Williamstown Cannabis Cultivation Assessment and Business Plan

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Averill Cook's Wendling Farm

Introduction and Background

"The legal marijuana industry has the potential to save local farms and repair a broken food system." Suehiko Ono, CEO, EOS Farm

Cannabis can be a viable way to uplift local farmers in danger of losing their land due to declining profits. Outdoor cannabis cultivation is an opportunity for small farms to become profitable, but there is a high possibility that the industry will be taken over by big agriculture companies. Unfortunately, already in Massachusetts the regulations were not designed with farmers in mind. Because medical marijuana was legalized before recreational, already-existing vertically integrated setups have the advantage in the state. The regulatory process is also long and expensive, discouraging small businesses from getting their start in the industry.

Despite these challenges, outdoor cultivation is the future of the cannabis industry. Indoor cultivation is incredibly energy-intensive due to the use of artificial lighting and climate control, giving it a huge carbon footprint. Outdoor growing is far more sustainable because it relies on the sun as a carbon-neutral light source. Outdoor cultivation can be done more cheaply for the same reason: there is no energy bill and there are lower equipment costs than indoor. This makes it more resilient in the long run, because with federal legalization in the possible future, wholesale prices are likely to decrease.

Outdoor cultivation is the future of cannabis, but without support, small farmers will not be able to enter the industry. Therefore, this project has two goals. It is meant to provide a feasibility study of cannabis cultivation for our clients, Averill Cook and Jake Zieminski, as well as serving as a model to ultimately help farmers in Williamstown retain their land. Our final product can be informational for local farmers who might want to get a start in cannabis

cultivation and give insights into the options available to them to make this work more accessible. With this study, Williamstown farmers will be able to have a better understanding of the realistic possibilities of cannabis cultivation. What follows is a sample business plan based on Wendling Farm. A business plan is a required part of the application for a Cannabis Cultivation license, and it includes analyses of the market and the regulatory framework, strategies for marketing and cultivation, and a financial breakdown.

Methodology

Our methodology for this project included a number of approaches. We met with our clients a few times a week to discuss progress, research, and next steps for that week. Several of these meetings were onsite at Wendling Farm, allowing us to understand the proposed cultivation site. We also took soil samples from the site, which were sent to UMass for testing. Being able to visit Wendling farm, as well Jake's CAVU Wellness CBD farm, allowed us to better understand the project, its scale, and what it physically takes to set up and operate cannabis cultivation. We also did online background research about cultivation operation, regulation, and financial details. This included researching case studies of other outdoor cultivation operations in Massachusetts to understand their process. These case studies included Theory Wellness/Equinox Farm of Sheffield, NOVA Farms of Sheffield, and Local Roots of Barre. They each had a different approach towards licensing and operation and therefore studying them and comparing them was useful in our own research. We also conducted regulatory research regarding the Cannabis Control Commission's guidelines for license applicants. Finally, we conducted six interviews with cultivators, retailers, and others involved in the cannabis industry in the Berkshires:

1. Ted Dobson, Equinox Farm & Theory Wellness: We spoke with Ted about his experience as a cultivator in Sheffield, MA and his partnership with an established retailer.
2. John Moore, Roaring Glen Farms: John told us about his operation as a cultivator with the regulatory status of a Craft Marijuana Cooperative
3. Donna Norman, Calyx Berkshire: Donna told us about her experience in the regulatory process as a retailer and her partnerships with local farms as well as how she decides what products to sell.
4. Sam Milton, Climate Resources Group: We spoke to Sam about energy consumption in the cannabis industry and the different practices of cultivators.
5. Marion Mcnabb, President of Cannabis Center of Excellence, Inc: We met with Marion to discuss the opportunities of a craft marijuana market as well as the ongoing research surrounding cannabis and future regulatory changes.
6. Tony Kieffer, Arch Solar: Tony gave us important information and details about different types of greenhouses used in cannabis cultivation and their respective prices.

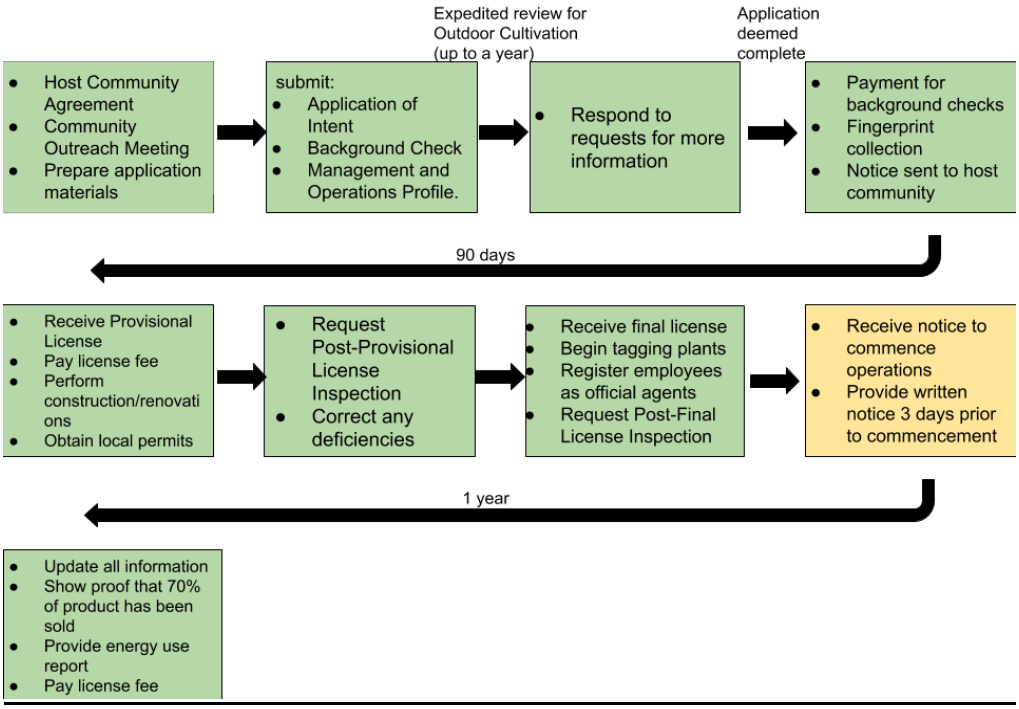
Massachusetts Regulatory Framework

Marijuana was legalized in Massachusetts in 2016, and the first licensed operations opened in 2018. There is a complex regulatory process involved with applying for and receiving a permit. This is governed by the Cannabis Control Commission (CCC). Businesses must first receive a provisional license and then apply for a final permit before beginning operations. The permit must be renewed each year and comes with a high fee. In regards to cultivation, the permitting process is the same for both indoor and outdoor cultivation ("Guidance for Farmers"). The application requires a business plan, a diversity plan, a Host Community Agreement, a

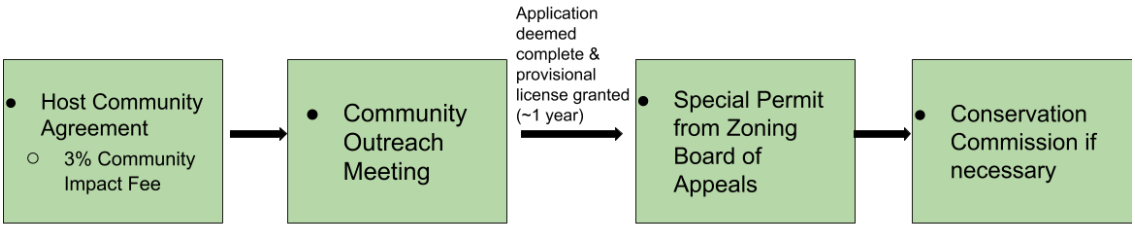
background check, and a summary of operating plans and procedures ("Application Checklist"). One particularly expensive requirement is that farms must be surrounded by a fence and must have security cameras. This creates a high initial cost for cultivators.

There are 11 tiers for marijuana cultivation, each with different application and permitting costs. The smallest is 1,000-5,000 square feet and the largest is 90,000-100,000 square feet, which is the equivalent of 2.2-2.3 acres. The application and license fees for outdoor cultivation are half that of indoor cultivation—for Tier 1 the license fee is $625 per year and for Tier 11 it is $25,000 ("Guidance for Farmers").

A challenge for cultivators has been local politics. Each municipality crafts its own zoning bylaws, and as is clear from Williamstown's experience, this is not a straightforward process. Zoning for marijuana varies from town to town and often creates local political conflict. Two of the state's four current outdoor cultivators are based in Sheffield, a town that acted early and created a zoning by-law friendly to outdoor growing in 2018 (Cowgill). Farmers must also develop a Host Community Agreement with the town where they are based. The CCC has guidance for the development of this agreement, including a requirement for a community outreach meeting ("Application Checklist").



Process flow for Massachusetts regulatory process



Process flow from Williamstown regulatory process

Craft Marijuana Cooperative

A Craft Marijuana Cooperative is an alternative licensing structure that is designed for use by farmers but also has certain restrictions. Specifically, this license allows for a "type of Marijuana Cultivator which may cultivate, obtain, manufacture, process, package and brand marijuana and marijuana products to deliver marijuana to Marijuana Establishments, but not to consumers" ("Guidance for Farmers"). There are certain stipulations in order to obtain a license and operate a Craft Marijuana Cooperative that are explicitly outlined by the CCC. These include:

- Although not limited to a number of locations for cultivation specifically, the total area of canopy is limited to 100,000 ft^2 and only three locations may be used for product manufacturing.
- Members of the Craft Marijuana Cooperative License must be Massachusetts residents and they must have created "a limited liability company, limited liability partnership, or a cooperative corporation"
- At least one member of the cooperative must have filed a Schedule F tax form within the past five years, which is a tax reporting farm income
- "The Craft Marijuana Cooperative must operate according to the seven cooperative principles published by the International Cooperative Alliance in 1995." ("Guidance for Farmers")

Sustainability of outdoor cultivation

In addition to the possibility of bringing economic benefits to small farms, outdoor cultivation has environmental benefits over indoor. Indoor growing is incredibly energy-intensive because of the reliance on electric lights and air conditioning systems. A 2018 report found that "legal cannabis cultivation in the U.S. consumes an estimated 1.1 million megawatt hours (MWh) of electricity" each year, enough to power 925,000 homes (Aguirre). Massachusetts has stricter energy standards than other states, allowing a maximum of 36 watts of lighting per square foot ("The Laws"). This regulation encourages the use of LED lighting rather than higher-intensity, less efficient lights. Renewable energy is an option to decrease the amount of electricity a facility pulls from the grid, but it can take 16 square feet of solar panels to power each square foot of indoor growing (Milton).

Outdoor cultivation eliminates much of the energy use of indoor growing because the sun is the main source of lighting. Most models, including the one we propose here, include some artificial lighting to help plants get started, but it is far less than what would be used in an equally-sized indoor operation. Another option to further reduce energy costs is to start seeds each year in a hoop house without supplemental lighting (Moore). As Massachusetts works to decrease greenhouse gas emissions, it is clear that the state should encourage outdoor cannabis cultivation.

Our Recommendation

This business plan presents a cultivation model starting with a Tier 6 outdoor license and a Tier 1 indoor license and growing to a Tier 11 outdoor license by the third year of operation. Despite the additional application, it is worthwhile to get an indoor license in addition to the outdoor one. The indoor license applies to a greenhouse, which would be used to propagate seedlings in the spring and to keep mother plants alive through the winter for the purpose of cloning them in the spring. Without a greenhouse onsite, farmers are reliant on other cultivators for plant starts in the spring. The other option is a hoop house that is set up each year, but this removes the possibility of saving mothers through the winter, reducing farmers' flexibility. The indoor license was created mainly for large indoor growing facilities that use only artificial lighting, but most greenhouses are also contained in this category.

In terms of size, it is most profitable to aim for the largest size possible, Tier 11. Every one of our interviewees recommended this route for cultivation because it makes the most sense in this industry. Ted Dobson explained, "I think if you have a small grow with a lot of competition, you're going to be pressed to make a living as prices go down…. If I were getting

into the game right now, I wouldn't be thinking small." Tier 11 makes the most profit and thus allows for a profit with consistently high startup costs in the Massachusetts marijuana industry. Even though Tier 11 is the largest category, it only amounts to about 2.3 acres of canopy, which is in reality a very small size for an experienced farmer, thus a manageable size to aim for. Our model starts with a Tier 6 before expanding because of the regulation that if 70% of product is not sold, the tier size is reduced. This allows the grower to gain experience before working at the largest scale.

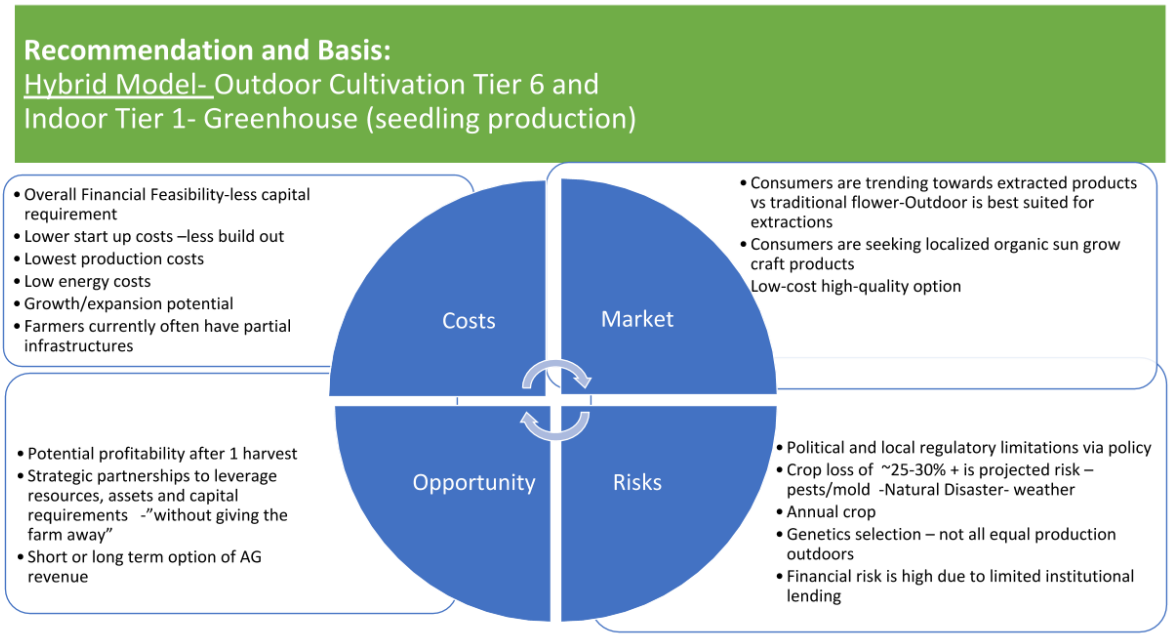


Figure made with help from Jake Zieminski

Alternative Cultivation Options

There are a number of alternative options to those that Averill and Jake plan to employ that farmers can utilize. These solutions can be helpful in mitigating costs and being more sustainable depending on the farmer's situation. The first of these methods is to save seeds instead of using the cloning method which would require a built-up greenhouse to keep the

mothers alive through the winter. Not having a built-up greenhouse and just having a hoop house for propagation is the lowest carbon footprint of all the possible cultivation methods; there is no need for construction and it is the lowest energy usage. Further, by saving seeds then farmers do not have to buy new seeds each year which is in the long term more expensive than cloning. Therefore, farmers can save expenses both in the startup phase and in the long term and can also control and specialize the genetics of their plants by saving their seeds as well. However, this method can lead to a decreased harvest and needs expertise around breeding marijuana plants.

Another option that cultivators can take is forming or joining a Craft Marijuana Cooperative, which is different from the standard cultivation licenses that Jake and Averill are applying for. As outlined in the regulation section, a Craft Marijuana Cooperative allows for resources to be pooled between farmers. Although there are limitations to the license itself, this can be a more accessible route through the high startup costs for small farmers.

Policy recommendations

We have a number of policy recommendations that range from the federal, state, to the local level. On the national level we suggest removing marijuana from the Schedule 1 list to allow tax levels to be decreased by allowing deductible expenses from marijuana businesses. We believe that the federal tax is unfair and limiting for small cannabis businesses and can prevent them from making a profit. On the state level, we recommend that the CCC amend the licensing process to make it more streamlined and accessible for small farmers. A faster process and ensuring that approval dates line up with the planting season could make getting a license easier for farmers - essentially shifting regulations to keep farmers in mind. Finally, at the local level, we recommend there be no limits on the farm size, simply to use the CCC regulations that have

already been established through an arduous research process. A microbusiness size is simply not profitable enough to support small farmers as they already have such limited options through the CCC. Local municipalities need to act as strategic partners to farmers in order to uplift them, not as an additional cost or barrier.

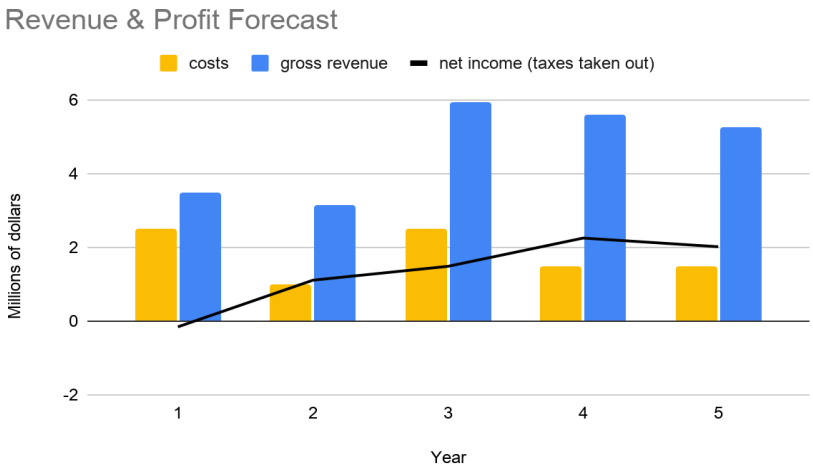
Business Plan

Executive Summary

Cannabis cultivation at Wendling Farm will start as a Tier 6 outdoor operation eventually building to a Tier 11 grow. Our mission is to provide a sustainable and high-quality but affordable product through the outdoor cultivation of cannabis. In doing this we work towards establishing a craft market in the marijuana industry to allow for the empowerment of small farmers and to avoid a takeover by big agricultural companies. Our product would be flower for the wholesale market, which would be dried and cured. It can be sold directly to retailers or to product manufacturers for oils and tinctures.

Objectives:

Year 1: Start with a Tier 6 outdoor grow supplemented by a Tier 1 indoor greenhouse
Year 2: Continue with a Tier 6, reinvest in facilities to enable expansion
Year 3: Expand to a Tier 11 outdoor grow, prepare application for product manufacturing and retail licenses
Year 4: Continue with a Tier 11 grow, continue application process and build capacity for manufacturing and retail
Year 5: Continue with Tier 11 cultivation, begin manufacturing and retail operations



Start-Up Summary

Fence & security	$200,000
Greenhouse	$600,000
Labor	$250,000
Plant-related expenses	$150,000
Legal & licensing	$200,000
Equipment	$400,000
(Land)	$500,000
Sales & marketing	$100,000
Total	$2,550,000

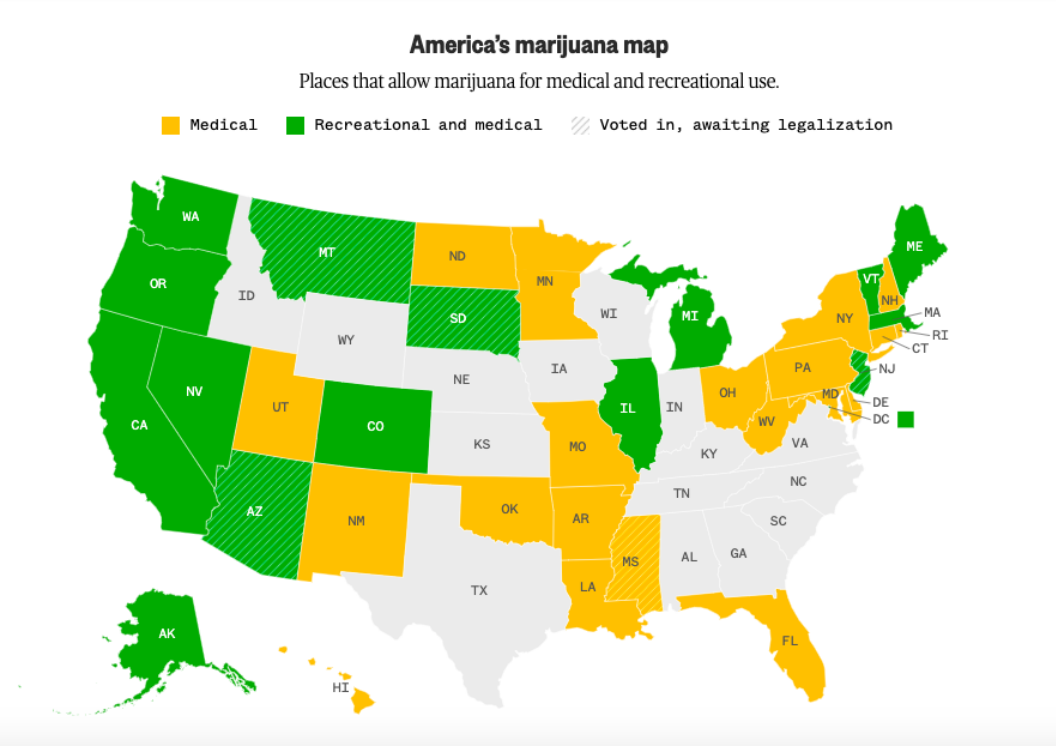
Market Overview

US Cannabis Market

Although marijuana is currently illegal at the federal level, more and more states are beginning to legalize its use. It is legal for just medical use in 19 states and two territories and for both recreational and medical use in fifteen states, Washington D.C., and two territories. Four of these states just passed legalization measures in the most recent election (Wu & Silva). President-elect Joe Biden and Vice President-elect Kamala Harris have both expressed support for decriminalizing marijuana nationwide, and there are multiple marijuana-related bills currently in Congress (Dsouza).

The prospect of federal legalization comes with both positive and negative effects on the budding craft marijuana market. It could damage local cultivation by allowing interstate commerce of marijuana. Currently, states can only sell marijuana products grown within the state, which encourages small-scale local growing. Interstate commerce would remove this protection for local cultivation and allow a state like California to export large amounts of cannabis. However, federal legalization could also allow for an organic certification process. Organic certification is done through the USDA, so as long as marijuana is illegal at the federal level there can be no federal organic certification. A standardized certification could provide a boost to small farmers (Chen).

As of November 13th, the national average price of marijuana was $1,856 per pound (Cannabis Benchmarks). It has been gradually increasing since a low of $1,565 per pound in March that was caused by COVID-19 restrictions (Koh). Prices vary across the country, with the lowest in Washington and the highest in Maryland and Alaska (Schaneman).



NBC News

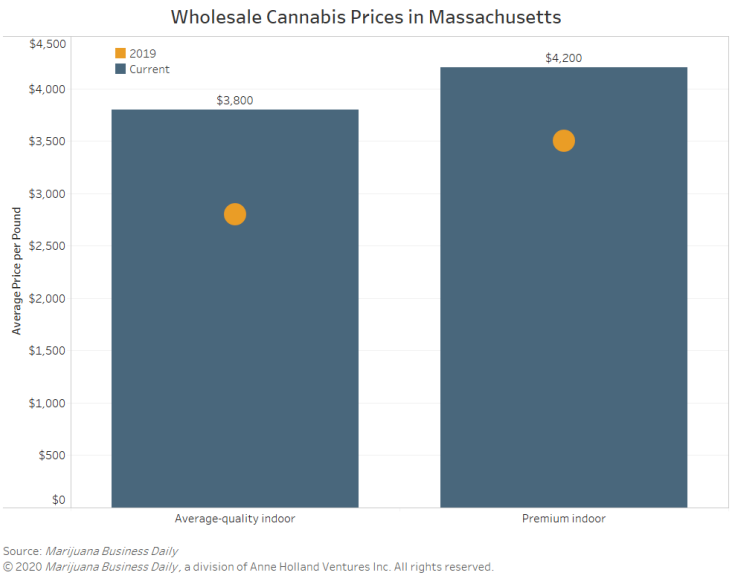
Target Market: Massachusetts

Massachusetts has some of the highest wholesale marijuana prices in the country. In March 2020, the average wholesale price for average-quality indoor marijuana was $3,800 per pound, more than twice the national average. The price for high-quality indoor, which means higher levels of THC, was $4,200 per pound (Schaneman). These high prices feed into high retail costs, which have led many MA consumers to continue buying from the illegal market (Adams). There are multiple reasons for these high costs. First, there is currently more demand than supply. As of November 2020, there are 90 licensed retail locations but only 40 licensed cultivators, both indoor and outdoor, in the state ("Licensing"). Vertically-integrated companies have an advantage because they are able to sell and grow their own product. Independent retailers must depend on the limited product from cultivators, and independent cultivators are

vulnerable to shifts in wholesale prices (Schaneman). Indoor production is consistent throughout the year, but the outdoor product is harvested in October, meaning the market becomes more crowded when those plants are processed and sold. This is one reason why outdoor-grown marijuana has a lower price.

Another contributing factor to the high prices in Massachusetts is the slow, complex regulatory process. It can take over a year for the CCC to approve an application (Adams). This has contributed to the low supply. There are currently only three licensed outdoor marijuana cultivators, but several more are waiting for their final licenses to be approved (Dobson). However, the CCC has significantly increased its speed of processing applications, which is allowing more and more businesses to be licensed. This simplifies the process for cultivators, but also will likely lead to lower wholesale prices in the future (Adams).

There is much uncertainty regarding the future of the market in Massachusetts, which lends urgency to the need to enter the market as soon as possible. New York and Connecticut have yet to legalize recreational use, but it is likely to happen soon, which could remove a base of consumers. Although it is illegal to transport recreational marijuana across state lines, there is an understanding that a large portion of customers come from out of state (Dobson). However, retailers in the Boston area see a growing consumer base, and lower prices could attract customers who are currently buying on the illicit market (Adams). There is also the prospect for a specialty/craft market which would mean higher prices for specific products. Currently, outdoor-grown marijuana is seen as a lower-quality product mostly used for extracts, but a craft market could reverse that by making outdoor-grown a specialty product (Schaneman).



This chart shows the wholesale price of cannabis per pound in Massachusetts in March 2020. The yellow points represent the cost in 2019, showing that the price is still increasing. A similar assessment has not been made for this point in the year, but the national average price decreased due to the COVID-19 pandemic before increasing again in the fall.

SWOT Analysis

Options	**Strengths**	**Weaknesses**	**Opportunities**	**Threats**
Outdoor Marijuana Cultivation	• High quality soil • Less expensive product than indoor • Low energy costs • Less construction	• Complex, expensive regulatory process • Only one harvest per year (compared to indoor) • High risk b/c such a large upfront investment	• Real potential for a craft outdoor market in NE • Demand is currently much higher than supply • Farmers market pitch idea • Wholesale prices for flower are continually increasing • Federal legalization could lead to organics certification process	• NY and CT may legalize soon • Market for craft cannabis is new • Local political hurdles • Federal legalization could lessen the importance of buying local in MA
No Action	• No regulatory process • Avoid political disputes	• Fail to take advantage of crop that is helpful to small farmers	• Continued present use of land (cattle grazing)	• Lack of income from other sources

Marketing Strategy

Marketing Strategy - Craft Cannabis

Currently, there is not a distinct market for "craft" marijuana, meaning a specialized product from small local farms, in the way that there is for beer or hard cider. However, many experts see this same market potential with marijuana. The plant itself has unique attributes that make it advantageous to explore a craft market. Craft businesses can take advantage of the genetic diversity of the marijuana plant and show the benefits of the local terroir. This establishment of variety allows craft businesses to be protected against large companies that might attempt to dominate the market (Chen). There are many other advantages to being at the forefront of this craft market. As more cultivators and retailers enter the market, prices will inevitably go down and with this competition it is paramount to have a specialized product, something that will be distinguishable from the at times homogenous indoor crop (Dobson). Furthermore, because this market is so new there is a lot of opportunity for future growth. An opportunity for a "cash crop" such as marijuana does not come along often and to be at the forefront could help revitalize small farms. Small farms are disappearing and land loss in New England in particular is a big problem. Craft marijuana could help small farmers keep their land while also boosting the local economy. There are many marketing strategies that have already been developed for craft goods and although it would be an investment to establish these practices in a new market, cultivators and retailers don't have to come up with anything new - this model works and has an untapped potential in the general marijuana market. Tapping into this potential would require an investment in marketing as well as consumer education; however, many agree that this investment is well worth it.

Marketing Strategy - Certifications

There are various certifications that can be obtained in order to specialize outdoor grown cannabis products. These certifications can differentiate products to the consumer and help to establish the craft marijuana market. Without federal legalization, there can be no USDA Organic certification for cannabis, and so it is difficult for consumers to know the conditions in which the plants were grown. Independent certifications such as the three listed here can indicate to consumers which products were grown in more environmentally sustainable ways, giving a boost to farmers who use these practices.

#1-Sun & Earth

The Sun & Earth certification was developed by farmers, businesses, and the Cannabis Conservancy to encourage regenerative agriculture. It sets a very strict standard based on the core values of Earth Care & Cultivation, Human Empowerment, and Community Engagement. There are several basic requirements as well as additional steps to qualify for the "Gold" level. Requirements include:

- Supplemental lighting is only permitted during propagation (no supplemental lighting permitted at the Gold level)
- All carbon emissions must be offset, and soil practices that sequester carbon must be used
- For the Gold level, farmers must run a seed saving program
- Biodiversity must be promoted through the use of companion crops and habitat preservation
- Farming practices must reduce erosion through cover cropping and work to increase soil health over time
- Farms must engage with the local community

#2- Sungrown

The Sungrown certification is less strict than Sun & Earth and has less of a focus on regenerative agriculture and healthy soil practices. It is designed to apply to greenhouse and outdoor cultivation. Its requirements fall into four categories: energy, pesticides, water, and land use.

- No supplemental lighting may be used during the flowering stage. At other times, supplemental lighting may only be used to extend natural sunlight hours and may not be used when natural sunlight is available.
- Only pesticides that are approved for organic farming may be used.
- Water use must be tracked and reported.

#3-Cannabis Conservancy Simply Eco Standard

The Cannabis Conservancy has a comprehensive certification program, including 45 Sustainability Standards with sub-categories for each one. The standards relate to policy, cultivation methods, and processing. Despite the long list, the standards are less strict than Sun & Earth and Sungrown because they are meant to be applicable to indoor or outdoor cultivation. Requirements include:

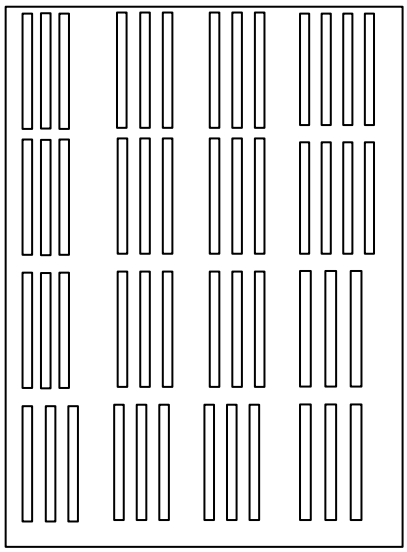
- The organization must have a Sustainable Cultivation Policy and a Sustainable Water Use and Conservation Policy
- Zero waste principles must be used.
- Cultivation must support wild pollinators by using IPM and no pesticides during flowering
- Energy efficient lighting must be used
- Some sort of carbon offsetting program is required

Cultivation Plan

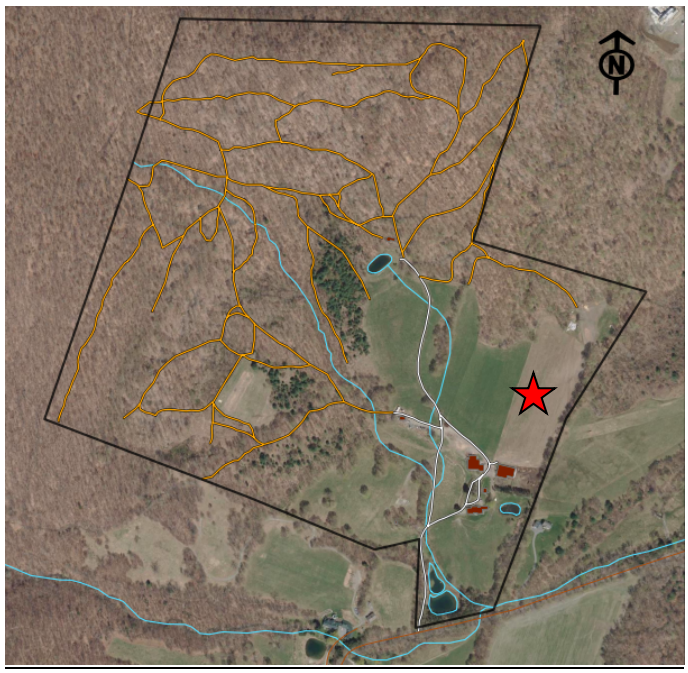
Cultivation Facilities

Our model is based on a Tier 6 outdoor license and a Tier 1 indoor license. The indoor license is for a closed greenhouse facility, used for propagation and for maintaining mother plants through the winter. The outdoor growing will take place in the field on Wendling Farm property currently used for cow feed. Rows will be 10 feet wide and 100 feet long, with 10 feet between each row. 40 plants will be planted in each row, organized by strain.

The greenhouse will be 4,000 square feet, with a 3,500 square foot central closed area and a more open surrounding area for hardening off plant starts. It will include HVAC and supplemental lighting.



This is a model for a Tier 6 grow, with 50,000 square feet of canopy. Each row is 100 feet long and 10 feet wide, and they are arranged to facilitate a tractor driving between rows. Each set of rows can be designated for a different strain.

	
Map of Wendling Farm, with field for cannabis cultivation marked with a star	Proposed cannabis cultivation site.

Cultivation Plan

Before planting, the rows will be treated with manure fertilizer. Black plastic row cover will be used to suppress weeds. Plants will be started from seed inside the greenhouse and will be grown indoors until they are 8 inches tall, at which point they will be transferred outdoors. Outdoor planting will happen in June. Plants will be planted in the ground by hand and tagged. Additional fertilizer will be added during planting.

Companion crops will be planted in between cannabis plants and along the fence line. They will serve to encourage pollinators, reduce soil loss, and reduce undesired smells. Flowers along the fence line also give a more attractive appearance to the farm. Companion crops may include: buckwheat, clover, comfrey, lavender, and flowers such as nasturtiums and cosmos.

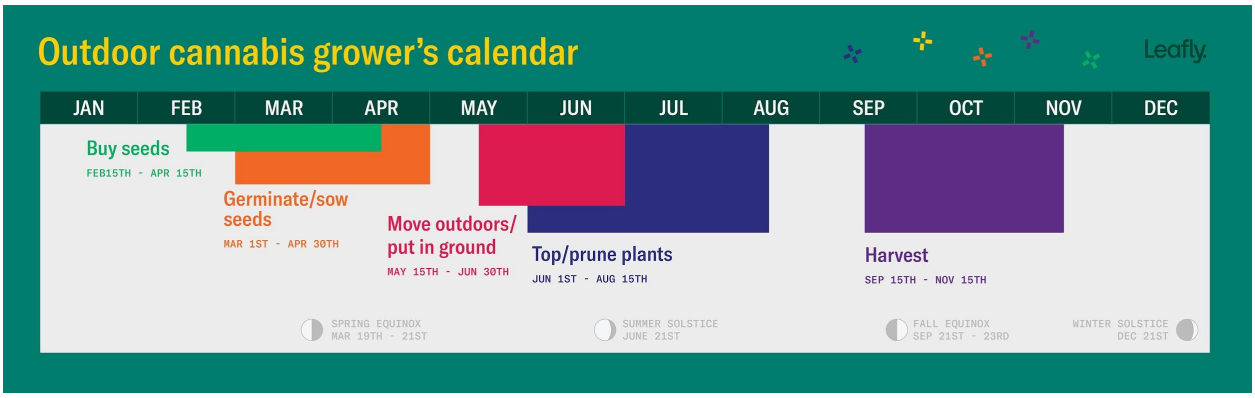
During the vegetative phase, plants will be sprayed with a combination of bio-insecticide and bio-fungicide every 10 days. These will control for powdery mildew and pests. The plants

will also be treated with Floraflex nutrients. In July, plants will be topped and pruned. Pesticide treatments will continue to week 5 of flowering.

Plants will be harvested from the end of September through the beginning of October, with the goal of getting all plants out of the ground by the first week of October. Plants will then be transferred indoors for drying. They will be hung upside down to dry first before being trimmed and set up to cure.

Outdoor cultivation comes with additional risks when compared to indoor growing. There is higher than average crop loss associated with marijuana cultivation. In New England in particular cannabis plants are subject to powdery mildew which can spread quickly and due to regulations, the options for treatment are very limited. This also increases the risk of destructive pests, which are present in other forms of outdoor cultivation, but again care is quite restricted in current regulations. Finally, as with other forms of outdoor cultivation, bad weather serves as a significant risk and this risk is only growing with climate change causing more variable weather in the North East. Marijuana is a high-risk crop and thus these risks must be taken into account when estimating profitability of the operation.

Cultivation Timeline

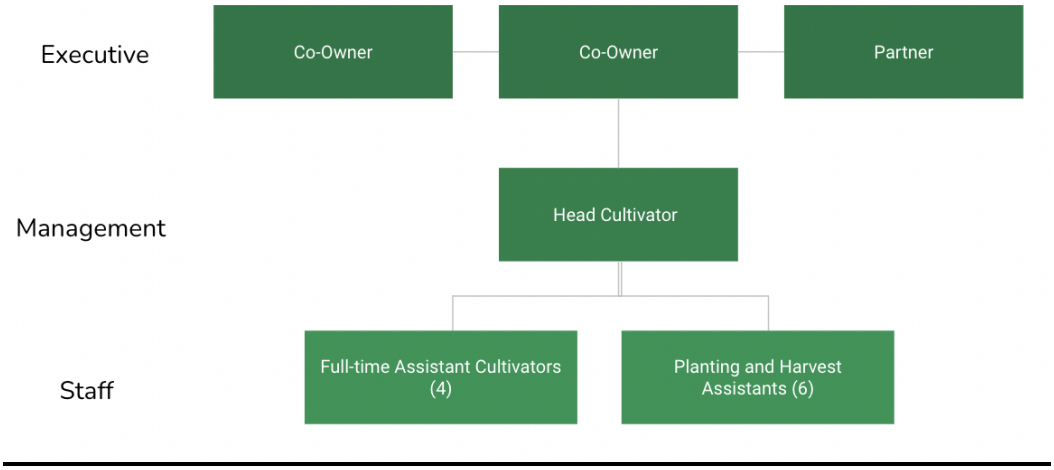


Leafly

Germinate and grow indoor: April 1- May 31
Move outdoor: June 1-June 15
Top plants: July 1- July 30
Prune and clean up: August 1-September 15
Harvest: September 20- October 7
Processing and Curing: October 7-November 20

Organizational Structure

The business will have five full-time employees, including a head cultivator and four full-time assistant cultivators. In addition, during planting and harvest, temporary employees will be needed to quickly complete the required work. These numbers are based on our interviews with two cultivators.



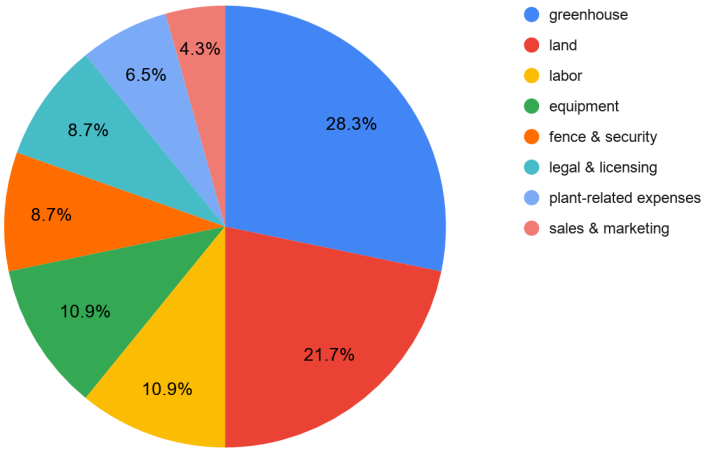
Financial Plan

We conducted financial estimates for the first five years of operation with the proposed model. A full business plan would also include a direct and operating expense breakdown, a profit and loss forecast, a cash flow statement, and a balance sheet, each with specific expenses listed out. This kind of in-depth financial planning was beyond the scope of our project.

Startup Costs

Startup costs for cannabis cultivation operations are certainly very steep due to the regulatory process in Massachusetts. The startup costs for this specific model will amount to about 2.5 million dollars. Some of the big contributors to this cost are the steps necessary through the regulatory process such as legal costs, regulation fence and security operation, as well as the licensing itself. The other substantial expenses come from the construction and energy use of greenhouse and the labor required during the year as well as costs directly related to the maintenance of the plants themselves. After a discussion with Tony Kieffer, it was clear that the built-up greenhouse would be the largest cost to start up this operation due to it being an all seasons greenhouse of 5,000 ft^2. He gave us a quote of the cost per square foot for the closed greenhouse we'd use based on our clients wanting to use clones for cultivation and therefore needing to keep the mothers alive through the winter. This closed greenhouse would also be joined by an open greenhouse to help with propagation during the spring. The quote that Tony gave us allowed us to calculate both the construction and operating costs of the built-up greenhouse. Not only this, but regulation would require us to apply for an indoor license due to the type of supportive greenhouse our clients would want to build. Another large contributor that can limit farmers' ability to join this industry, by adding to the startup costs, is the security requirement in the regulation. A large fence, video cameras, and required storage of video data adds both to the startup cost and the operating costs later on. Finally, the licensing process itself requires a substantial investment not only because of the licensing fees present but the legal help necessary to complete this process. Overall, startup prices are steep; however, our revenue and profit forecast still shows opportunity in this industry.

Fence & security	$200,000
Greenhouse	$600,000
Labor	$250,000
Plant-related expenses	$150,000
Legal & licensing	$200,000
Equipment	$400,000
(Land)	$500,000
Sales & marketing	$100,000
Total	$2,550,000

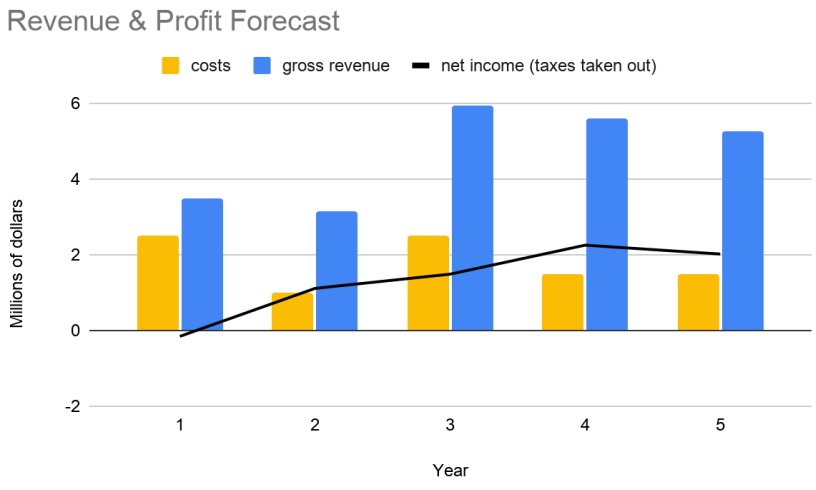


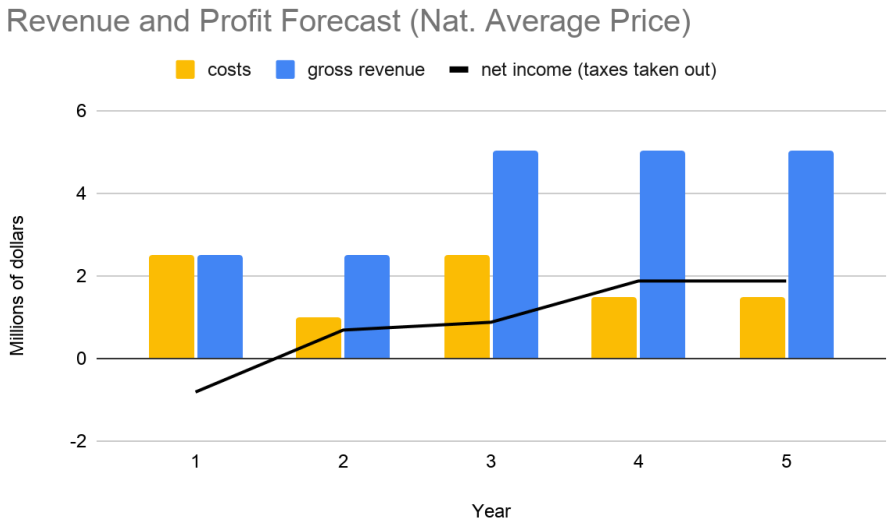
Revenue and Profit Forecast

The charts below show revenue and profit forecasts for the first five years of cultivation operations. They incorporate two different estimates for wholesale cannabis price. The first starts

with our estimated price of $2,500 per pound, based on the current average wholesale price in Massachusetts. The price then declines over time towards the national average price, reflecting how prices in MA will most likely decrease over time as more cultivators are licensed and as neighboring states legalize recreational marijuana. The second revenue and profit forecast is based on the national average price and is set at $1800 per pound. The gross revenue figures are based on 2000 lbs./acre and account for 30% crop loss. Costs account for start-up costs, operating expenses, and the cost of expanding to a Tier 11 size. The local, state, and federal taxes are also subtracted from profits.

Both estimates show negative income in the first year due to high start-up costs, but the start-up costs are paid off by the second year in the $2500/lb. model and by the third year in the $1800/lb. model. After that, net income is about $2 million per year. This model does not include possible product manufacturing and retail costs, but income would be reinvested to expand the business into those areas.





Our estimates for price

year	1	2	3	4	5
costs	2.5	1	2.5	1.5	1.5
gross revenue	3.15	3.5	5.95	5.6	5.25
minus 3% for the	3.0555	3.395	5.7715	5.432	5.0925
taxes	0.945	1.05	1.785	1.68	1.575
net income (taxe	-0.3895	1.345	1.4865	2.252	2.0175

National Average Price

Year	1	2	3	4	5
costs	2.5	1	2.5	1.5	1.5
gross revenue	2.24	2.52	5.04	5.04	5.04
minus 3% for the	2.1728	2.4444	4.8888	4.8888	4.8888
taxes	0.672	0.756	1.512	1.512	1.512
net income (taxe	-0.9992	0.6884	0.8768	1.8768	1.8768

Lending

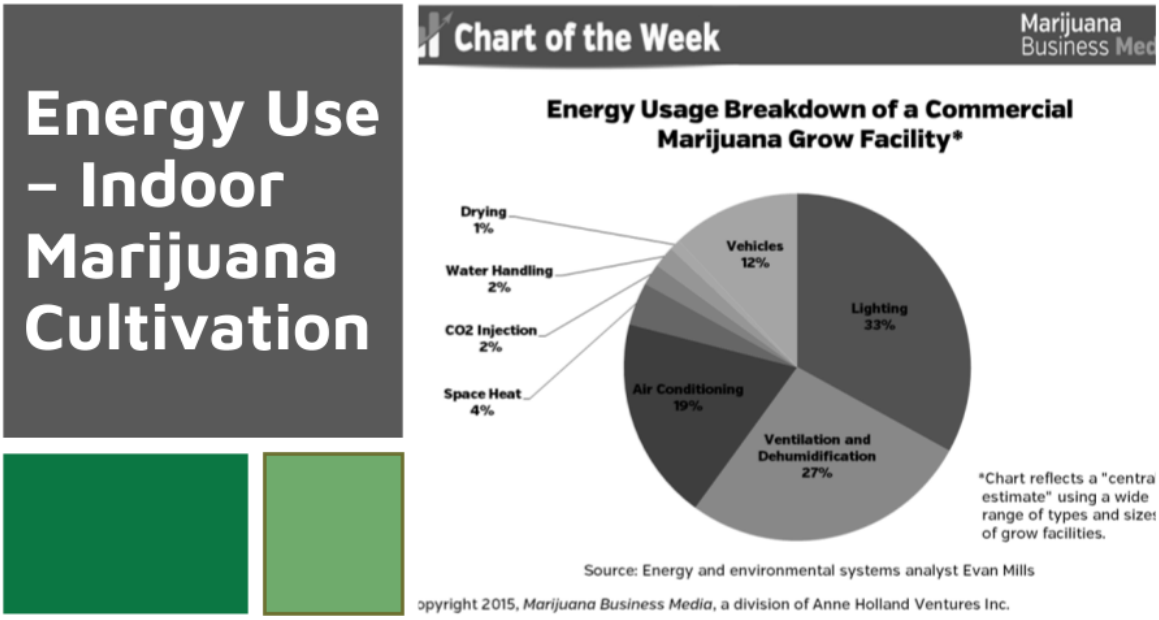
Due to federal prohibition, banks have been unwilling to provide loans to marijuana businesses. This presents a large challenge for anyone trying to enter the field independently. Recently, three Massachusetts institutions, Century Bank of Medford, GFA Credit Union, and BayCoast Bank, have begun lending to recreational cannabis enterprises. GFA is currently only

providing mortgages for property used for cannabis businesses, but is moving towards providing loans directly to operators, as well as providing insurance plans. So far, none of these banks have faced federal consequences, so more may soon begin lending to marijuana businesses (Adams). Commercial lending would make it far easier for farmers to enter the industry.

Appendix

License Types	Application Fees (Indoor/Outdoor)	Annual License Fee (Indoor/Outdoor)
Indoor or Outdoor Cultivator		
Tier 1: up to 5,000 square feet	$200 (I)/$100 (O)	$1,250 (I)/$625 (O)
Tier 2: 5,001 to 10,000 sq. ft.	$400 (I)/$200 (O)	$2,500 (I)/$1,250 (O)
Tier 3: 10,001 to 20,000 sq. ft.	$600 (I)/$300 (O)	$5,000 (I)/$2,500 (O)
Tier 4: 20,001 to 30,000 sq. ft.	$600 (I)/$300 (O)	$7,500 (I)/$3,750 (O)
Tier 5: 30,001 to 40,000 sq. ft.	$600 (I)/$300 (O)	$10,000 (I)/$5,000 (O)
Tier 6: 40,001 to 50,000 sq. ft.	$600 (I)/$300 (O)	$12,500 (I)/$6,250 (O)
Tier 7: 50,001 to 60,000 sq. ft.	$600 (I)/$300 (O)	$15,000 (I)/$7,500 (O)
Tier 8: 60,001 to 70,000 sq. ft.	$600 (I)/$300 (O)	$17,500 (I)/$8,750 (O)
Tier 9: 70,001 to 80,000 sq. ft.	$600 (I)/$300 (O)	$20,000 (I)/$10,000 (O)
Tier 10: 80,001 to 90,000 sq. ft.	$600 (I)/$300 (O)	$22,500 (I)/$11,250 (O)
Tier 11: 90,001 to 100,000 sq. ft.	$600 (I)/$300 (O)	$25,000 (I)/$12,500 (O)
Craft Marijuana Cooperative	Total fees for its canopy. If more than six locations, add $200 (I)/$100(O) per additional location.	Total fees for its canopy. If more than six locations, add $1,250(I)/$625(O) per additional location.
Microbusiness	$300	50% of all applicable fees
Manufacturing	$300	$5,000

Cannabis Control Commission license types



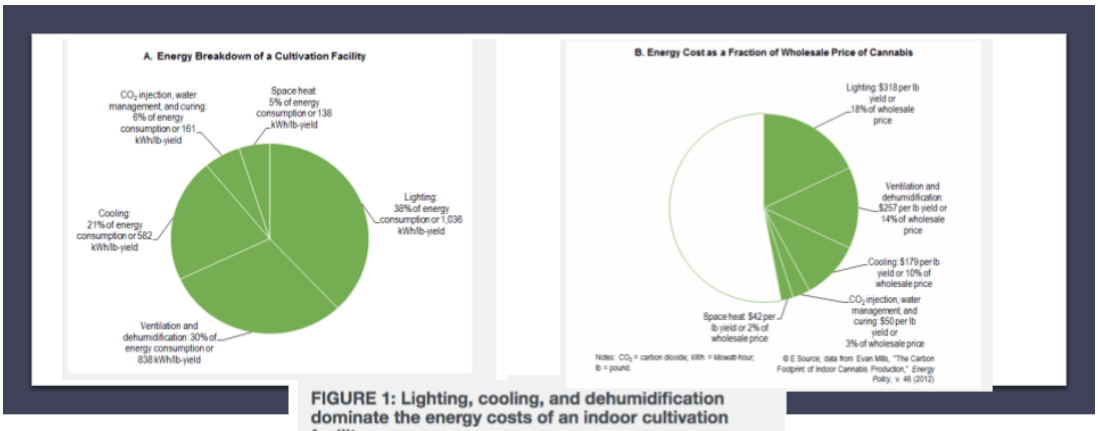
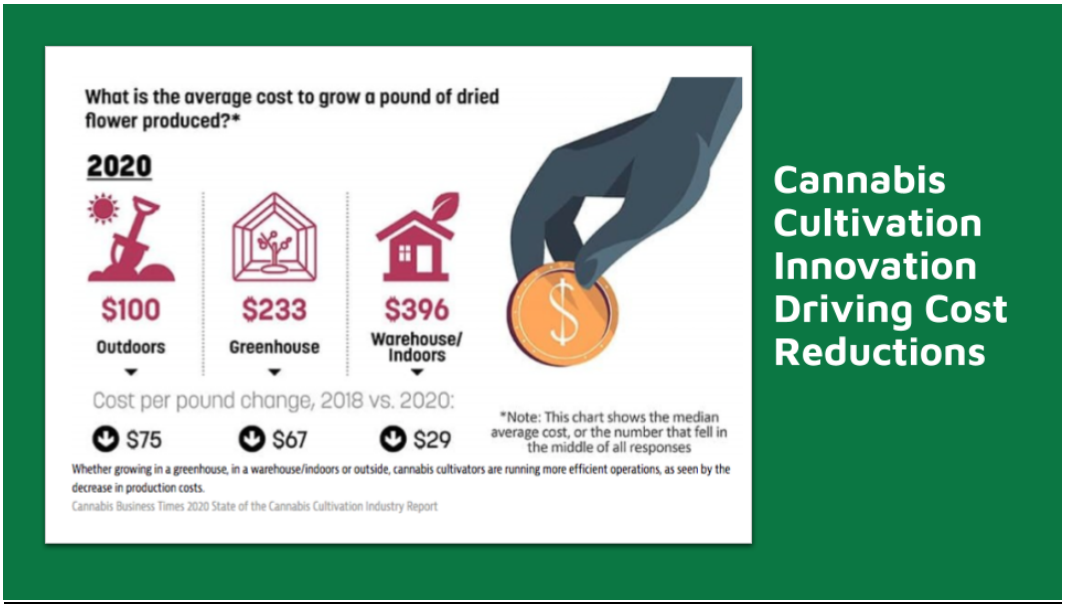


FIGURE 1: Lighting, cooling, and dehumidification dominate the energy costs of an indoor cultivation facility

Lighting constitutes the highest portion of the energy consumption of an indoor facility (A) and is also the main contributor to the cooling load, making the combined effects of indoor lighting the vast majority of load in indoor cannabis facilities. Energy costs make up almost 50 percent of the total wholesale cost of cannabis production (B), according to Evan Mills.

https://www.esource.com/tas-f-18/harvesting-energy-savings-indoor-agriculture-facilities

Indoor Energy Cost Breakdown



Production Cost Trends- National Data

*Not adjusted for Ma

47% of cultivators indicated their average production costs per pound of dried flower *grown outdoors* is less than $100.

When compared to 2018 data, as the chart above illustrates, the decreases are even more dramatic. Cultivators are continuing to utilize automation technology when cultivating, which could be increasing efficiency and lowering production costs. As noted in this year's report, competition and declining prices have been the top challenge for cultivators for multiple years, so decreasing the cost to produce a poun of flower may be a top priority.

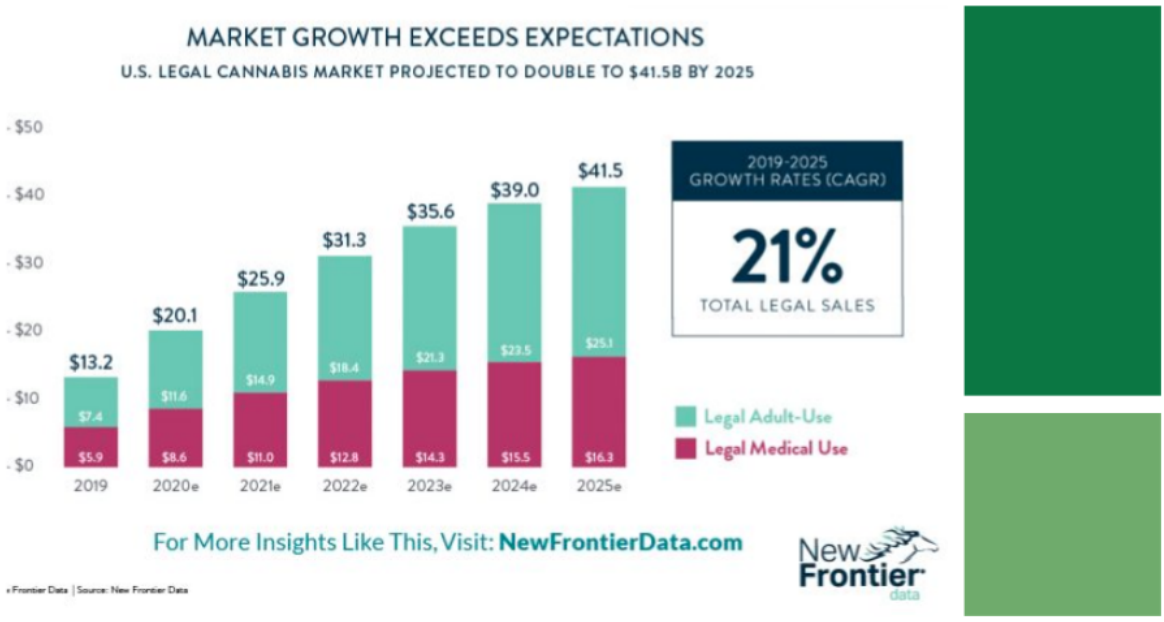
Dried Flower: Production Costs

What is your operation's average production cost per pound ($/lb.) of dried flower produced?

	Warehouse/Indoors	Greenhouse	Outdoors
$1,000 or more	7%	2%	5%
$700 - $999	15%	13%	2%
$500 - $699	14%	6%	5%
$400 - $499	8%	6%	1%
$300 - $399	12%	7%	6%
$200 - $299	7%	12%	11%
$100 - $199	17%	10%	16%
Less than $100	11%	29%	-
$50-$99	-	-	19%
Less than $50	-	-	28%
No answer	9%	13%	7%

Read more insights from *CBT's* 2020 "State of the Cannabis Cultivation Industry Report" by following the

https://www.cannabisbusinesstimes.com/article/cannabis-production-costs-research-data/



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