

North American Cannabis Lighting Market

Market Analysis and Forecast 2019

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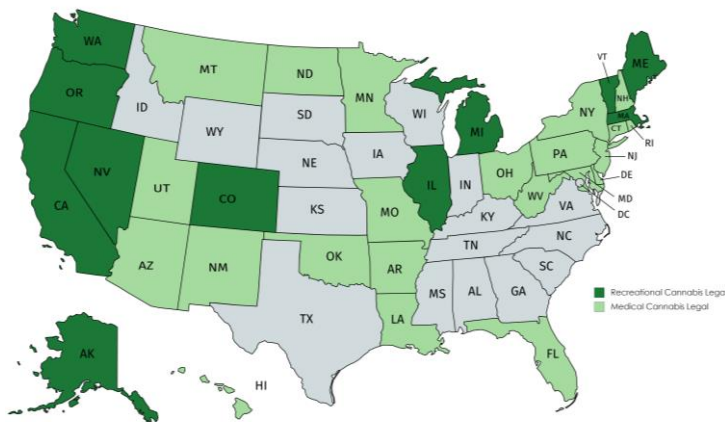
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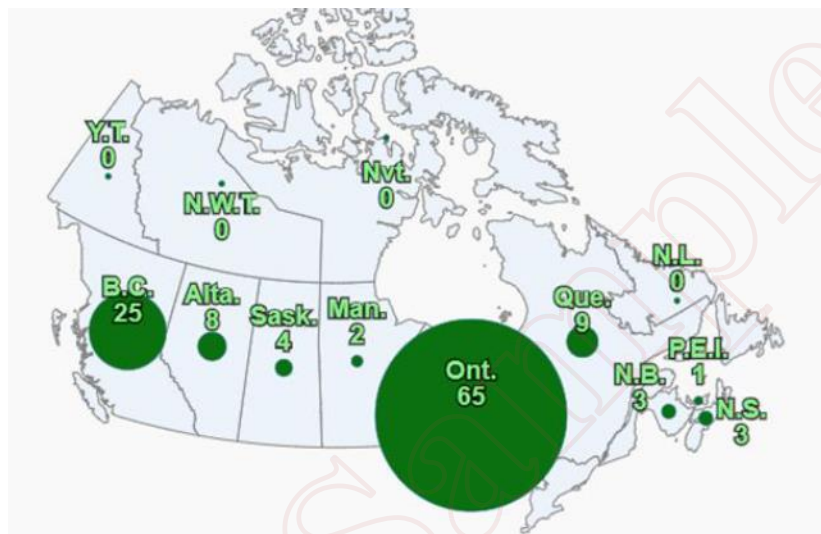
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Introduction



- Thirty-three states and the District of Columbia currently have laws broadly legalizing marijuana in some form, be it for recreational or medical use.
- This trend of medical and then recreational legalization in the United States is expected to continue as successful programs continue to generate revenue for states that implement them and as the stigma behind cannabis consumption continues to decrease.
- Since 2001, cannabis has been available for specialized medical use from dispensaries in several Canadian provinces, including British Columbia and Alberta. In 2017, the Canadian government passed a law making recreational marijuana legal, with the new law coming into effect on July 1, 2018.



- The main focus of this report is on determining the current and forecasted size of the overall market for cannabis lighting, with a specific emphasis on the market for LED lighting.



Definitions

Cannabis: The cannabis market in this report refers strictly to regions in North America where the cultivation and sale of marijuana is legal, breaking out the individual state for the United States and Canada as a whole.

Greenhouse: Controlled environments which are usually enclosed to moderate humidity, water levels, sunlight, and various other environmental factors for the plants being grown inside. The enclosure structure could vary from glass, plastic, and various other materials that allow for the penetration of sunlight and act as a barrier between the plants and the outside environment. Modern greenhouses include automatic watering systems such as booms or flood benches to improve efficiency and conserve water by recycling excess water back into the system. For the purpose of this study, Strategies Unlimited is only considering greenhouses where supplemental lighting is used.

Indoor Growing: Indoor growing takes place in warehouse style buildings where plants are provided with light solely through lighting systems. This system is most widely used in the growth of cannabis plants in the United States due to: industry regulations, the abundance of empty warehouses in several cities, and the (until recently) illegality of the plant, which made this the typical method of production.

Vertical Farming: The practice of growing fruits/vegetables using vertically stacked layers. The plants in this structure are grown under controlled environments which are usually enclosed to moderate humidity, water levels, sunlight, and various other environmental factors for the plants being grown inside. Vertical farms usually exclusively use supplemental lighting for plant growth.

While vertical farms have traditionally been used for leafy green products, it would not be unrealistic to expect other crops to be grown under these conditions in the near future as well, as both growing techniques and different varieties of plants evolve.



Methodology

- The suppliers, manufacturers, and end users within cannabis lighting usually track the market by looking at the area of lighting installed (by project) instead of lamps and/or luminaires installed. In order to comply with practices of revenue tracking methodologies within the horticulture lighting market, Strategies Unlimited is reporting lighting in terms of square feet of installations. This report pertains to lighting installations specifically in commercial size indoor, greenhouse, and vertical farm facilities.
- The report first established the existing installed base of greenhouses, vertical farms, and indoor grow areas through industry and government reports, interviews, and other research. After establishing the installed base, Strategies Unlimited conducted interviews and secondary research to surmise the portion of supplemental/artificial lighting being utilized in greenhouses, vertical farms, and indoor grow areas (indoor and vertical farms were assumed to use 100% supplemental lighting for growing plants).
- Lighting installations per year were assessed by sq.ft. installations due to new construction, lamps and luminaire failures (and replacements), and active replacements; these factors are described in more depth on the next page.

Methodology (Continued)

The total sq.ft. (M) of installations is calculated by the parameters discussed below:

- ***New construction***: This is derived from the construction of new square feet or area to the existing installed area of greenhouses and vertical farms. In other words, this parameter looks at how many new commercial greenhouse and vertical farm facilities (in terms of area) are being constructed yearly. In addition to new construction, SU also took an increase or decrease in supplemental lighting used in existing facilities.
- ***Reactive replacement due to failure***: This sums the square feet of lighting that needed to be replaced due to the number of lighting failures (in terms of area) from failure of light sources (both lamps and luminaires). This is directly related to the hours of operation of a light source and its lifetime of the technology.
- ***Active replacement***: This is the replacement of a light source before it reaches its end of usable life. If a traditional lighting system is replaced with an LED lighting system, then the new system would be assumed as an LED luminaire.



Provided Parameter (Value Type) in Supplemental Pivot Tool (Excel document)

- **Installed Base:** Total area in square feet where supplemental lighting is installed.
- **Sq.ft:** Total square footage where supplemental installations take place each year. This includes both lamp replacements in existing installations and luminaire replacements/installations.
- **ASP:** Average selling price per square foot of lighting installation (\$/sq.ft.).
- **Revenue:** Annual market in terms of US\$ Millions from supplemental lighting installations.
- **LED:** Lighting system using light emitting diodes as the light source.
- **Traditional/Incumbent:** Lighting technologies such as HID and fluorescent lighting; non-LED light sources.
- **Hybrid:** These are the installations that use both LED and traditional lighting in tandem. Growers may want to take advantage of the benefits of both lighting technologies, for instance, where they may want to ensure the DLI of a plant is reached while also saving energy. This practice may be achieved by installing both LED and traditional lighting with the goal to give plants more of a specific wavelength of light at different growing cycles of plants.

United States

North America
Summary

Canada

NORTH AMERICA

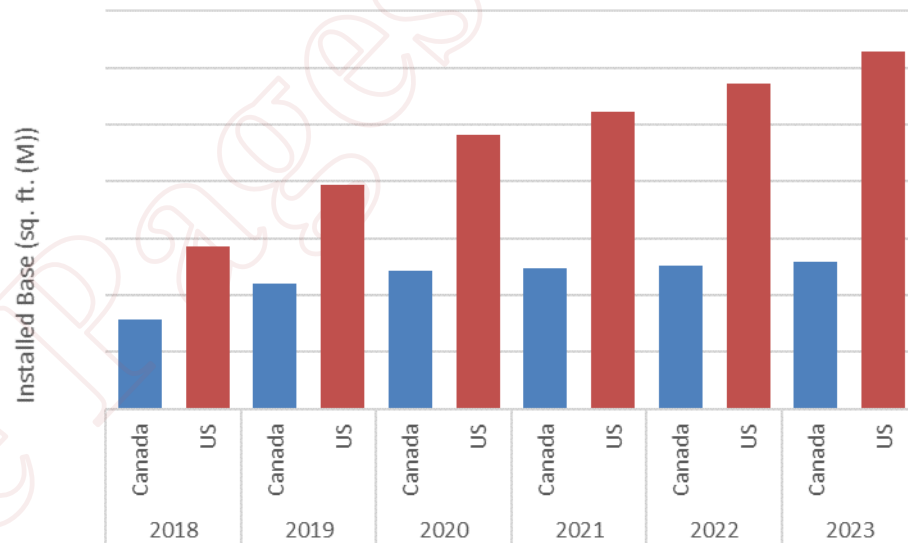
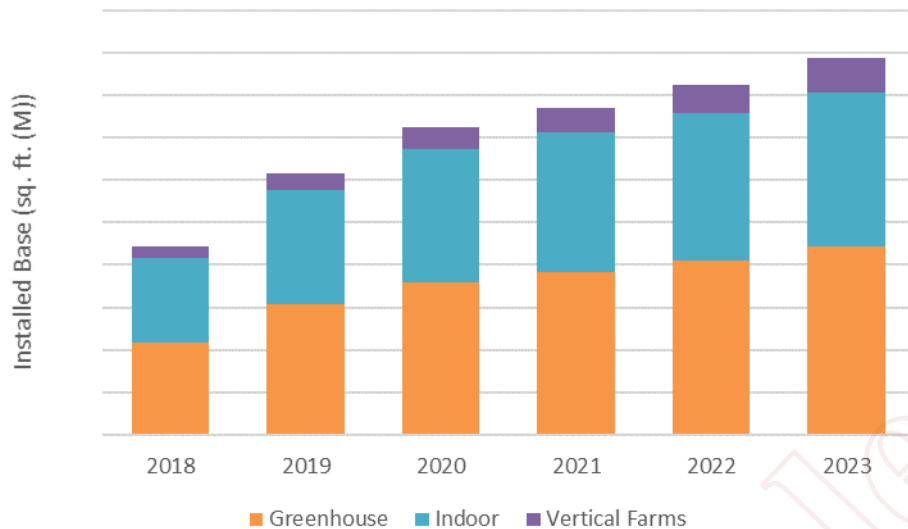




North America Data

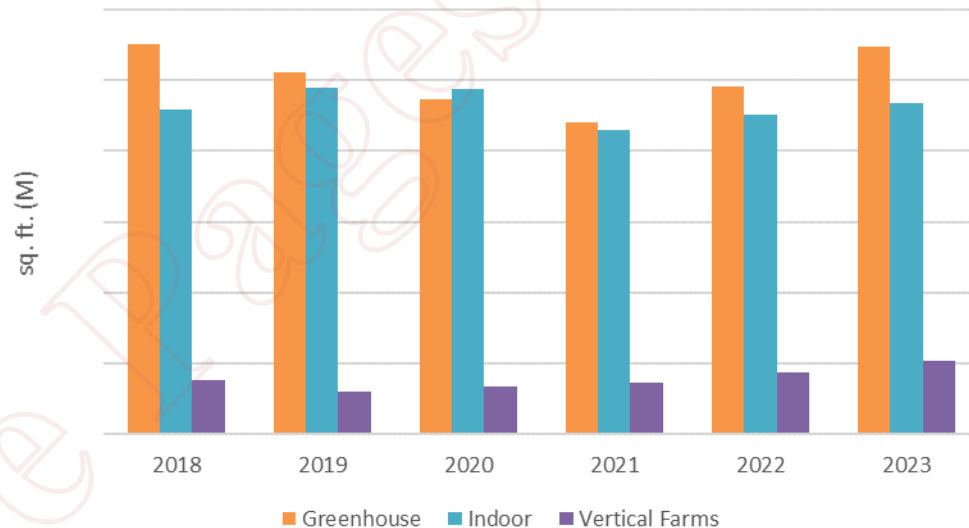
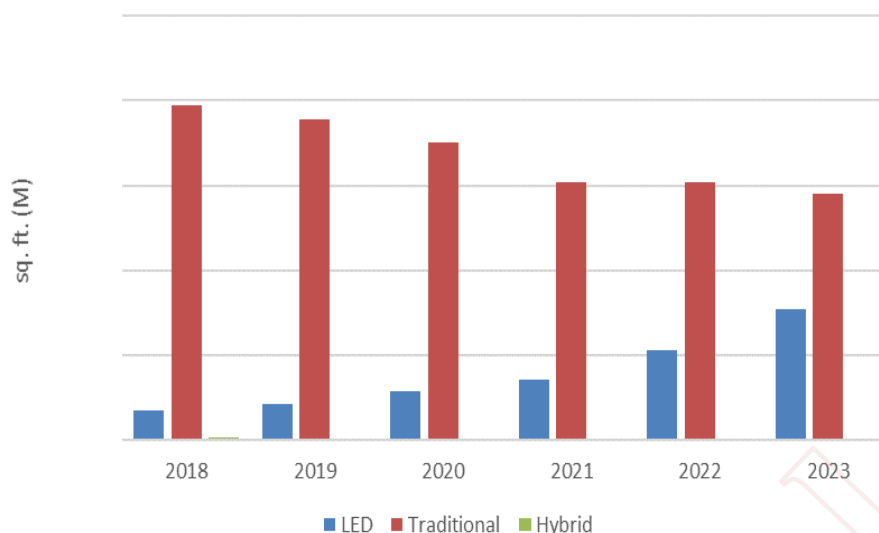


North America Cannabis Canopy Installed Base Sq.Ft. (M)



- Canada led the growth of canopy space in 2018 as distribution of recreational cannabis consumption started in July of that year. The country's heavy reliance on greenhouses means that in 2018 almost 50% of all canopy space was made up of these kinds of facilities.
- In 2018, Canada made up approximately 35% of the total installed base of canopy space in North America. However, the fact that so much of their canopy was built in 2018 will lead to a slowdown in growth and by 2023 the country will only comprise approximately 29% of North America's canopy space.

North America Annual Cannabis Lighting Installations Sq.Ft. (M)

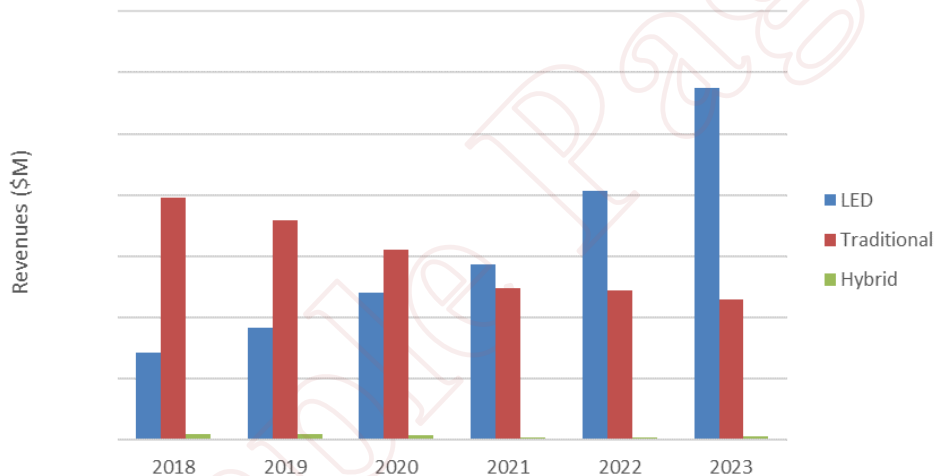


- The total square footage of lighting installations is expected to stay relatively flat in the forecast period as the industry experiences continued legalization of cannabis in different US states. In 2018 total installations amounted to approximately 22.5 million square feet and by 2023 it is forecasted to be approximately 23.5 million square feet of installations taking place.
- LED lighting only comprised approximately 2.2% of all lighting installations taking place in 2018, but by 2023, LED is expected to make up approximately 10.6% of all installations.



North America Cannabis Market (\$M)

North America	2018	2019	2020	2021	2022	2023	CAGR
Revenues Traditional (\$M)							
Sq. Ft Traditional(M)							
Revenues LED (\$M)							
Sq. Ft LED (M)							



- As LED penetration increases, the market is expected to have a CAGR from 2018 through 2023, with LED revenues overtaking traditional technology by 2021.
- The market for LED lighting is expected to grow from just under million to over million by 2023.

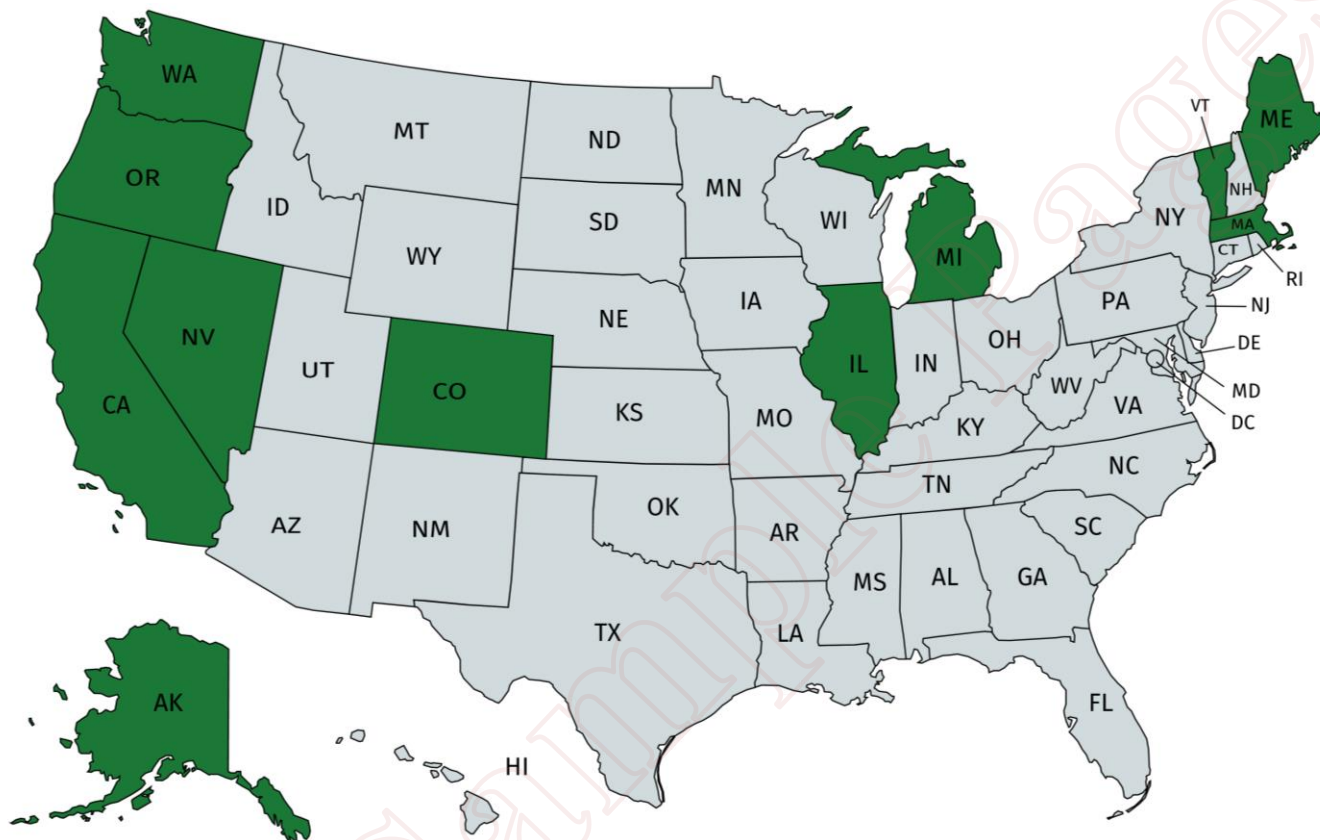
LED ASP (\$/Sqft)	2018	2019	2020	2021	2022	2023
Propagation	\$					
Vegetative	\$					
Flowering	\$					



United States Market and Data



Current Recreational Consumption Landscape

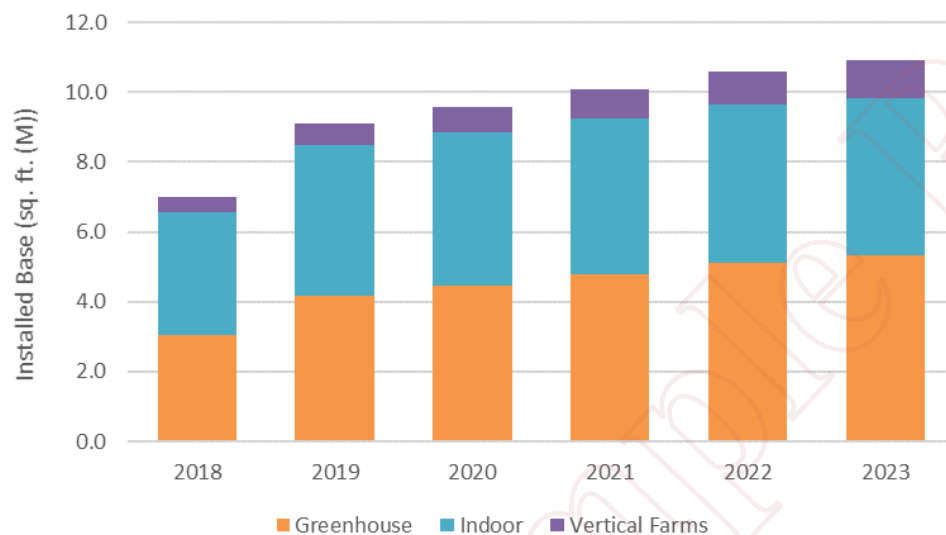


The recreational consumption of cannabis is currently legal in 11 US states and Canada.

California Cannabis Canopy Installed Base Sq.Ft. (M)



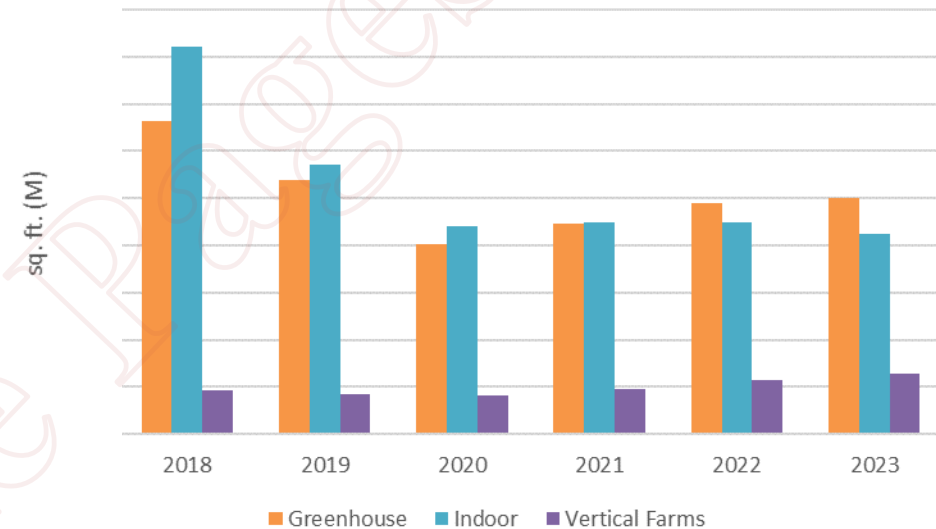
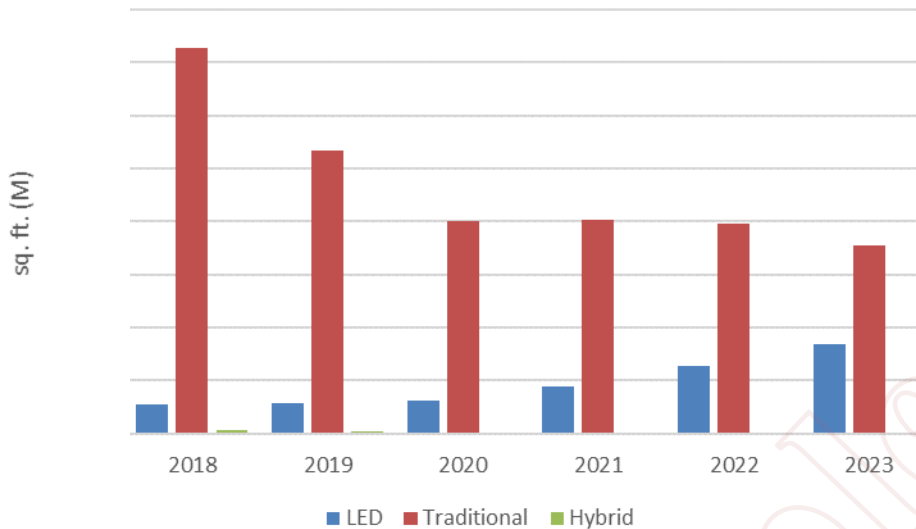
Total Sq. Ft	2018	2019	2020	2021	2022	2023	5 Yr. CAGR
Indoor							
Greenhouse							
Total							



It is estimated that of CA cannabis is grown outdoors, as basic greenhouses using soft plastic were counted as “outdoor” growing since they are not likely to use supplemental lighting

- Since the State only legalized recreational consumption in 2018, we saw substantial growth of canopy space that year and expect this to continue through 2019. However, the temperate climate in the state and vast growing area will allow for robust outdoor production, which means that canopy growth for indoor and greenhouse will not be as important when compared to that of less hospitable regions, e.g., Canada.

California Annual Cannabis Lighting Installations Sq.Ft. (M)

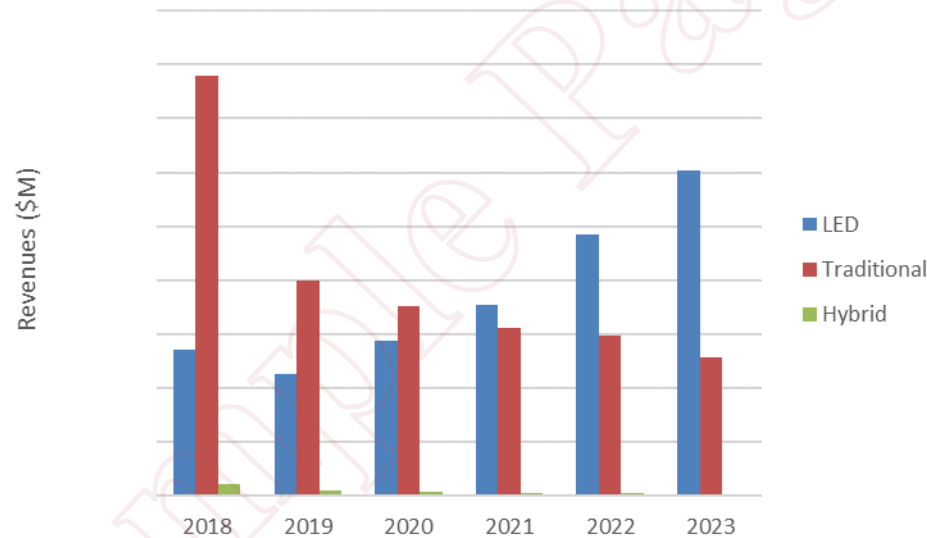


- As recreational usage of cannabis was made legal in 2018, we would expect the overall square footage of lighting installations to stay relatively flat in 2019.
- Traditional lighting made up over 80% of all installations in 2018 but by 2023, it is expected that LED will make up over 45% of all installations.
- As the share of greenhouse canopy expands in the state, it is forecasted to comprise a larger portion of all installations by 2022. Additionally, vertical farms are forecasted to make up over 15% of all installations in 2023, vs. 5% in 2018.

California Cannabis Lighting Market



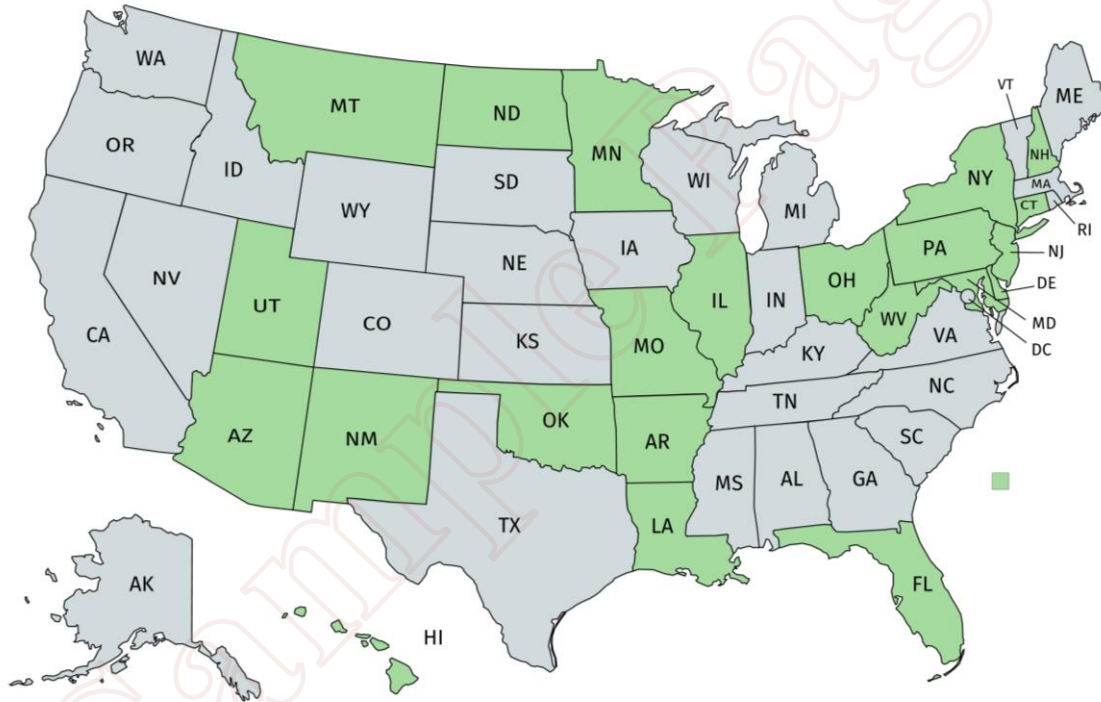
California	2018	2019	2020	2021	2022	2023	CAGR
Revenues Traditional (\$M)							
Sq. Ft Traditional(M)							
Revenues LED (\$M)							
Sq. Ft LED (M)							



- With so many installations taking place in 2018 as the market for recreational cannabis legalized, it is forecasted that the overall square footage of installations will decrease and then stabilize by 2022. However, the increased usage of LED lighting means that the overall lighting market will continue to grow, with LED lighting revenues surpassing those of traditional lighting by 2021.

U.S. Medical Cannabis

- For the purpose of this report, only states that have legalized use of the marijuana plant for medical purposes have been include. States that limit use to the non-psychoactive marijuana extract called cannabidiol (CBD) are not included in our analysis.



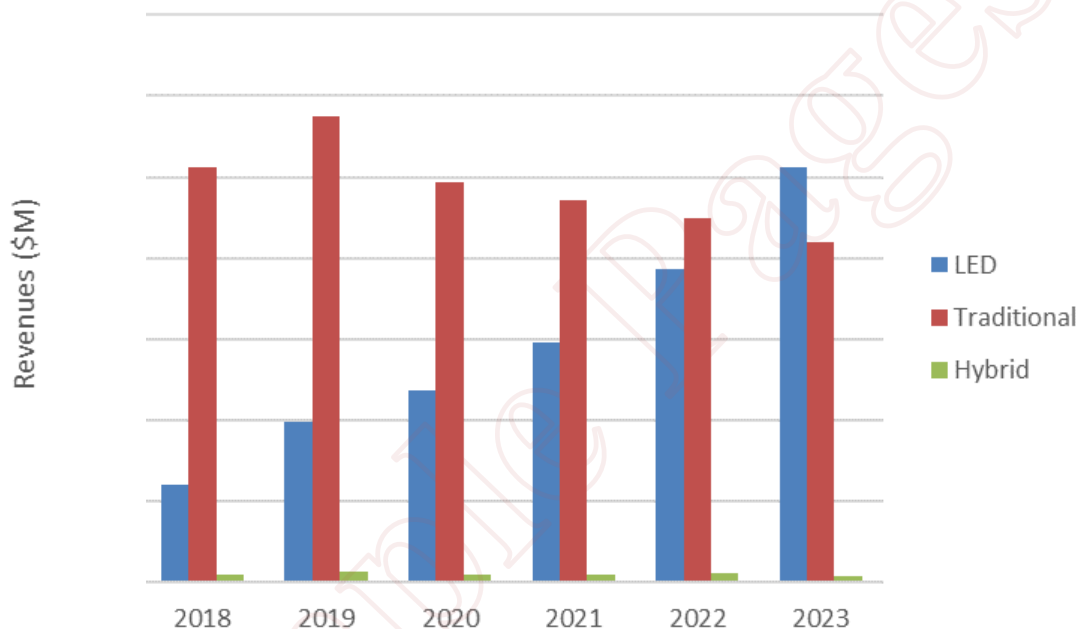


U.S. Medical Canopy Space 2018 by State

State	Estimated Growing Licenses (2018)	Estimated Canopy Square Footage (2018)	Estimated Qualified Patients (2018)
Arizona	61		
Arkansas	5		
Connecticut	4		
Delaware	3		
Florida	5		
Hawaii	16		
Maryland	15		
Minnesota	2		
Montana	390 Providers (30sqft per patient allowed)		
New Jersey	6		
New Mexico	77		
New York	10		
Ohio	24		
Rhode Island	3		
Utah	0		
North Dakota	2		
Missouri	0		
Louisiana	2		
West Virginia	0		
Pennsylvania	12	---	---

Estimated canopy square footage is based on several factors including: Number of growing licenses, cannabis production, the number of qualified patients by state and an annual average assumed consumption of cannabis by qualified patient (.75 pounds).

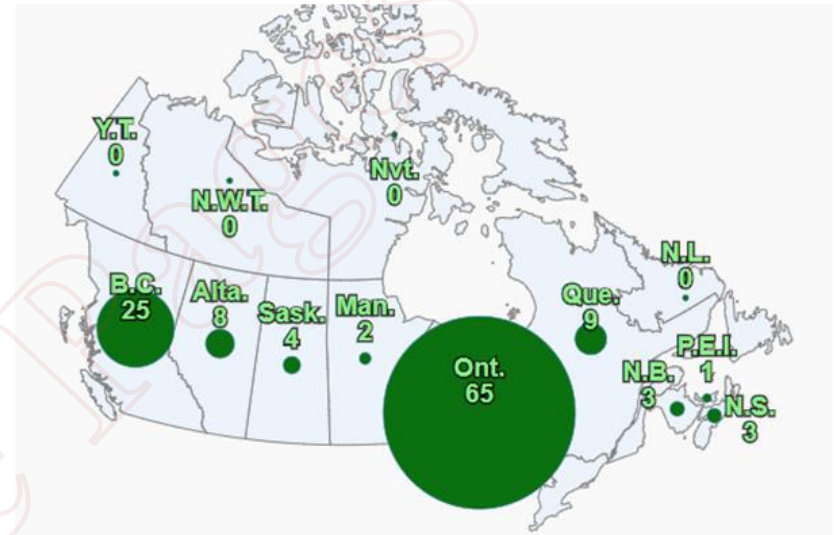
U.S. Medical Cannabis Market (\$M)



- The total market for medical cannabis lighting was worth approximately 100 million in 2018 and is expected to be worth just under 100 million in 2023, at which point the market for LED is forecasted to have overtaken that of traditional lighting and be worth approximately 70 million.

Canada Market and Data

Canada



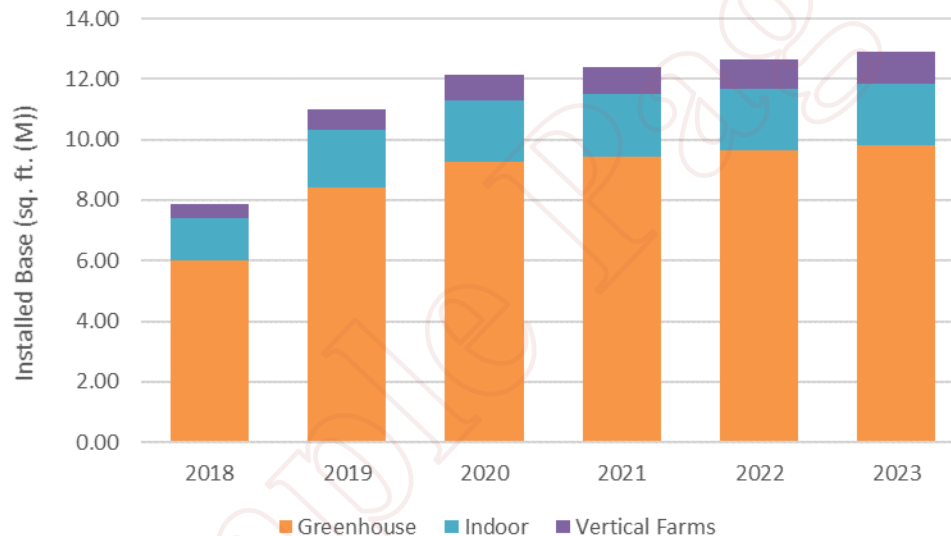
2017 (Left) and 2018 (Right) cannabis licenses

- Since 2001, cannabis has been available for specialized medical use from dispensaries in several Canadian provinces, including British Columbia and Alberta. In 2017, the Canadian government passed a law making recreational marijuana legal, with the new law coming into effect on July 1, 2018.
- In October 2018, there were 125 licensed cannabis producers in the market, up from approximately 60 in 2017.

Source: <https://www.canada.ca>

Canada Cannabis Canopy Installed Base Sq.Ft. (M)

Total Sq. Ft	2018	2019	2020	2021	2022	2023	5 Yr. CAGR
Indoor							
Greenhouse							
Total							



- Canada had a robust medical cannabis market in place, but the federal legalization of cannabis for recreational purposes created an immense construction boom in the market in 2018 that is following through to 2019. In 2018, there were approximately 7.8 million square feet of canopy space, which is expected to grow to over 11 million in 2019 and approximately 12.8 million by 2023.
- The fact that cannabis is federally legal in Canada means that it can produce more cannabis for consumption abroad.