appeal and lab testing.



Additionally, there are areas for easy improvement to traditional style cannabis greenhouses operations. The cannabis industry has been slow to apply standard operational practices from well-established floriculture/horticulture industries that allow for mass production, control precision, and automation.

Advances in designs and engineering have lead manufacturers to expand the capabilities of high-tech (non-HVAC) greenhouses to minimize the risk of pest, reduce the concerns of odor leaks, maximize the climate control capabilities (including humidity control), and overall lower the cost of production while maintaining a high degree in confidence in the ability to successfully grow a profitable crop. Anyone entering cannabis production or expanding their operations must carefully consider: 1. where the wholesale prices are heading as more competition enters the industry, 2. how much capital it requires to develop their cultivation facilities, and 3. what the costs of operation will be to produce. Make sure you are working with a greenhouse manufacturer or engineering firm that is leading you down the right path.