

## U.S. CANNABIS INVESTMENT REPORT 2016



## Overview

- Cannabis is federally illegal in the United States. However, as of the date of this report, 39 states have legalized cannabis in some form for recreational or medicinal use.
- The current consumer market for recreational and medicinal cannabis in the United States is estimated to be more than \$40 billion, including both legal and illegal consumption.
- We believe that it is a question of when—not if—the federal prohibition on cannabis will end. In analyzing how the end of prohibition may affect the cannabis industry, we have assumed that prohibition ends by 2020. However, even with federal prohibition, the cannabis industry today is large and dynamic.
- We estimate that the U.S. cannabis consumer market for legalized recreational and medicinal use was \$4.4 billion in 2015 and will grow to \$9.5 billion in 2019. Once legalized federally, we estimate this market will grow to \$37 billion within 5 years and \$50 billion within 10 years.
- Potential cannabinoid-based therapeutic applications have been identified for more than 40 medical conditions, including arthritis, cancer, chronic pain, epilepsy, glaucoma and HIV/AIDS. While this market will not develop until after the end of prohibition, we believe that the future cannabinoid-based pharmaceuticals market may ultimately exceed \$50 billion annually.
- Therefore, we believe that there is a potential \$100 billion market for cannabis. A broad range of investment opportunities exists both now and in the future for sophisticated investors who are willing to take significant risks.

## The “Green Gold Rush”

## Contents

- Foreword
- I Executive Summary
- II Legislative Landscape; Legal Issues for Investor Consideration
- III Cannabis 101
- IV U.S. Cannabis Market Estimates
- V Industry Segmentation
- VI Capital Markets for Cannabis Companies
- VII Top 100 Private Cannabis Companies 2016
- VIII Industry Risk Factors
- IX Glossary of Terms
- Disclosures, Disclaimers, Sources and Use of This Report
- Ackrell Capital Team Leaders
- *Inside Back Cover: The Green Field 2016*

## About Ackrell Capital

Founded in 2003, Ackrell Capital is a leading independent investment bank focused on emerging growth companies. Ackrell Capital’s principals have completed more than 300 corporate finance and M&A transactions valued at more than \$50 billion during the last 25 years. Ackrell Capital’s expertise includes:

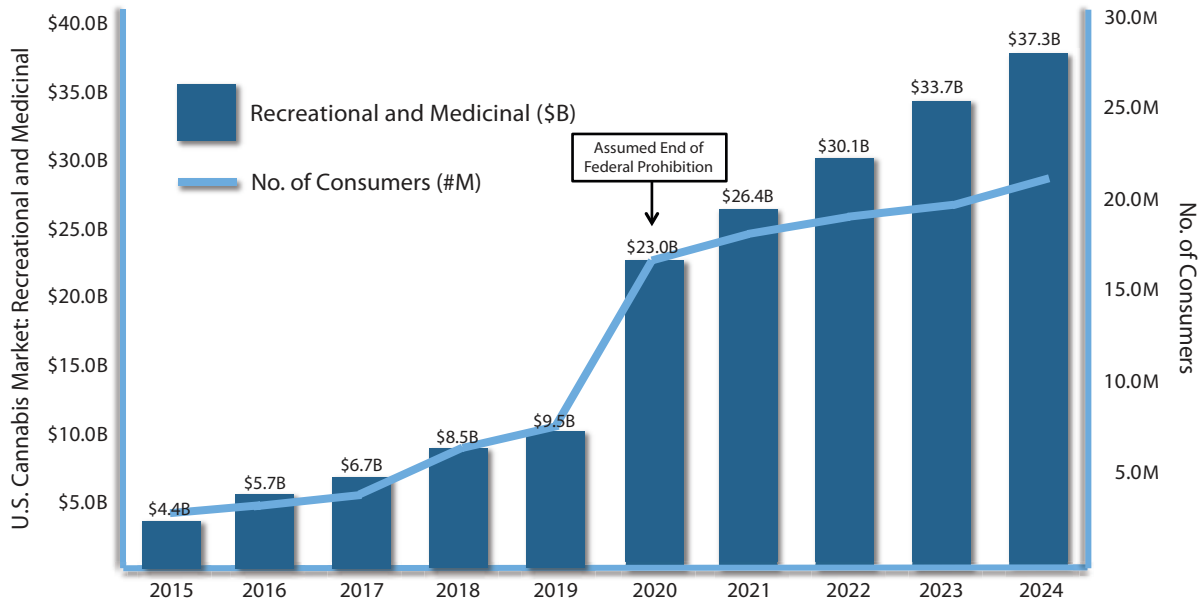
- Private Equity
- Mergers and Acquisitions Advisory Services
- Private Placements of Debt or Equity
- Corporate Development Services
- Cannabis, Consumer, Technology, Digital and Other Emerging Growth Industries

Ackrell Capital is located in San Francisco, CA. Ackrell Capital is a member of FINRA and SIPC.

# Report Highlights

## U.S. Cannabis Consumer Market: Recreational and Medicinal

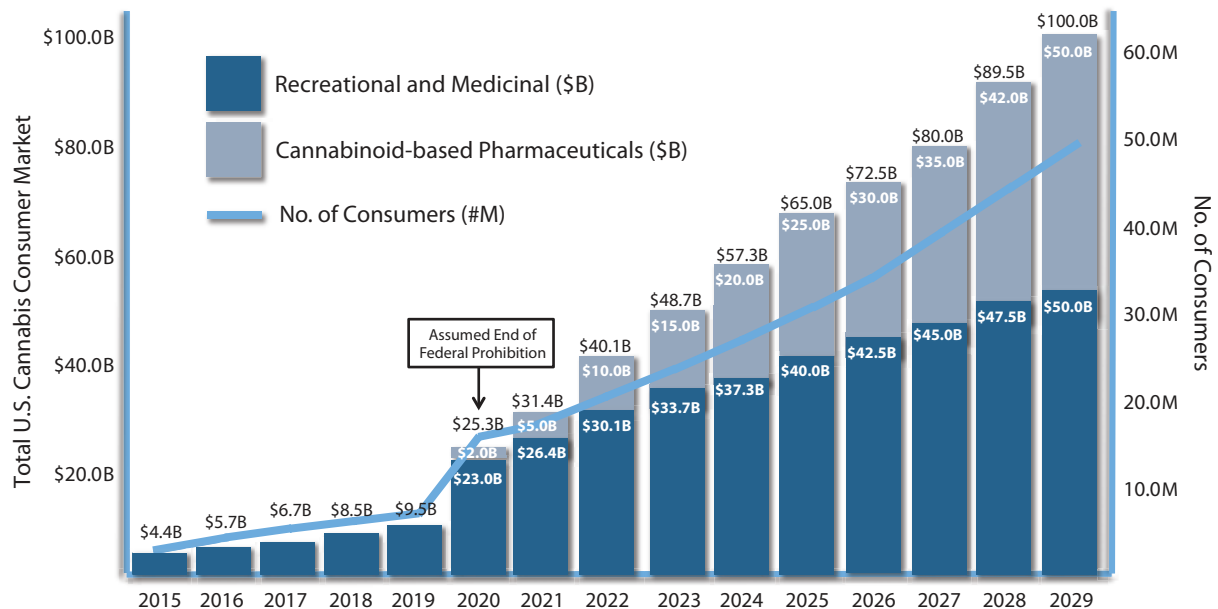
**\$37B Market by 2024 with 22M Consumers**



Source: Ackrell Capital estimates. See Chapter IV: U.S. Cannabis Market Estimates.

## Total U.S. Cannabis Consumer Market: Including Pharmaceuticals

**\$100B Market by 2029 with 50M Consumers**



Source: Ackrell Capital estimates. See Chapter IV: U.S. Cannabis Market Estimates.

## 23 Legalized States and the District of Columbia

	Medicinal Use	Recreational Use
Alaska	•	•
Arizona	•	
California	•	
Colorado	•	•
Connecticut	•	
Delaware	•	
Hawaii*	•	
Illinois	•	
Maine	•	
Maryland*	•	
Massachusetts	•	
Michigan	•	
Minnesota	•	
Montana	•	
Nevada	•	
New Hampshire*	•	
New Jersey	•	
New Mexico	•	
New York	•	
Oregon	•	•
Rhode Island	•	
Vermont	•	
Washington	•	•
Washington, D.C.	•	On Hold

Note: Asterisk indicates a state with no dispensaries. Consumers may cultivate their own plants or purchase cannabis from a qualified caregiver. Hawaii has recently passed legislation approving a limited number of medicinal dispensaries to open in July 2016.

## 16 "Limited Use" States and 3 "Decriminalized" States

	Limited Use	Decriminalized	No Legal Use
Alabama	•		
Arkansas			•
Florida	•		
Georgia	•		
Idaho			•
Indiana			•
Iowa	•		
Kansas			•
Kentucky	•		
Louisiana	•		
Mississippi	•		
Missouri	•		
Nebraska		•	
North Carolina	•		
North Dakota			•
Ohio		•	
Oklahoma	•		
Pennsylvania			•
South Carolina	•		
South Dakota			•
Tennessee	•		
Texas	•		
Utah	•		
Virginia		•	
West Virginia			•
Wisconsin	•		
Wyoming	•		

Note: "Limited Use" denotes states that have approved the use of selected cannabis-based products in limited circumstances. "Decriminalized" denotes states that ignore small violations and "No Legal Use" denotes states where cannabis is fully illegal.

## Leading U.S. Presidential Candidates: Positions on Legalization of Cannabis

	Full Legalization for Recreational and Medicinal Use	Against Recreational Use	State Regulation For Medicinal Use	FDA-Approved Products Only	Against Federal and State Legalization
<b>Republican</b>					
Donald Trump		•	•		
Ted Cruz		•	•		
Marco Rubio		•		•	
John Kasich		•	•		
Ben Carson		•	•		
<b>Democratic</b>					
Hillary Clinton		•	•		
Bernie Sanders	•				

Note: Newly elected Canadian Prime Minister Justin Trudeau has indicated that he intends to legalize cannabis for recreational use in Canada.

## Cannabis Industry Segmentation

### 6 Segments: 14 Subsegments Identified

Production			Retail Distribution		Business Software	Business Solutions
Cultivation	Production Equipment and Supplies	Laboratory-Testing Equipment and Services	Dispensaries	e-Commerce	Business Services	
Consumer Products			Cannabinoid-based Therapeutics		Online Content and Networking	Digital Media
Flower and THC Concentrates	Edibles, Topicals and Nutraceuticals	Vaporizers and Accessories	CBD Concentrates	Pharmaceuticals	Online Directories	

## 20 Most Common Qualifying Medical Conditions for Medicinal Cannabis Treatment

### Preliminarily Identified Applicable Cannabinoids

	THC	CBD	CBC	CBG	CBGA	CBN	THCA	THCV
Alzheimer's	•							•
Amyotrophic lateral sclerosis (ALS)	•	•				•		
Anorexia	•							
Arthritis	•	•						
Cachexia	•	•						
Cancer	•	•	•	•			•	
Chronic pain	•	•	•		•	•	•	
Crohn's disease				•				
Epilepsy		•						
Glaucoma	•	•		•				
Hepatitis C	•	•						
HIV/AIDS	•	•						
Inflammation		•	•	•	•		•	
Migraine	•	•						
Multiple sclerosis	•							
Nausea	•	•					•	
Nervous system degeneration		•						
Parkinson's disease		•						
Post-traumatic stress disorder (PTSD)		•						•
Spasms	•	•				•	•	

## Foreword

Ackrell Capital is pleased to present our U.S. Cannabis Investment Report 2016. We created this report to provide sophisticated investors with a framework for analyzing the emerging U.S. cannabis industry. In this report, you will find useful information on the cannabis industry, including an overview of the basics of cannabis, the legislative landscape, legal issues for investors to consider, market estimates, industry segmentation, an overview of the capital markets for cannabis companies, industry risk factors, our inaugural list of the *Top 100 Private Cannabis Companies*, and our industry landscape, *The Green Field 2016*.

Why did we write this report? Because we believe that the accelerating momentum toward cannabis legalization and the growth of this newly created market will result in the “green gold rush” of our generation. We also wanted to give the reader a modern understanding and perspective of the cannabis industry.

Cannabis is federally illegal in the United States. However, as of the date of this report, 39 states have legalized cannabis in some form for recreational or medicinal use. We believe that the trend toward expanded legalization at the state level will continue: a number of states are expected to hold voter referendums on this issue in the next few years.

We believe that it is a question of when—not if—the federal prohibition on cannabis will end. We believe that there is a reasonable chance the end of prohibition will occur by the end of the next one or two presidential terms. If pressed, we would say the former. In analyzing how the end of prohibition may affect the cannabis industry, we have assumed prohibition ends by 2020. However, even with federal prohibition, the cannabis industry today is large and dynamic.

We divide the cannabis market into two categories: the current cannabis consumer market for legalized recreational and medicinal use and the future market for cannabinoid-based pharmaceuticals. We estimate that the U.S. cannabis consumer market for legalized recreational and medicinal use was \$4.4 billion in 2015 and will grow to \$9.5 billion in 2019. Once legalized federally, we estimate this market may ultimately exceed more than \$50 billion annually, with more than 30 million consumers.

In the states where cannabis is legal for medical use, potential cannabinoid-based therapeutic applications have been identified for more than 40 medical conditions, including arthritis, cancer, chronic pain, epilepsy, glaucoma and HIV/AIDS. While this market will not develop until after the end of prohibition, we believe that the future cannabinoid-based pharmaceuticals market may ultimately exceed more than \$50 billion annually, with more than 20 million consumers.

The cannabis industry is still in a very early stage of development and the investment risks are not inconsequential. Deciding if, when and how to invest in the cannabis industry will not be easy. Ackrell Capital has prepared this report to assist prospective sophisticated investors in this process.

Sincerely,

The Ackrell Capital Cannabis Team

## ■ Table of Contents

<b>CHAPTER I</b>	<b>Executive Summary .....</b>	<b>1</b>
	The “Green Gold Rush”	
	Investment Outlook and Final Thoughts	
<b>CHAPTER II</b>	<b>Legislative Landscape; Legal Issues for Investor Consideration .....</b>	<b>15</b>
	Legislative Landscape	
	Legislative Outlook	
	Other Legal Issues for Investor Consideration	
<b>CHAPTER III</b>	<b>Cannabis 101 .....</b>	<b>25</b>
	Overview	
	Medicinal Applications of Cannabinoids	
	Negative Side Effects of Cannabis Consumption	
	Cultivation	
	Consumer Products	
	Retail Pricing	
	Ingestion Methods	
	Cannabinoid-based Therapeutics	
<b>CHAPTER IV</b>	<b>U.S. Cannabis Market Estimates .....</b>	<b>43</b>
	Key Market Growth Drivers	
	Market Estimate Methodology	
	The Total U.S. Cannabis Consumer Market	
<b>CHAPTER V</b>	<b>Industry Segmentation.....</b>	<b>51</b>
	Production	
	Retail Distribution	
	Consumer Products	
	Cannabinoid-based Therapeutics	
	Business Solutions	
	Digital Media	
<b>CHAPTER VI</b>	<b>Capital Markets for Cannabis Companies .....</b>	<b>67</b>
	Overview	
	Selected Precedent Transactions	
<b>CHAPTER VII</b>	<b>Top 100 Private Cannabis Companies 2016 .....</b>	<b>71</b>
<b>CHAPTER VIII</b>	<b>Industry Risk Factors .....</b>	<b>99</b>
<b>CHAPTER IX</b>	<b>Glossary of Terms .....</b>	<b>103</b>
	<b>Disclosures, Disclaimers, Sources and Use of This Report .....</b>	<b>107</b>
	<b>Ackrell Capital Team Leaders .....</b>	<b>108</b>
<b>FRONT COVER</b>	<b>Report Highlights</b>	
<b>BACK COVER</b>	<b>The Green Field 2016</b>	

# CHAPTER I

## Executive Summary

### ■ The “Green Gold Rush”

The early stage of the legal cannabis market has the makings of a “green gold rush.” The groundswell of public support for legalization of cannabis and the demand for cannabis-based products is fueling industry growth at a pace rarely seen for a retail product since the end of Prohibition. The current momentum by states to legalize cannabis for medicinal and recreational use is creating the foundation for a U.S. cannabis retail market that we expect may ultimately exceed \$100 billion annually, with more than 50 million consumers.

A cultural and generational shift in public attitude is occurring as awareness increases regarding the potential medicinal and recreational benefits of cannabis. Advancements in cannabis cultivation and extraction processes have enabled the development of thousands of different cannabis strains or derivative products to meet the varying needs of medicinal and recreational consumers. In addition, potential cannabinoid-based therapeutic applications have been identified for more than 40 medical conditions, including arthritis, cancer, chronic pain, epilepsy, glaucoma and HIV/AIDS. Many of these conditions affect millions of people, and most of these conditions currently have multi-billion-dollar annual treatment costs. As the efficacy of cannabinoid-based treatments becomes better understood, we believe that cannabinoid-based pharmaceuticals may become viable treatment alternatives in these large, addressable markets.

The use and trade of cannabis is prohibited under federal law because cannabis is designated as a Schedule I substance under the Controlled Substance Act of 1970 (CSA). This designation was made more than 45 years ago (under the Nixon Administration), during a time of broad public opinion against hallucinogenic or highly addictive substances, such as LSD and heroin. Despite federal prohibition, and due to state legalization momentum, the U.S. Department of Justice has enacted policies and the U.S. Congress has adopted spending bills that defer to the states to monitor such activities as long as certain standards are met.

As of the date of this report, 23 states and the District of Columbia have legalized the purchase and sale of cannabis for a broad range of medical conditions, while 4 of those states—Alaska, Colorado, Oregon and Washington—have legalized cannabis for recreational use by adults aged 21 or older. In addition, 16 other states have legalized the limited use of cannabis. This legalization movement has resulted in the growth of cannabis dispensaries, or retail outlets, in legalized states and locally approved

jurisdictions. At dispensaries, consumers may purchase a multitude of cannabis-based products for medicinal and recreational uses. The legal status of each state and the District of Columbia is as follows.

23 Legalized States and the District of Columbia			16 "Limited Use" States and 3 "Decriminalized" States		
	Medicinal Use	Recreational Use		Limited Use	No Legal Use
Alaska	●	●	Alabama	●	
Arizona	●		Arkansas		●
California	●		Florida	●	
Colorado	●	●	Georgia	●	
Connecticut	●		Idaho		●
Delaware	●		Indiana		●
Hawaii*	●		Iowa	●	
Illinois	●		Kansas		●
Maine	●		Kentucky	●	
Maryland*	●		Louisiana	●	
Massachusetts	●		Mississippi	●	
Michigan	●		Missouri	●	
Minnesota	●		Nebraska		●
Montana	●		North Carolina	●	
Nevada	●		North Dakota		●
New Hampshire*	●		Ohio		●
New Jersey	●		Oklahoma	●	
New Mexico	●		Pennsylvania		●
New York	●		South Carolina	●	
Oregon	●	●	South Dakota		●
Rhode Island	●		Tennessee	●	
Vermont	●		Texas	●	
Washington	●	●	Utah	●	
Washington, D.C.	●	On Hold	Virginia		●
			West Virginia		●
			Wisconsin	●	
			Wyoming	●	

Note: Asterisk indicates a state with no dispensaries. Consumers may cultivate their own plants or purchase cannabis from a qualified caregiver. Hawaii has recently passed legislation approving a limited number of medicinal dispensaries to open in July 2016.

Note: "Limited Use" denotes states that have approved the use of selected cannabis-based products in limited circumstances. "Decriminalized" denotes states that ignore small violations and "No Legal Use" denotes states where cannabis is fully illegal.



This trend toward liberalization of cannabis laws at the state and local levels is being driven by a variety of factors, including the growing demand for medicinal and recreational cannabis, the potential economic impact of local cannabis-related businesses and the expected impact on tax revenues.

We divide the cannabis market into two categories: the current cannabis consumer market for recreational and medicinal use, and the future market for cannabinoid-based pharmaceuticals. We estimate that the U.S. cannabis consumer market for legalized recreational and medicinal use was \$4.4 billion in 2015, with 4.1 million consumers, and will grow to \$9.5 billion in 2019, with 7.3 million consumers. Once legalized federally, we estimate that this market will grow to \$37 billion within 5 years, with 22 million consumers, and \$50 billion within 10 years, with 30 million consumers. We believe that within 10 years after the end of federal prohibition, the cannabinoid-based pharmaceuticals market may exceed \$50 billion annually, with more than 20 million consumers. Therefore, we believe that the combined total market for cannabis in the United States may ultimately reach \$100 billion annually, with more than 50 million consumers.

While this report focuses on the U.S. market, we believe that the international market has the potential to exceed \$500 billion annually, with more than one billion consumers worldwide. In 2013, Uruguay became the first nation to legalize cannabis for recreational use. Canada has a national medical cannabis program and a newly elected prime minister who has stated his intention to legalize cannabis for recreational purposes. In December 2015, the president of Colombia signed a decree legalizing and regulating the cultivation, processing and exportation of medical cannabis in Colombia. In addition, numerous other countries—including Brazil, Chile, Mexico, Poland, Portugal and Switzerland—have expressed interest in legalizing or decriminalizing the use of cannabis. Similar to the United States, we expect the worldwide trend of legalizing cannabis to continue and accelerate. Over time, we believe that U.S. companies will be leading participants in the global cannabis market as it develops.

## Potential End of the Federal Prohibition on Cannabis

The cannabis market is currently constrained by the effects of federal prohibition and, to a lesser extent, by restrictions at the state and local levels. As a result of cannabis being designated a Schedule I controlled substance, interstate commerce in cannabis is illegal, commercial banking regulations for cannabis companies are restrictive, credit card processing providers are unwilling to work with cannabis companies, and federal tax income laws and regulations do not permit a cannabis business to deduct certain operating expenses for federal income tax purposes. In addition, no prescriptions are allowed to be written for Schedule I substances and, moreover, it is a Class 1 federal felony to conduct any otherwise legitimate scientific research on Schedule I substances. Notwithstanding these challenges, cannabis businesses have emerged in selected safe-haven jurisdictions, with the anticipation that federal and state laws will ultimately be reconciled.

Due to the time elapsed since inclusion of cannabis as a Schedule I substance under the CSA, and the evolution of perspectives regarding the potential medicinal efficacy and safety of cannabis, there is a growing consensus to reassess the status of cannabis as a regulated substance under the CSA. The CSA classifies five schedules (classifications) of substances, each with specific qualifications. Two federal agencies, the Drug Enforcement Administration (DEA) and the Food and Drug Administration (FDA), now determine which substances are added to or removed from the various schedules, after

the U.S. Congress created the initial listing. Classifications under the CSA are based on three criteria:

- (i) the degree to which a substance has the potential for abuse;
- (ii) whether there is a currently accepted medical use in the United States; and
- (iii) whether there is a lack of accepted safety for use under medical supervision.

A Schedule I substance is any substance (i) that is considered to have a high potential for abuse; (ii) has no currently accepted medical use in the United States; and (iii) for which there is a lack of accepted safety for use under medical supervision.

Currently, Schedule I substances include heroin, ecstasy, LSD, peyote and cannabis. Cocaine and crystal methamphetamine are Schedule II substances. The substances on each successive schedule are purportedly less harmful. For example, Schedule V substances include cough suppressants containing small amounts of codeine, preparations containing small amounts of narcotic drugs, and other substances containing small doses of regulated substances.

### **Current Cannabis Assessment Under the CSA**

- ***CSA Criteria 1: Potential for Abuse*** More studies are indicating that the potential for abuse of cannabis may be lower than that of other legal substances, such as alcohol and tobacco. Medical scientists are just now developing dosing schedules for cannabis-based products. Over time, standardized dosages will emerge so doctors can more readily and safely prescribe effective and targeted cannabis products. Given that potential safety regulations for dosage and packaging could be enacted for both recreational and medicinal cannabis, the potential for abuse of cannabis may decrease. In addition, 4 states have legalized cannabis usage by adults aged 21 or older without medical supervision, after considerable discussion and review of a range of factors, including safety and the potential for abuse.
- ***CSA Criteria 2: Currently Accepted Medical Use*** In states where cannabis is legal for medicinal use, potential cannabinoid-based therapeutic applications have been identified for more than 40 qualifying medical conditions, including arthritis, cancer, chronic pain, epilepsy, glaucoma and HIV/AIDS. In addition to qualifying conditions, anecdotal evidence indicates that cannabinoid-based therapeutics are being used to treat other ailments, such as anxiety, asthma, depression, diabetes, insomnia, psoriasis and schizophrenia.
- ***CSA Criteria 3: Safe to Use under Medical Supervision*** Given the increasing amount of information available about cannabis and its effects and the body of evidence surrounding medicinal cannabis usage, doctors in 39 states now prescribe cannabis in various forms for numerous medical conditions. As this trend continues, safety measures will only improve as dosage standards are refined and as more efficacious strains of cannabis are developed.

Based on the preceding list, we believe that cannabis will eventually be moved to a lower schedule under the CSA, or removed altogether. Three additional arguments support the call for an end to federal prohibition:

**State Legalization Momentum** Given that 23 states have legalized cannabis for a broad range of medical conditions and 16 other states have legalized the limited use of cannabis, a supermajority of states have now adopted legislation legalizing cannabis in some form. We believe that public opinion and voter referendums will continue to influence state and federal legislators and the federal government will eventually reconcile federal and state laws rather than “ignoring” the legal conflict.

**Federalism and Constitutional Issues with the Selective Enforcement of Laws** In our federalist system of government, based on the Supremacy Clause in the U.S. Constitution, federal laws have priority over state laws when there is a conflict. However, the executive branch of the U.S. federal government has shown deference to the state legalization movement and has overtly declared that it will not enforce the federal prohibition on cannabis in selected circumstances. This is arguably a violation of both the due process clause under the U.S. Constitution (for selective enforcement of laws) and the doctrine of separation of powers (executive branch effecting legislative change). To further complicate the matter, the U.S. Congress has recently adopted spending bills that require the federal government to defer to the states to monitor cannabis activities as long as certain standards are met.

**Public Policy for Medicinal Applications** Given the breadth of medical conditions that could potentially be treated with cannabis-based therapeutics and the safety regulations that could be employed in the future, many have argued that cannabis-based therapeutics should be legalized nationally in order to enhance quality of life for medical patients throughout the United States.

### Political Landscape

Given the legalization momentum by select states for the full recreational use of cannabis, we believe that it is a question of when and how—not if—the federal prohibition on cannabis will end. Will the U.S. Congress finally reconcile federal and state laws? How will the next U.S. president affect the current momentum for nationwide legalization? The current Democratic presidential candidates have expressed more willingness than Republican candidates to liberalize cannabis regulations. Bernie Sanders has gone so far as to state that he supports the legalization of cannabis (similar to alcohol and tobacco), whereas Hillary Clinton has stated that she would support moving cannabis to Schedule II under the CSA. The current positions of leading presidential candidates on the legalization of cannabis are shown in the following table.

Leading U.S. Presidential Candidates: Positions on Legalization of Cannabis					
	Full Legalization for Recreational and Medicinal Use	Against Recreational Use	State Regulation For Medicinal Use	FDA-Approved Products Only	Against Federal and State Legalization
<b>Republican</b>					
Donald Trump		●	●		
Ted Cruz		●	●		
Marco Rubio		●		●	
John Kasich		●	●		
Ben Carson		●	●		
<b>Democratic</b>					
Hillary Clinton		●	●		
Bernie Sanders	●				

Note: Newly elected Canadian Prime Minister Justin Trudeau has indicated that he intends to legalize cannabis for recreational use in Canada.

## Cannabis Overview

Cannabis is a genus of flowering plants that includes two primary species, *Cannabis sativa* and *Cannabis indica*; both species have long been used for recreational and medicinal purposes. Cannabis sativa is known for its uplifting and energetic effect when ingested, whereas Cannabis indica is known for its calming and relaxing effect when ingested. In addition to these primary species, many hybrid species of cannabis have been developed, resulting in different combinations of characteristics. Consumers may inhale, eat or topically apply the various forms of cannabis.

Cannabis contains at least 85 active compounds, known as “cannabinoids,” that act on cannabinoid receptors in cells located in the brain and throughout the central and peripheral nervous systems. The most abundant and naturally occurring cannabinoid is tetrahydrocannabinol, or THC, the psychoactive ingredient of cannabis responsible for the “high,” or euphoric feeling. The second most abundant cannabinoid is cannabidiol, or CBD, which produces a physical effect without the psychoactive effect associated with THC.

## Medicinal Applications of Cannabinoids

In states where cannabis is legal for medicinal use, patients may possess and use cannabis if they qualify under the state medical requirements and otherwise satisfy state law. To qualify for medicinal cannabis, patients must have at least one of the medical conditions designated under their state’s laws. In aggregate, more than 40 qualifying conditions have been so designated. Depending on the state, these qualifying conditions are often described as “serious” or “debilitating,” but in some cases as simply “qualifying.” The following table lists the 20 most common qualifying conditions and certain cannabinoids that are being used or studied to help treat such conditions.

20 Most Common Qualifying Medical Conditions for Medicinal Cannabis Treatment								
	THC	CBD	CBC	CBG	CBGA	CBN	THCA	THCV
Alzheimer's	●							●
Amyotrophic lateral sclerosis (ALS)	●	●				●		
Anorexia	●							
Arthritis	●	●						
Cachexia	●	●						
Cancer	●	●	●	●			●	
Chronic pain	●	●	●		●	●	●	
Crohn's disease				●				
Epilepsy		●						

(continued)

	THC	CBD	CBC	CBG	CBGA	CBN	THCA	THCV
Glaucoma	●	●		●				
Hepatitis C	●	●						
HIV/AIDS	●	●						
Inflammation		●	●	●	●		●	
Migraine	●	●						
Multiple sclerosis	●							
Nausea	●	●					●	
Nervous system degeneration		●						
Parkinson's disease		●						
Post-traumatic stress disorder (PTSD)		●						●
Spasms	●	●				●	●	

In addition to the qualifying conditions listed in the table, anecdotal evidence indicates that cannabinoid-based therapeutics are being used to treat other ailments, such as anxiety, asthma, depression, diabetes, insomnia, psoriasis and schizophrenia.

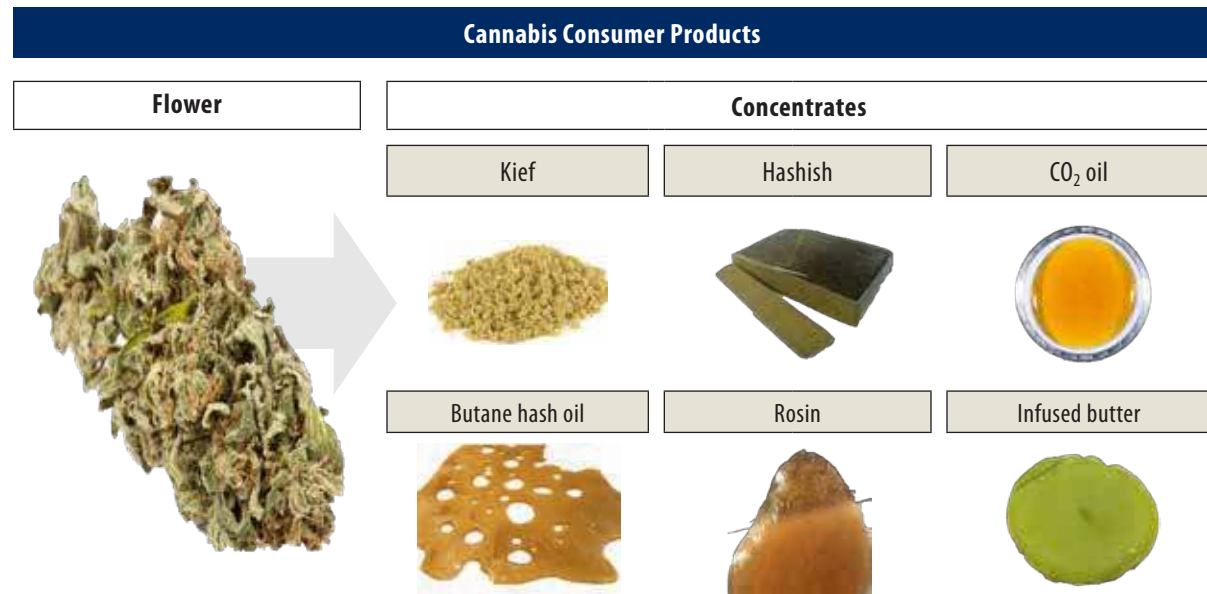
## Negative Side Effects of Cannabis Consumption

In concert with the research on potential medicinal applications of cannabis, the negative side effects of cannabis consumption are still being investigated. Currently, it is believed that ingesting cannabis, especially in improper dosages, may induce a number of short-term symptoms, including sensory distortion, panic, anxiety, poor coordination of movement, reduced reaction time, lethargy or drowsiness, depression and elevated heart rate. Longer-term effects may include suppression of the immune system, growth disorders, an increase in abnormally structured cells in the body, destruction of lung fibers, brain lesions, reduced sexual capacity, difficulties with concentration, reduced ability to learn and retain information and personality and mood changes. In addition, there is continuing debate whether cannabis consumption may lead to the use of substances more harmful than cannabis (the “gateway drug” discussion).

## Cannabis Products

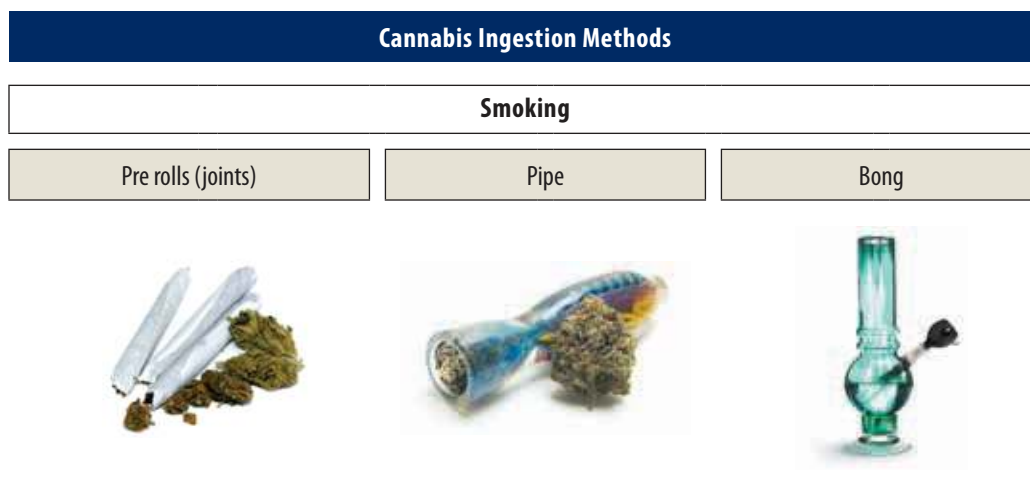
Cannabis is available in numerous forms, such as flower (or bud), concentrates or extracts, edibles, topicals and pills. There are thousands of different strains of cannabis flower, with different aromas,

flavors and potencies. Cannabis flower can be further processed into a variety of higher-potency concentrates. Historically, the most common form of cannabis concentrate was hashish. Today, in addition to hashish, there are several other popular forms of concentrated cannabis, including kief, oil, rosin and infused butter.






### Ingestion Methods

Cannabis can be ingested by a variety of methods. Because inhaling cannabis provides an almost immediate effect, most consumers smoke or vaporize cannabis flower or concentrates. However, health-conscious consumers often prefer to consume cannabis products in edible forms. Edibles can provide longer-lasting relief of chronic symptoms such as pain, often making them a preferred choice for medical consumers. Topicals are cannabis-infused lotions, balms and oils that are absorbed through the skin for localized relief of pain, soreness and inflammation.





Other Ingestion Methods		
Vaporizer	Edibles	Topicals
		

### Cannabis Consumers: Past, Present and Future

Over the past several decades, cannabis consumers have migrated from the stereotypical “hippie” to a broad base of consumers from all generations. Cannabis is popular with young adults, or Millennials, men and women, the middle-aged, a growing population of senior citizens, and adults across most ethnicities. Men represent about two-thirds of the market, and the average user is about 40 years old. Even prior to the potential end of federal prohibition, we expect the consumer base to increase significantly as more states continue to legalize cannabis and as medical professionals and the public become increasingly aware of its potential medicinal benefits. This increase is expected to accelerate after the end of federal prohibition, should it occur.

*Historical Stereotype*



*New Cannabis Consumers*



### Cannabis Industry Segmentation

The cannabis industry has begun to develop and diversify into numerous segments. We have divided the cannabis industry into 6 primary segments and 14 subsegments, each with its own unique role in the market, distinct business model, opportunities and risks.

Cannabis Industry Segmentation					
Production			Retail Distribution		Business Software
Cultivation	Production Equipment and Supplies	Laboratory-Testing Equipment and Services	Dispensaries	E-Commerce	Business Services
Consumer Products			Cannabinoid-based Therapeutics		Online Content and Networking
Flower and THC Concentrates	Edibles, Topicals and Nutraceuticals	Vaporizers and Accessories	CBD Concentrates	Pharmaceuticals	Online Directories

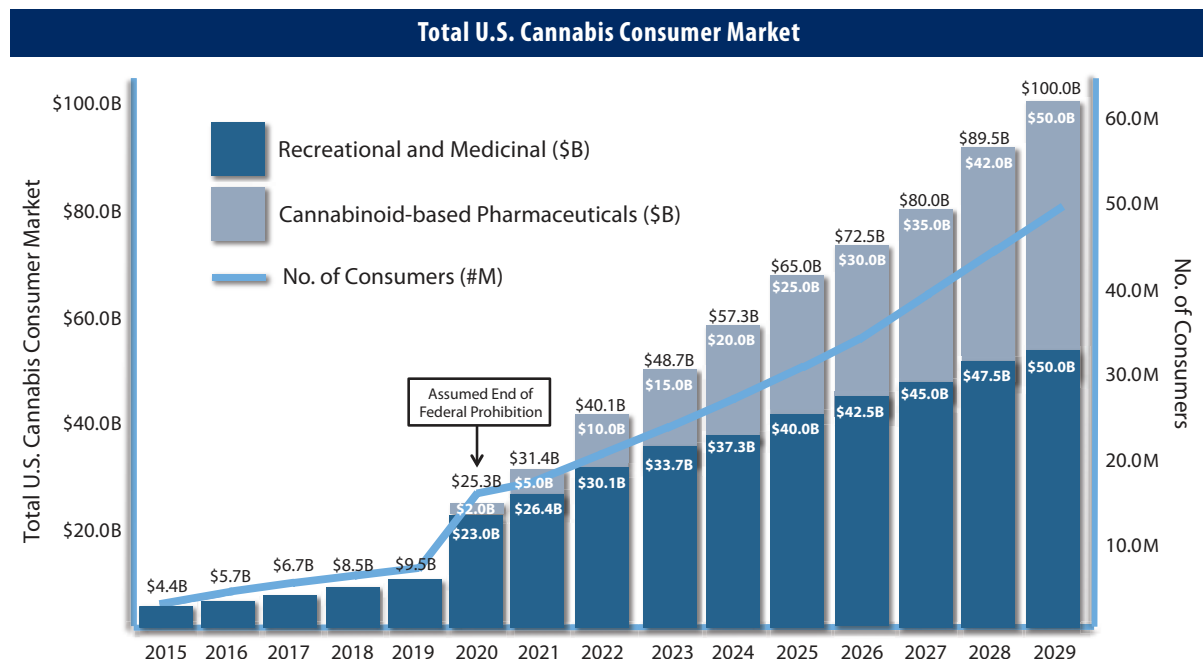
Business  
Solutions

Digital  
Media

## U.S. Cannabis Market Estimates

The RAND Corporation estimated that the illegal U.S. market for cannabis was approximately \$40 billion in 2010. Despite federal prohibition, it is estimated that approximately 20 million people in the United States consume cannabis on a monthly basis. For comparison, the annual U.S. retail market for tobacco is approximately \$100 billion, with approximately 45 million consumers.

We divide the cannabis market into two categories: the current consumer market for legalized recreational and medicinal use, and the future market for cannabinoid-based pharmaceuticals. We believe that within 10 years after the end of federal prohibition, the combined total market for cannabis in the United States may reach \$100 billion annually, with more than 50 million consumers. Our estimates of the total U.S. cannabis consumer market are shown in the following table.



Source: Ackrell Capital estimates. See Chapter IV: U.S. Cannabis Market Estimates.



## Key Market Growth Drivers

The cannabis market has numerous growth drivers, including the following:

- ***Large Base of Potential Cannabis Consumers*** Approximately 45% of the U.S. population currently resides in a state that has legalized recreational or medicinal cannabis use, representing a large pool of potential cannabis users. Even prior to the potential end of federal prohibition, this pool of potential consumers is expected to increase significantly as additional states legalize the use of cannabis. In addition, we believe that the number of cannabis consumers will continue to increase as the general population is more exposed to cannabis use, the culture continues to shift toward cannabis destigmatization and the potential medicinal benefits of cannabis are better understood.
- ***Potential End of Federal Prohibition*** We believe that it is a question of when, but not if, the federal prohibition on cannabis will end. We also believe that the end of prohibition may trigger rapid growth in the market, launched by interstate commerce and the emergence of the cannabinoid-based pharmaceuticals market.
- ***Advancements in Alternative Forms and Ingestion Methods*** Product innovation and advancements in flower strains, concentrates, edibles, vaporizing technology and cannabinoid-based therapeutics will drive consumer adoption and consumption.
- ***Branded Products and Product Platforms*** Because the cannabis industry is in its infancy, participants in each industry segment have the opportunity to create recognizable brands and product platforms in their respective markets. Over time, providers will differentiate their brands through marketing, distribution, packaging, selection, quality and pricing.
- ***Economies of Scale*** As the cannabis industry develops, the benefits of economies of scale are beginning to be realized in selected segments, enabling more competitive solutions to reach the market; however, the benefits of true economies of scale will not be realized until after the end of federal prohibition.
- ***Technology Leverage and Digital Media*** Mobile applications, e-commerce and digital media will drive growth with existing and new consumers. As dispensaries and others adopt e-commerce solutions and provide on-demand home delivery, the ease of online ordering will drive consumer adoption and consumption. Also, cannabis-related online content, directories and social networking will increasingly heighten awareness of the recreational and medicinal benefits of cannabis products.

## Market Estimate Methodology

In our calculations of estimates for the size of the U.S. cannabis consumer market both before and after the assumed end of federal prohibition, we employed our own research and utilized a variety of additional data sources. For the current market for legalized recreational and medicinal use, we first determined the base pool of eligible cannabis consumers in the United States. We then determined, and applied to this base pool, current and prospective penetration rates for cannabis usage based on geographical location, age and gender. This enabled us to estimate various population sizes for current

and prospective cannabis users in the United States. We then applied estimated consumption levels to these population sizes, based on type of user, user demographics and geographical location. For our estimates after the end of prohibition, we assumed that (i) consumer penetration rates and the number of consumers would increase in states that were legalized prior to the end of prohibition, (ii) new states would become legalized and (iii) the regulated pharmaceuticals market would develop. For a more detailed description of our market-size estimate methodology, see Chapter IV: U.S. Cannabis Market Estimates.

### ***Cannabis Penetration, Consumption and Market Size: Sanity Check***

In order to provide a sanity check on our methodology and estimate of market size, we compared the total U.S. cannabis consumer market to markets for other stimulants and pharmaceuticals. We believe that this comparison is useful because cannabis is often consumed recreationally in much the same way as alcohol, coffee and tobacco are enjoyed. In addition, we believe that cannabis treatments may ultimately be a legal alternative for a broad range of medical conditions. The following table offers a comparison of the estimated penetration rate, average monthly spending per consumer and U.S. retail market size for a number of common stimulants and pharmaceutical substances.

Comparison between Cannabis and Common Stimulants and Substances						
	Alcohol	Coffee	Tobacco	Painkillers	Anti-depressants	Cannabis (Future)
Primary Usage	Recreational	Recreational	Recreational	Medicinal	Medicinal	Recreational / Medicinal
Adult Penetration %	50%	50%	17%	40%	25%	20%
Consumer Monthly Spending	\$45 to \$200	\$80 to \$100	\$40 to \$80	\$50 to \$200	\$50 to \$100	\$50 to \$500
U.S. Retail Market Size	\$200B	\$35B	\$100B	\$300B	\$60B	\$100B

Source: Ackrell Capital estimates

This table demonstrates that our metrics and market-size estimates for the U.S. cannabis consumer market are in line with other U.S. retail markets for recreational stimulants and pharmaceutical substances.

## ■ Investment Outlook and Final Thoughts

We believe that we are at the very early stages of a powerful secular growth cycle for cannabis-based solutions and companies. Within 5 to 10 years, we believe that cannabis use will become mainstream, and a host of mature companies will be dominating the market. In the near term, we believe only one thing is certain: the market will continue to change rapidly.

As the cannabis industry continues to evolve, market opportunities for well-managed, well-resourced and well-positioned companies should be significant. The greatest value will be created by those companies able to drive affordably the awareness and adoption of their solutions, take advantage of economies of scale and leverage technology to optimize their operations. New companies will emerge and poorly positioned companies will disappear. Although some early entrants have had success with only modest invested capital, we believe that low barriers to entry, access to capital and eventual pricing pressure will remain issues for most.

Both pure plays and derivative plays will enable investors to participate in the market's anticipated growth, but the risks will continue to be significant. Eventually, we expect a full roster of cannabis companies will go public in the years following the end of federal prohibition, and soon thereafter we may begin to see the development of the next Starbucks®, Marlboro, Pfizer or See's Candies. Ultimately, we believe that large incumbent players in agriculture, alcohol, pharmaceuticals and tobacco may enter and potentially dominate certain segments of the market. In the meantime, in view of rapidly changing industry dynamics, we believe that private, emerging companies represent the most attractive opportunities.



## CHAPTER II

# Legislative Landscape; Legal Issues for Investor Consideration

## ■ Legislative Landscape

Cannabis is currently federally illegal in the United States because of its status as a Schedule I substance under the Controlled Substance Act of 1970 (CSA). As of the date of this report, 23 states and the District of Columbia have legalized the purchase and sale of cannabis for medicinal use, and 4 of those states—Alaska, Colorado, Oregon and Washington—have legalized the purchase and sale of cannabis for recreational use by adults aged 21 years and older. In addition, 16 other states have legalized the limited use of CBD-only cannabis oil products or cannabis use by compassionate care-type patients, while another 3 states have decriminalized the possession and use of small amounts of cannabis.

The legal status of each state and the District of Columbia is as follows.

23 Legalized States and the District of Columbia							
Medicinal Use		Recreational Use		Medicinal Use		Recreational Use	
Alaska	●		●	Minnesota	●		
Arizona	●			Montana	●		
California	●			Nevada	●		
Colorado	●		●	New Hampshire*	●		
Connecticut	●			New Jersey	●		
Delaware	●			New Mexico	●		
Hawaii*	●			New York	●		
Illinois	●			Oregon	●		●
Maine	●			Rhode Island	●		
Maryland*	●			Vermont	●		
Massachusetts	●			Washington	●		●
Michigan	●			Washington, D.C.	●		On Hold

Note: Asterisk indicates a state with no dispensaries. Consumers may cultivate their own plants or purchase cannabis from a qualified caregiver. Hawaii has recently passed legislation approving a limited number of medicinal dispensaries to open in July 2016.

16 "Limited Use" States and 3 "Decriminalized" States						
	Limited Use	Decriminalized	No Legal Use		Limited Use	No Legal Use
Alabama	●			North Dakota		●
Arkansas			●	Ohio		●
Florida	●			Oklahoma	●	
Georgia	●			Pennsylvania		●
Idaho			●	South Carolina	●	
Indiana			●	South Dakota		●
Iowa	●			Tennessee	●	
Kansas			●	Texas	●	
Kentucky	●			Utah	●	
Louisiana	●		●	Virginia		●
Mississippi	●			West Virginia		●
Missouri	●			Wisconsin	●	
Nebraska		●		Wyoming	●	
North Carolina	●					

Note: "Limited Use" denotes states that have approved the use of selected cannabis-based products in limited circumstances. "Decriminalized" denotes states that ignore small violations and "No Legal use" denotes states where cannabis is fully illegal.

The cannabis market is currently constrained by the effects of federal prohibition and, to a lesser extent, by restrictions at the state and local levels. Interstate commerce in cannabis is illegal, commercial banking regulations for cannabis companies are restrictive, credit card processing providers are unwilling to work with cannabis companies, and federal income tax laws and regulations do not permit a cannabis business to deduct certain operating expenses for federal income tax purposes. Notwithstanding these challenges, cannabis businesses have emerged in select safe-haven jurisdictions, with the anticipation that federal law will ultimately be reconciled with the legal movement of the states.

## Federal Controlled Substances Act and Department of Justice Enforcement Priorities

The CSA prohibits manufacturing, distributing, dispensing or possessing certain controlled substances, including cannabis and its extracts. A business that deals in cannabis is committing a federal crime, irrespective of whether the business complies with state law. The CSA establishes five schedules of substances, and each schedule includes substances that the DEA and the FDA have jointly determined to have certain characteristics. Cannabis is currently classified under the CSA as a Schedule I substance, along with other substances, such as heroin, LSD, ecstasy and peyote. Schedule I substances are those

determined by the DEA and FDA to have the following characteristics:

- (i) a high potential for abuse;
- (ii) no currently accepted medical use in the United States; and
- (iii) a lack of accepted safety for use under medical supervision.

Violation of the CSA is punishable by imprisonment, and any person or business that operates a cannabis business in violation of the CSA may have cash and other assets of the business seized. Further, not only businesses that grow, transport, possess or sell cannabis violate the CSA. Those who knowingly facilitate such activities do so in violation of the CSA and are subject to punishment thereunder and may also be prosecuted under theories of conspiracy and accomplice liability.

A series of memorandums published by the U.S. Department of Justice (DOJ) from 2009 through 2014 outline the DOJ's enforcement priorities in relation to prosecutions for cannabis-related federal crimes. An August 2013 DOJ memorandum (2013 Cole Memo) guides federal attorneys to focus their limited enforcement resources and efforts on persons or organizations whose conduct interferes with any one or more of the following eight enforcement priorities:

- (i) preventing distribution of cannabis to minors;
- (ii) preventing revenue from the sale of cannabis from going to criminal enterprises, gangs and cartels;
- (iii) preventing the diversion of cannabis from states where it is legal under state law in some form to other states;
- (iv) preventing state-authorized cannabis activity from being used as a cover or pretext for the trafficking of other illegal drugs or other illegal activity;
- (v) preventing violence and the use of firearms in the cultivation and distribution of cannabis;
- (vi) preventing drugged driving and the exacerbation of other adverse public health consequences associated with cannabis use;
- (vii) preventing the growing of cannabis on public lands and the attendant public safety and environmental dangers posed by cannabis production on public lands; and
- (viii) preventing cannabis possession or use on federal property.

The 2013 Cole Memo observes that in states with strong and effective regulatory and enforcement systems to control the cultivation, distribution, sale and possession of cannabis, conduct in compliance with those laws and regulations is less likely to threaten the eight enforcement priorities. The 2013 Cole Memo has provided some comfort to those operating state-legal cannabis businesses that do not interfere with the memorandum's enforcement priorities; however, the memorandum merely reflects internal guidance within the DOJ and does not create a legal defense for any violation of the CSA.

In December 2015, the U.S. Congress passed a spending bill with a provision that prevents the DOJ and DEA from using their funding to interfere with states' implementation of medical cannabis laws, and thus, in theory, prohibits agents from arresting or prosecuting patients or providers that are in compliance with such state laws. While some media outlets have reported this as "the end" of federal prohibition on medical cannabis, others have observed that because state laws may be vague, federal agencies will continue to have latitude in determining whether businesses and individuals are in fact complying with state laws. Additionally, the provision expires in September 2016.

## **Federal Banking and Financial Crimes**

Financial transactions involving proceeds from a cannabis business may involve criminal violations of the Bank Secrecy Act (BSA), the federal money-laundering statute and the federal unlicensed money-transmitter statute. Under these federal laws, it is a criminal offense to engage in certain transactions with or involving proceeds derived from cannabis-related violations of the CSA. Financial institutions engaging in transactions with cannabis business proceeds could face criminal liability under the BSA, including penalties for failure to report such transactions.

In February 2014, the DOJ and the U.S. Department of the Treasury's Financial Crimes Enforcement Network (FinCEN) issued parallel releases discussing the impact of the 2013 Cole Memo enforcement priorities specifically on cannabis-related financial crimes, including violations of the BSA. The DOJ memorandum indicates that federal investigations and prosecutions of financial crimes involving cannabis should, like other federal cannabis crimes, be subject to the enforcement priorities outlined in the 2013 Cole Memo. The DOJ memorandum also observes that financial institutions servicing cannabis businesses that operate either in violation of state law or in states without robust regulatory schemes are at increased risk of interfering with the 2013 Cole Memo priorities.

The FinCEN memorandum describes how financial institutions can provide services to cannabis businesses consistent with their BSA obligations, also emphasizing the role of conducting thorough due diligence to assess the risk of engaging a cannabis business client and outlining specific steps financial institutions should take in conducting that due diligence. The FinCEN memorandum also prescribes a scheme for filing various types of suspicious activity reports (SARs) for cannabis businesses and identifies certain "red flags" that would tend to indicate which type of SAR filing was appropriate in a given circumstance.

## **Cannabis Legalized by State Law**

As of the writing of this report, 39 states and the District of Columbia have legalized the purchase and sale of cannabis for some form of medicinal or recreational use. In addition, 16 other states have legalized the limited use of CBD-only cannabis oil products or cannabis use by compassionate care-type patients. Each state has its own laws governing who can grow, transport, sell, possess and use cannabis and cannabis products within the state. The result is a fragmented patchwork of unique regulatory regimes across the United States. An exhaustive review of each state's legal landscape is beyond the scope of this report; instead we discuss generally the ways in which states have chosen to address some key legal issues.



***Permitted Users***

In Alaska, Colorado, Oregon, Washington and the District of Columbia, where cannabis possession has been legalized for recreational purposes, generally any adult aged 21 years or older may possess and use a limited amount of cannabis. In states where cannabis is legal for medicinal use, patients who qualify under the state medical requirements, and otherwise satisfy state law requirements, may possess and use cannabis. To qualify for medicinal cannabis use under state law requirements, patients must have at least one of the medical conditions designated under their state's laws. Some states designate a small number of highly specific medical conditions, while others designate expansive lists of conditions that include fairly subjective maladies such as pain and nausea. States also vary in determining how a patient qualifies as having one of the conditions. Some states require only an oral recommendation from a physician, whereas other states require a written prescription or certification from a physician and may even require the diagnosing physician to be registered with the state as qualified to prescribe cannabis.

Patients who are properly diagnosed with a qualifying condition may face additional requirements or restrictions under state law in order to possess and use medicinal cannabis. In some states, patients must register in a state database, obtain an identification card or even submit fingerprints. Some states prohibit convicted felons or certain government employees (e.g., firefighters) from qualifying for medicinal cannabis use.

***Permitted Forms***

Cannabis can be delivered and consumed in flower, or “bud,” form, or in the form of a number of concentrates and edibles. Many state cannabis statutes do not discriminate between these various forms of cannabis and generally permit the manufacture, sale and use of cannabis flower and cannabis-infused products; however, some states legalize only certain forms of cannabis or its derivatives. For example, certain “CBD-only” states (compassionate care-type jurisdictions) permit only the possession and use of low-THC/high-CBD cannabis concentrates and prohibit the use of cannabis flower. Arizona's governor has interpreted that state's medicinal cannabis statute to prohibit products made with cannabis extracts (however, in 2014, a county superior court ruled that the statute does allow the use of extracts). In Michigan, a state court of appeals found that state's medicinal cannabis statute prohibits the use of extracts.

***Permitted Cultivation and Distribution***

Those permitted to grow and distribute cannabis under state law generally fall into three categories: qualified patients, designated caregivers associated with one or more qualified patients, and licensed cultivators and distributors that may or may not be associated with any particular patient or recreational consumer.

Under state medicinal cannabis regimes (including states where cannabis is now recreationally legal but which separately maintain their medicinal cannabis statutes), qualified patients may be permitted to grow a certain amount of cannabis or a certain number of cannabis plants for their own personal use. In certain states, whether a qualified patient is permitted to grow cannabis depends on the patient's other options (in the view of the state statute) for accessing cannabis. For example, certain states permit qualified patients to grow cannabis only if they reside more than a certain distance from the nearest licensed dispensary or if procuring cannabis from other sources would cause financial hardship.

A designated caregiver is generally a person designated by a qualified patient as being responsible for the care of the patient with respect to cannabis-related matters. State statutory regimes for a designated caregiver role may place rules on who may be a designated caregiver and the number of patients for whom a person may serve as designated caregiver, and may further prescribe rules about the amount of cannabis or number of plants a qualified caregiver may grow. Designated caregivers and qualified patients may be permitted to aggregate their growing and distribution efforts on behalf of a large number of qualified patients and operate what is effectively an unlicensed but legal (under state law) nonprofit dispensary.

A licensed grower or distributor that may or may not be associated with any particular patient or recreational user must obtain a license from the state to grow or sell cannabis. Licensees generally must meet requirements related to health, safety and security. In states with vertical integration requirements or patient association requirements, a licensee may be part of a single production and distribution enterprise or may be permitted to sell cannabis only to patients associated with the particular licensee. In other states, a licensed grower may be permitted to sell to unaffiliated dispensaries or delivery services and to qualified patients who do not maintain an association with the licensee.

### ***Permitted Investors, Owners and Profits***

Each state has its own rules about whether a cannabis business may be operated for profit. In states where caregivers and qualified patients aggregate their cultivation and distribution efforts, cannabis businesses generally are allowed to charge amounts necessary to recover the reasonable costs associated with those activities but may not operate for profit. The four states that permit recreational use—Alaska, Colorado, Oregon and Washington—all permit recreational cannabis businesses to operate for profit. Medicinal cannabis regimes across states vary with respect to whether they permit for-profit businesses.

Each state also has its own rules about who may own, operate or invest in cannabis cultivation and sale enterprises. Some states require all owners or operators to be state residents, while others permit some level of nonresident investment or ownership. Some states permit but discourage nonresident investment (for example, Nevada permits nonresidents to be license holders and investors, but effectively favors Nevada residents by including the amount of taxes previously paid to Nevada as a factor in license applications). Nonprofit aggregations of qualified patients and caregivers are generally deemed to be owned by those patients and caregivers, and thus ownership residency requirements in states with such operations are congruous with the qualified patient or designated caregiver requirements in those states.

### ***State Licensing and Regulation***

In 1996, when California passed the first medical cannabis statute in the country, it did not provide for a state regulatory agency or the state licensing of cannabis businesses. Some other medicinal-use states also lack regulatory infrastructures. However, the clear trend in recent state initiatives is toward comprehensive regulation that includes the commissioning or designation of a state regulatory agency and robust licensing requirements.

In addition to residency requirements for owners and operators as previously discussed, state license requirements tend to address health, safety and security concerns. Health and safety rules may require testing for product potency or impurities such as mold or fungus, and labeling requirements including

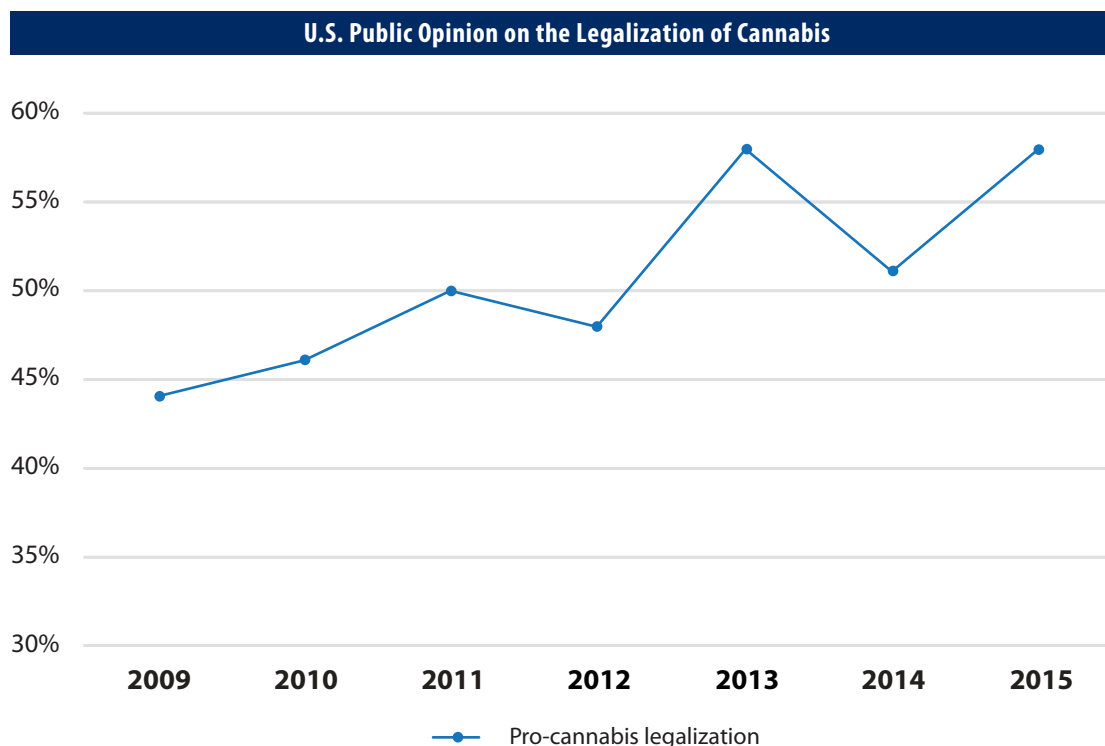
instructions for use and warnings about ancillary ingredients. Security requirements address physical security issues related to cultivation facilities and product transportation as well as digital security and patient privacy concerns.

Licenses are awarded by states according to several different systems. Some states award an unlimited number of licenses to parties who satisfy objective requirements. Other states maintain a fixed number or range of licenses, often tied to geographical regions of the state, and award them based on either the merits of applicants or a randomized lottery system. Applying for and maintaining a state license may require application and maintenance fees costing tens of thousands of dollars each year and may require the licensee to maintain certain insurance coverage or demonstrate financial resources in excess of \$1 million.

## ■ Legislative Outlook

The trend toward liberalization of cannabis laws is being driven by a variety of factors, including the potential economic impact of cannabis-related businesses, the expected impact on tax revenue and the growing demand for medicinal cannabis applications. More important, the social movement to legalize cannabis is being driven by the growing recognition that individuals have the fundamental right to access and consume cannabis, given its potential medicinal and recreational benefits.

The effects of social movement on government take time. Currently, 58% of the U.S. population is in support of the legalization of cannabis, considerably higher than just a few years ago. The following chart depicts the increasing level of public support for legalizing cannabis.



Source: Gallup

## Next Wave of State Legalizations

In the next few years, we expect many states to hold voter referendums for the legalization of cannabis for recreational or medicinal consumption. States voting on recreational consumption may include Arizona, California, Connecticut, Maine, Michigan, Nevada, Ohio, Rhode Island and Vermont; states voting on medicinal consumption may include Florida, Kentucky and Ohio. While such referendums may not pass in each state, we expect the overall trend toward legalization of cannabis laws at the state and local level to continue.

## United Nations Single Convention on Narcotic Drugs

In 1961, the United Nations (UN) established the Single Convention on Narcotic Drugs (Single Convention), an international treaty intended to strictly control the production and distribution of specific substances, including cannabis. More than 180 member states of the UN are currently state parties to the Single Convention. In response to the establishment of the Single Convention, individual countries passed their own laws to carry out the provisions of the treaty (including the passage of the CSA in the United States). Like the CSA, the Single Convention establishes schedules of controlled substances. Agencies including the World Health Organization (WHO) and the Commission on Narcotic Drugs are tasked with oversight and administration of the treaty and assignment of substances to each of the treaty's four schedules. Cannabis is included as a Schedule I and a Schedule II substance under the Single Convention, indicating that it is particularly liable to abuse and to producing ill effects, and such liability is not offset by substantial therapeutic advantages.

In 1998, a UN General Assembly Special Session (GASS) on drugs focused on the continued pursuit of the treaty's purpose. In 2008, the UN determined not to hold its next GASS on drugs until 2019. However, the status quo of the Single Convention is being challenged and, as described in more detail below, the date of the GASS on drugs originally scheduled for 2019 has been rescheduled for April 2016.

## End of the War on Drugs?

In conflict with the Single Convention, an array of measures decriminalizing cannabis or legalizing it for medical use have been passed or are being seriously considered in dozens of countries located throughout Europe, Africa and the Americas. In 2013, Uruguay became the first nation to legalize cannabis for recreational use. Canada has a national medical cannabis program and the newly elected prime minister has stated his intention to legalize cannabis for recreational purposes. In December 2015, the president of Colombia—the nation perhaps most adversely affected by the global drug war—signed a decree legalizing and regulating the cultivation, processing and exportation of medical cannabis in Colombia.

These countries are part of a growing chorus of UN member states, media outlets and influential world leaders calling for an end to the war on drugs engendered by the Single Convention. In 2012, the presidents of Colombia, Guatemala and Mexico requested the UN to focus its next special session on drugs on policy reform rather than on a mere progress review and continuation of the same policies. In 2014, the Global Commission on Drug Policy—represented by former UN Secretary-General Kofi Annan and the former presidents of Brazil, Chile, Colombia, Mexico, Poland, Portugal and

Switzerland—called for an end to the criminalization of drug use and possession and for the responsible legal regulation of psychoactive substances.

As the result of a formal proposal sponsored by Mexico and cosponsored by 95 other countries, the date of the GASS on drugs is now scheduled for April 2016. The general assembly is the primary policy body of the United Nations, and one in which all 193 UN member states have equal representation. Given this broad representation and the global trend toward cannabis decriminalization and legalization, the 2016 GASS on drugs has the potential to significantly impact global cannabis policy.

## ■ Other Legal Issues for Investor Consideration

### Federal Securities Laws

Federal securities laws are intended to protect investors by requiring disclosure of certain information, imposing liability for fraud and regulating securities transaction intermediaries. Federal securities laws do not prohibit transactions in securities of cannabis companies, despite the federal prohibition on cannabis. A cannabis business raising capital is subject to federal securities laws like any other company: to comply with federal securities laws, the company should make all required notice or registration filings and include extensive disclosures of any inherent risks, including the possibility of the company's assets being seized and the possibility of arrest and criminal prosecution of the company's principals, employees, agents and investors.

### Federal Income Tax

Like other businesses, cannabis businesses are obligated to pay federal income tax on all taxable income. However, any business that sells cannabis operates at a distinct disadvantage under federal income tax rules. To compute taxable income, a business generally starts with its gross receipts and then subtracts two categories of costs: (1) the cost of goods sold (COGS) and (2) all ordinary and necessary business expenses. The COGS reduction is premised on constitutional grounds, whereas the ordinary and necessary business expense deduction is prescribed by the Internal Revenue Code.

Internal Revenue Code Section 280E disallows any deduction for ordinary and necessary business expenses incurred in carrying on any trade or business consisting of the “trafficking” of a controlled substance, which is prohibited by federal law. Thus, a business that handles and sells cannabis may not deduct necessary and ordinary business expenses, which effectively increases the amount of income tax any such business is required to pay. The ordinary and necessary expenses that a cannabis business may not deduct under Section 280E include expenses that are not illegal per se: employee salaries, payments to contractors, the cost of utilities and rent, marketing costs and insurance premiums. However, cannabis businesses may deduct COGS, which generally include the cost of acquiring, constructing or extracting a physical product that is to be sold.

### Federal Bankruptcy Protection

Protections afforded under federal bankruptcy law appear to be largely unavailable to cannabis businesses. Cannabis businesses that have filed for bankruptcy in federal courts in Colorado and California

have had their cases dismissed. Bankruptcy protection may involve a debtor turning over assets to a bankruptcy trustee to liquidate and deliver proceeds to creditors, or it may involve a plan whereby creditors are paid over time from assets or profits of the business. Federal bankruptcy courts have so far refused to oversee or endorse any arrangement that would involve operating a business that is illegal under federal law or taking control of and liquidating such a business; however, cannabis businesses may seek the protection of state law substitutions for bankruptcy in states where cannabis is legal.

## **Federal Intellectual Property Protection**

Because of federal restrictions on transporting cannabis across state lines, the primary means by which cannabis businesses are building national businesses is by establishing brands and licensing intellectual property associated with those brands. However, until the federal prohibition on cannabis is lifted, cannabis businesses cannot afford themselves of the full benefits of federal intellectual property protection.

### ***Trademarks***

A trademark identifies and distinguishes a specific product or service from others in the market, and it can take many forms, including a logo, slogan, symbol, color, sound or design. Trademarks may be registered in individual states or registered federally under the Trademark Act. While unregistered trademarks receive some protection under common law, federal trademark registration provides significant additional protections.

Federal trademark registration requires lawful use of the mark in commerce, and the Trademark Act does not allow federal trademark registration for “immoral, deceptive or scandalous” matters. Thus, products that contain cannabis, as well as certain illegal cannabis-related products, such as paraphernalia, are not currently eligible for U.S. federal trademark registration.

On the other hand, federal trademark protection is available for products or services related to cannabis that are federally legal, such as a recipe for food meant to be infused with cannabis or a cannabis-related clothing line. Also, cannabis companies may obtain state trademark protection on a state-by-state basis.

### ***Patents***

A patent is a right to exclude others from making, using, selling, importing or offering for sale some invention. Securing a patent under the U.S. Patent Act requires that an invention be novel, useful and non-obvious. The U.S. Patent and Trademark Office (USPTO) will generally grant a patent to an inventor who has invented or discovered and asexually reproduced a distinct and new variety of plant. The grant of a patent for a plant precludes others from asexually reproducing, selling or using the patented plant.

Under the U.S. Patent Act, there are no clear prohibitions against patents for federally illegal subject matter like the prohibitions on federal trademark registration, so obtaining a patent for a strain of cannabis is a possibility. The USPTO has not granted any cannabis-strain patents, but patent applications for cannabis strains are currently in submission. Intellectual property professionals have different opinions on whether such patents will be granted or denied.



## CHAPTER III

# Cannabis 101

### ■ Overview

Cannabis is a genus of flowering plants that includes two primary species, *Cannabis sativa* and *Cannabis indica*; both species have long been used for recreational and medicinal purposes. *Cannabis sativa* is known for its uplifting and energetic effect when ingested, whereas *Cannabis indica* is known for its calming and relaxing effect when ingested. In addition to these primary species, many hybrid species of cannabis have been developed, resulting in different combinations of characteristics. Cannabis species are differentiated by the appearance of their leaves.

*Cannabis sativa*



*Cannabis indica*



Hemp, or industrial hemp, is considered by researchers to be a separate species of cannabis. While hemp is known to have no psychoactive effect when ingested and is not generally used for recreational or medicinal purposes in its raw form, it is nevertheless a Schedule I substance under the CSA. In international markets, hemp is typically processed into a range of products—including cloth, paper, rope and oil—some of which are imported into the United States. The hemp industry is not covered in the scope of this report.

Cannabis comes in numerous consumable forms, such as flower (or bud), concentrates or extracts, edibles, topicals and pills. Consumers may inhale, eat or topically apply the various forms of cannabis.

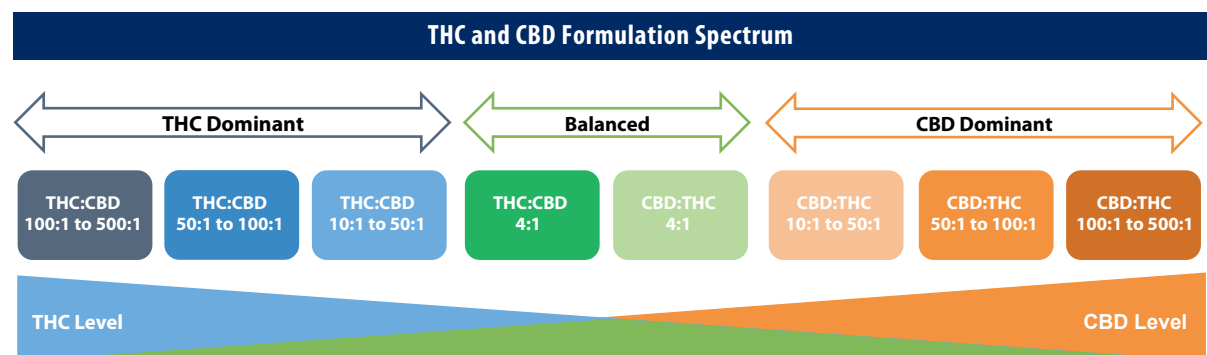
### Cannabinoids

Cannabis contains at least 85 active compounds, known as “cannabinoids,” that act on cannabinoid receptors in cells located in the brain and throughout the central and peripheral nervous systems. The endocannabinoid system of the body is involved in a variety of physiological processes related to appetite, pain sensation, mood and memory. Two primary endocannabinoid receptors have been identified:

CB<sub>1</sub> and CB<sub>2</sub>, both of which are activated primarily by plant cannabinoids. CB<sub>1</sub> is a cannabinoid receptor located primarily in the central and peripheral nervous system, and CB<sub>2</sub> is a cannabinoid receptor located primarily in the immune system, the brain, the gastrointestinal system and the peripheral nervous system.

The most abundant, naturally occurring cannabinoid is tetrahydrocannabinol, or THC, the psychoactive ingredient of cannabis responsible for the “high,” or euphoric feeling. The second most abundant cannabinoid is cannabidiol, or CBD, which produces a physical effect without the psychoactive effect associated with THC and is considered to have a wider scope of medicinal applications than THC.

THC and CBD work together when applied to therapeutic applications, with concentrations ranging from 10:1 to 500:1 (THC:CBD) for THC-dominant solutions versus 10:1 to 500:1 (CBD:THC) for CBD-dominant solutions. The spectrum of formulations of THC and CBD are as follows.



In addition to THC and CBD, researchers are beginning to explore other cannabinoids for their applicability to a broad range of medical conditions. Following is a list of eight cannabinoids that have shown early indications of potential effectiveness for treatment of a range of medical conditions.

Notable Cannabinoids			
<b>THC</b> <b>Tetrahydrocannabinol</b> <ul style="list-style-type: none"> <li>• Strong psychoactive effect</li> <li>• Broad medicinal use</li> </ul>	<b>CBD</b> <b>Cannabidiol</b> <ul style="list-style-type: none"> <li>• Nonpsychoactive</li> <li>• Broad medicinal use</li> </ul>	<b>CBC</b> <b>Cannabichromene</b> <ul style="list-style-type: none"> <li>• Nonpsychoactive</li> <li>• Narrow medicinal use</li> </ul>	<b>CBG</b> <b>Cannabigerol</b> <ul style="list-style-type: none"> <li>• Nonpsychoactive</li> <li>• Narrow medicinal use</li> </ul>
<b>CBGA</b> <b>Cannabigerolic Acid</b> <ul style="list-style-type: none"> <li>• Nonpsychoactive</li> <li>• Narrow medicinal use</li> </ul>	<b>CBN</b> <b>Cannabinol</b> <ul style="list-style-type: none"> <li>• Weak psychoactive effect</li> <li>• Narrow medicinal use</li> </ul>	<b>THCA</b> <b>Tetrahydrocannabinolic Acid</b> <ul style="list-style-type: none"> <li>• Nonpsychoactive</li> <li>• Moderate medicinal use</li> </ul>	<b>THCV</b> <b>Tetrahydrocannabivarin</b> <ul style="list-style-type: none"> <li>• Mild psychoactive effect</li> <li>• Narrow medicinal use</li> </ul>



## ■ Medicinal Applications of Cannabinoids

In states where cannabis is legal for medicinal use, patients may possess and use cannabis if they qualify under the state medical requirements and otherwise satisfy state law. To qualify for medicinal cannabis, a patient must have one of the medical conditions designated under their state's laws. In aggregate, more than 40 qualifying conditions have been so designated. Depending on the state, these qualifying conditions are often described as “serious” or “debilitating,” but in some cases as simply “qualifying.” The following table lists the 20 most common qualifying conditions and certain cannabinoids that are being used or studied to help treat such conditions.

Twenty Most Common Qualifying Medical Conditions for Medicinal Cannabis Treatment								
	THC	CBD	CBC	CBG	CBGA	CBN	THCA	THCV
Alzheimer's disease	●							●
Amyotrophic lateral sclerosis (ALS)	●	●				●		
Anorexia	●							
Arthritis	●	●						
Cachexia	●	●						
Cancer	●	●	●	●			●	
Chronic pain	●	●	●		●	●	●	
Crohn's disease				●				
Epilepsy		●						
Glaucoma	●	●		●				
Hepatitis C	●	●						
HIV/AIDS	●	●						
Inflammation		●	●	●	●		●	
Migraine	●	●						
Multiple sclerosis	●							
Nausea	●	●					●	
Nervous system degeneration		●						
Parkinson's disease		●						
Post-traumatic stress disorder (PTSD)		●						●
Spasms	●	●				●	●	

Anecdotal evidence also indicates that cannabinoid-based therapeutics are being used to treat other conditions, such as anxiety, asthma, depression, diabetes, insomnia, psoriasis and schizophrenia.

## ■ Negative Side Effects of Cannabis Consumption







In concert with the research on potential medicinal applications of cannabis, the negative side effects of cannabis consumption are still being investigated. Currently, it is believed that ingesting cannabis, especially in improper dosages, may induce a number of short-term symptoms, including sensory distortion, panic, anxiety, poor coordination of movement, reduced reaction time, lethargy or drowsiness, depression and elevated heart rate. Longer-term effects may include suppression of the immune system, growth disorders, an increase in abnormally structured cells in the body, destruction of lung fibers, brain lesions, reduced sexual capacity, difficulties with concentration, reduced ability to learn and retain information and personality and mood changes. In addition, there is continuing debate whether cannabis consumption may lead to the use of substances more harmful than cannabis (the “gateway drug” discussion).

## ■ Cultivation

Cannabis is cultivated in legalized states for both recreational and medicinal use. While cannabis can be grown outdoors, the majority of legal cannabis cultivation occurs indoors because state and local legislation typically prohibits the outdoor growing of cannabis. Cannabis cultivation for recreational use favors the cultivation of high-THC strains, while cultivation for medicinal use favors high-CBD strains. In cannabis cultivation, high-THC strains are often characterized by THC levels greater than 20% and high-CBD strains are often characterized by CBD levels greater than 4%. Typically, Cannabis sativa-based strains are bred to have high THC:CBD ratios, while Cannabis indica-based strains are bred to have high CBD:THC ratios. Both recreational and medicinal cannabis cultivators have broad flexibility in their cultivation processes, which enables them to grow specific strains of cannabis flower with desired characteristics.

Cultivators can purchase thousands of different strains of cannabis seeds from commercial seed banks or selectively breed their own proprietary strains. Cultivators alter variables such as lighting, nutrients, air quality, and drying and curing time to specifically determine a plant’s cannabinoid content, aroma and flavor. The cultivation process is a combination of art and science, and leading cultivators have developed significant expertise in cultivating various strains of cannabis. Leading cultivators are recognized for their best strains of Cannabis indica, Cannabis sativa or hybrids in several award ceremonies held each year; award-winning strains (often with unique identifying names) typically become the most in-demand, and cultivators distribute the seeds of these popular strains through seed banks for production by other cultivators. Popular strains today include “Blueberry,” “Blue Dream,” “Granddaddy Purple,” “OG Kush” and “Sour Diesel.” It is difficult to replicate a cannabis strain in its entirety from one cultivation cycle to the next; however, advancements in cultivation technology are expected to lead to increased consistency of output, higher yields and more accurate cultivation of desired characteristics.

Cannabis shares growth characteristics with other types of flowering plants. A typical growth cycle is three to eight months, depending on the type of strain and desired characteristics. In general, the cultivation process includes several stages: (i) seed selection; (ii) seedling; (iii) vegetative; (iv) flowering; (v) harvesting; and (vi) curing.

Cultivation Process Overview: Seed to Bud		
Time	Seed Selection	
Start	<p>The cannabis cultivation process begins with the selection of the seed. There are more than 1,500 strains of cannabis seeds, characterized by THC:CBD content, autoflowering features, sex and species (e.g., sativa, indica or hybrid). High-quality seeds produce greater yields and are bred to be pest-resistant.</p>	
Seedling		
1–4 weeks	<p>During the seedling stage, the seed has sprouted and begins to show identifying characteristics of the cannabis plant. The stem's growth is critical during the seedling process. Cultivators aim to avoid long, stretchy stems, which lack strength to support further vegetation.</p>	
Vegetative		
3–8 weeks	<p>During the vegetative stage, also called the “stretch,” the plant begins to reveal its sexual characteristics and experiences rapid growth, generally doubling or tripling in height. Female plants are desired because they produce the flower and are separated from male plants to avoid pollination. Cultivators vary the amount of lighting and nutrients the plant receives to maximize the plant's yield of flower, based on desired characteristics and the type of seed being grown.</p>	
Flowering		
6–16 weeks	<p>During the flowering phase, the flower, or “bud,” appears and gives off the plant's characteristic odor. The flower contains the highest amount of trichomes, sticky-hairy glandular substances that grow throughout the plant's surface. The maturation of the plant's trichomes determines the flower's THC:CBD content. Cultivators examine the plant's trichomes to determine the appropriate time for harvesting.</p>	
Harvesting		
2–4 weeks	<p>During the harvesting phase, the plant is uprooted and undergoes a drying and trimming process. Cultivators determine when to harvest to obtain the desired THC:CBD content. The cannabis plant is trimmed to separate the leafstalks from the main stem. The leafstalks are then dried. The dried leafstalks are further trimmed or “picked” to separate the individual flowers from the leafstalks, leaving the desired dried flower. Other parts of the plant may be further processed into concentrated forms.</p>	
Curing		
2–8 weeks	<p>During the curing phase, the dried flower undergoes a period of controlled fermentation. The fermentation process determines the flower's taste and aroma characteristics. Cultivators determine the length of time the dried flower undergoes controlled fermentation to produce the desired characteristics. Typically, a longer curing period produces a smoother taste and less-pungent smell.</p>	
3–8 Months		

### *Various Strains of Cannabis Flower*



### **Indoor Growing**

Cannabis plants can be grown faster indoors than outdoors due to 24-hour light, additional atmospheric CO<sub>2</sub> and controlled humidity. Although indoor growing is more complicated and expensive than outdoor growing, it provides the cultivator with more control over the growing environment and the end product. Common types of lighting for indoor growing include traditional fluorescent lamps, compact fluorescent lamps, high-intensity discharge lamps and light-emitting diode (LED) lights. LED lights are becoming more popular in grow rooms because of their low energy requirements, low heat output and range of spectrum, allowing for greater control over photosynthesis (the process by which plants convert light to energy). In addition to appropriate light and nutrients, adequate levels of CO<sub>2</sub> must be maintained for the plants to grow efficiently and quickly. Cultivators employ a variety of means to increase CO<sub>2</sub> levels in the grow room, including bottled CO<sub>2</sub> and CO<sub>2</sub> generators. It is also important to promote vigorous air circulation within the grow room; this is usually accomplished by mounting extraction fans and oscillating fans.

### *Indoor Grow Room*





## Hydroponics

Cannabis is often grown indoors through the use of hydroponics, a method of growing plants that uses mineral nutrient solutions in water, without soil. Plants may be grown with their roots in the mineral nutrient solution only, or in an inert medium, such as perlite or gravel. While more difficult to operate than soil-based growing environments, hydroponic systems greatly increase aeration of plant roots and provide increased control of nutrient uptake.

Many types of hydroponic systems are used in cannabis cultivation: *ebb-and-flow* or *flood-and-drain systems*, in which the nutrient solution floods the loose growing-medium and recedes for aeration; *drip systems* that gradually drip solution onto the medium; *aeroponic systems* that intermittently spray roots floating in air; *nutrient film technique systems*, in which aerated water runs down a channel lined with a film of rooting medium; and *top-feed systems*, in which a series of tubes intermittently runs high-flow nutrient solution into the tops of growing containers.

### Hydroponics Systems

Ebb-and-Flow System



Aeroponic System



## ■ Consumer Products

Cannabis comes in numerous consumable forms, such as flower (or bud), concentrates or extracts, edibles, topicals and pills. It is most commonly smoked or vaporized and inhaled; in this form it requires from 1 to 10 minutes to take effect. However, health-conscious consumers often prefer to consume cannabis products in edible forms. Edibles can provide longer-lasting relief of chronic symptoms, such as pain, often making this form a preferred choice for medical consumers. If eaten, cannabis will require about 1 to 2 hours to take effect as it is metabolized by the liver. Inhaled THC undergoes a different metabolic process—the THC travels directly to the brain rather than passing through the stomach and then the liver. Thus, the effects of smoked or vaporized cannabis are felt more rapidly and diminish more quickly than those of edibles or topical applications.

Most recreational consumers use cannabis for the “high,” or psychoactive effect, that results when THC is ingested. Since THC, CBD and other cannabinoids can be extracted from the cannabis plant

and reformulated into other consumable forms, providers can offer to consumers a variety of consumable products and a range of potencies. Cannabis flower is currently the most popular form of consumption, but concentrates and edibles are gaining in popularity. As processing techniques advance, an increasing number of options will become available to consumers.

## Cannabis Flower







Cannabis flower is generally green in color and slightly sticky to the touch, and it has a strong aroma. There are thousands of different strains of cannabis flower, with different aromas, flavors and potency. Cannabis flower usually contains 15% to 30% THC and varying levels of CBD and other cannabinoids. Owing to the advancements in cultivation techniques, cannabis flower available today is much more potent, with significantly higher levels of THC, than cannabis flower previously available.

*Cannabis Flower*



## Concentrates (Extracts)

Cannabis can be processed into a variety of concentrates. Extracting THC, CBD and other cannabinoids into a concentrated form enables producers to offer a broad array of alternatives for ingestion and enables users to consume cannabis in a form with higher potency than is possible from smoking or vaporizing cannabis flower. THC content can range from 20% to 80% and higher in concentrates. Most concentrates are produced by solvent-based extraction techniques, whereby the essential oils of the plant are stripped using either a specific chemical solvent or a combination of heat and pressure. Historically, the most common form of cannabis concentrate was hashish. Today, in addition to hashish, there are several other popular forms of concentrated cannabis, including kief, oil, rosin and infused butter.

Popular Concentrates		
Form	THC Content	Description
	20% to 60%	<b>Kief</b> is the simplest of cannabis concentrates and is generally considered a lower-quality extract. Kief is most commonly collected as the remnants of the cannabis flower found in containers or in screens during the manufacturing process. Kief is commonly consumed by smoking, vaporizing or after further processing into hashish.
	20% to 60%	<b>Hashish</b> , or hash, is made from cannabinoid-rich glandular hairs known as trichomes, as well as varying amounts of cannabis flower and leaf fragments. Hashish may be solid or resinous, depending on the preparation; pressed hashish is usually solid, whereas water-purified hashish is often a paste-like substance with varying hardness and pliability. Hashish is commonly consumed by smoking, vaporizing or being infused into an edible.
	50% to 75%	<b>CO<sub>2</sub> oil</b> is created by using carbon dioxide compressed at high pressure until it becomes what is known as a “supercritical fluid,” which strips the essential oils of the cannabis plant. The appeal of this method is that CO <sub>2</sub> is nonflammable and contains no chemical solvents. CO <sub>2</sub> oil is then further processed into edible goods, topical creams, pills or products intended for smoking or vaporizing.
	60% to 90%	<b>Butane hash oil (BHO)</b> products, the most common type of extract, are known by various names, such as wax, shatter and crumble. BHO is pressurized in a vessel and washed over plant material; the resulting solution is then collected. Heat is then applied, evaporating away the butane, and leaving only the THC oil. The THC oil is cooled to create a waxlike substance that is commonly consumed by smoking or vaporizing.
	50% to 70%	<b>Rosin</b> is extracted from dried cannabis flower, trim or lower-grade hash or kief. Rosin is created by heating and condensing the material until some of the essential oils are secreted. The oil secretion creates a waxlike substance that is commonly consumed by smoking or vaporizing.
	10% to 20%	<b>Infused butter</b> is the preferred method for creating cannabis-infused edibles. Cannabis is infused into butter by cooking the cannabis flower with butter until the butter becomes darkish brown or green. The cannabis flower is then sifted out until only the butter remains. Infused butter is substituted in cooking recipes, most popularly in brownies, cookies and candy.

## ■ Retail Pricing

### Flower and Concentrates

Cannabis flower and concentrates are generally priced by the gram when sold to consumers at a dispensary. Consumers generally pay a lower retail price for medicinal cannabis than for recreational cannabis because more taxes are levied on recreational products, ranging from 10% to 35% or more, depending on the jurisdiction. Cannabis prices vary across the country, with basic principles of supply and demand in effect. When dispensaries open in newly legalized markets, prices are often abnormally high due to the scarcity of supply and the propensity of early adopters to pay higher prices at the

launch of a new market. Over time, dispensary prices typically normalize as the market becomes more competitive. For example, Oregon offers some of the lowest prices in the nation because of the large number of medicinal and recreational dispensaries and cultivators located in the state. The quantity of product that consumers can purchase in a single visit to a dispensary is often capped by state law and regulations. Typically, medicinal consumers are limited to one ounce (28.3 grams) per purchase and recreational consumers are limited to one-quarter of an ounce (7.1 grams) per purchase.

Similar strains of cannabis are generally available in both the legal and illegal markets. The price for cannabis is typically lower in the illegal market. However, consumers are showing a willingness to pay higher prices for cannabis through dispensaries and other licensed providers due to the perceived protections provided by product labeling and testing requirements. We expect the pricing disparity between the legal and illegal markets to narrow over time as pricing decreases in the legal market because of increased competition and economies of scale.

The following is a sample “menu” of medicinal and recreational cannabis flower for sale at a typical dispensary in Oregon.

Representative Medicinal and Recreational Flower Pricing: Oregon						
Strain		Content		Price Per Gram		Effects
Name	Type	THC	CBD	Medicinal	Recreational	
Albert Walker OG	Hybrid	21.50%	0.20%	\$10.00	\$12.50	Uplifting / Energy
Big Wreck	Indica	16.50%	0.08%	\$10.00	\$12.50	Pain Relief / Sleep
Blueberry Kush	Indica	24.90%	0.20%	\$10.00	\$12.50	Pain Relief / Sleep
Blue Magoo	Hybrid	25.90%	0.09%	\$8.00	\$10.00	Pain Relief / Sleep
Feel Right Kush	Hybrid	24.30%	0.08%	\$6.00	\$7.50	Calmness / Relaxed
Jack Herer	Sativa	25.30%	0.10%	\$10.00	\$12.50	Creative / Happy
Pandora's Box	Sativa	29.70%	0.02%	\$7.00	\$8.75	Uplifting / Energy
Raspberry Kush	Indica	23.80%	0.01%	\$10.00	\$12.50	Relaxed / Happy

The following is a sample “menu” of medicinal cannabis concentrates for sale at a typical dispensary in Oregon.

Representative Medicinal Concentrates Pricing: Oregon				
Name	Type	Content		Price Per Gram
		THC	CBD	Medicinal
Afghan Haze	Crumble	83.47%	0.25%	\$25.00
ATF	Kief	NA	NA	\$12.00
Blue Magoo	Resin	NA	NA	\$30.00
Cinex	Shatter	66.01%	0.12%	\$24.00
EP Honey Oil	Oil	77.98%	1.31%	\$20.00
Gorilla Glue #4	Shatter	87.60%	0.00%	\$15.00
Hawaiian Blaze	Wax	NA	NA	\$25.00
Sour Diesel	Shatter	75.39%	0.20%	\$15.00



## ■ Ingestion Methods

Cannabis can be ingested by a variety of methods. Because inhaling cannabis provides an almost immediate effect, most consumers smoke or vaporize cannabis flower or concentrates. In jurisdictions where cannabis is legal, smoking devices and vaporizers are legal to purchase. In jurisdictions where cannabis is illegal, smoking devices and vaporizers are still sold but are marketed as products to be used for consuming tobacco or other legal herbs. For consumers who want to avoid inhaling smoke or vapor, cannabis-infused products can be eaten in an edible, taken in pill or capsule form, or applied topically in a balm, lotion or transdermal patch.

### Smoking

Consumers generally smoke cannabis in a joint (hand-rolled cannabis cigarette), a pipe or a bong. Smoking devices vary in design and are often made of metal, glass, wood or plastic.

#### *Smoking Devices*

Pipe



Bong



### Vaporizing

Consumers can also ingest cannabis using a vaporizer, a device that heats the cannabis product to the point of releasing THC or other cannabinoids, without causing combustion. Vaporizers are designed to allow the use of (i) concentrates (oil and other cannabis-derived liquids), (ii) dry flower, or (iii) both concentrates and dry flower. Vaporizers have quickly become a popular method for inhaling cannabis and are viewed by many consumers as a “healthier” alternative to smoking. Also, because vaporizers do not combust the cannabis product, they are significantly more efficient than smoking in extracting the active cannabinoids from the cannabis product. Smoking has been shown to destroy as much as 30% of the active cannabinoids in the cannabis product.

Vaporizing allows for the controlled heating of the cannabis product. Cannabinoids and terpenoids—the compounds responsible for the taste and aroma of the cannabis product—are vaporized at different temperatures. Therefore, the ability of a vaporizer to reach and maintain a range of tem-

peratures is critical for extracting the greatest amount of cannabinoids and terpenoids without reaching combustion (451°F). The boiling point for selected cannabis compounds is as follows.

Compound Boiling Point	
Compound	Boiling (°F)
THCA	220°F
CBDA	248°F
Terpenoids	259°F
THC	315°F
CBD	356°F
CBN	365°F

The most popular vaporizers available on the market today are portable, handheld vaporizers. These vaporizers are now in more demand than tabletop versions, which were previously the only type of vaporizer available to the consumer. In tabletop models, the extracted vapor may be collected in an inflatable bag and then inhaled.

### Vaporizers

Tabletop



Handheld



Vaporizers are generally differentiated from one another based on the following characteristics: (i) form usage (i.e., oil or flower); (ii) heat mechanism, or atomizer, and time to heat; (iii) power efficiency and battery duration; and (iv) durability, re-usability and maintenance. There are hundreds of vaporizers on the market ranging from simple to complex. Handheld vaporizers range in price from \$10 for disposable e-cigarette-type devices to \$500 or more for high-end premium devices. Tabletop vaporizers typically range in price from \$100 to \$1,000 or more.

Handheld vaporizers are generally constructed of a mouth piece, a filter, a chamber for a cannabis cartridge, a heating chamber, an indicator light and a battery. When the consumer presses the power button, the heating element activates, heating the liquid solution or the cannabis flower to create the vapor.



### Heating Methods

There are three heating methods for vaporizing cannabis: conduction, convection and induction. In general, the heating mechanism should allow for precise control of the temperature, in order to achieve vaporization without overheating, and should heat the material evenly. Some vaporizers offer dynamic temperature control, increasing the temperature as the consumer holds down a button and cooling upon release. This manual control enables consumers to personalize their experience by exploring different heating temperatures.

Most vaporizers are heated using conductive heating methods, which provide for the transfer of heat to the cannabis directly from a heat source (usually a coil). Convection heats the cannabis by moving superheated air through the cannabis product. With dynamic convection—an emerging heating method—the temperature changes with each breath taken during inhalation. By vaporizing the cannabis at a range of temperatures as it is inhaled, dynamic convection extracts a range of active ingredients and flavors in a single breath. Induction heats the cannabis through high-frequency electromagnetic fields.

**Conduction Vaporizer**



**Convection Vaporizer**



**Induction Vaporizer**



### Edibles

Cannabis edibles are food-based products, in either solid or liquid form, that have been infused with concentrated THC, CBD or other cannabinoids. Edibles are typically formulated with cannabis-infused butter or infused oil. In addition to the stereotypical “pot” brownie, almost any recipe can be transformed into a cannabis-infused edible. The most popular edibles are in the form of candies, cookies and brownies. Edibles generally deliver body-focused effects, which are preferred by consumers

who suffer from pain, nausea or lack of appetite. For consumers who want to avoid inhaling smoke or vapor, edibles are a preferred form for consumption.

The effects of eating an edible typically take one to two hours to be felt because the body needs to digest and metabolize the substance. Given the delay between the ingestion of edibles and the onset of effects, consumers may sometimes overestimate the dose of an edible required to achieve the intended effect. Inhaled cannabis, with its nearly instantaneous effect, enables the consumer to dose gradually.

Cannabis-infused edibles are not currently subject to FDA regulations (because cannabis remains illegal under federal law) but can be subject to state regulations. However, even under state regulations, there is no uniform standard for product dosage, potency, packaging and labeling. As the market continues to develop, states that have legalized cannabis are beginning to establish regulations for edible testing and labeling. The lack of uniform standards contributes to a lack of consistency from one product to another, with potency varying even unit by unit.

#### *Solid Edibles*



#### *Liquid Edibles*



### **Topicals**

Cannabis-infused topicals include many forms: lotions, balms, oils, lubricants and transdermal patches. In addition to THC, CBD and other cannabinoids, other ingredients and essential oils may be incorporated into topical products; such ingredients include cayenne, wintergreen and clove. Cannabis-infused topicals are absorbed through the skin and are generally nonpsychoactive.

Topicals are typically used for localized pain relief, muscle soreness, tension and inflammation. Anecdotal, topicals are also being used for a broadening range of conditions—psoriasis, dermatitis, itching, headaches and cramping.

### Topicals

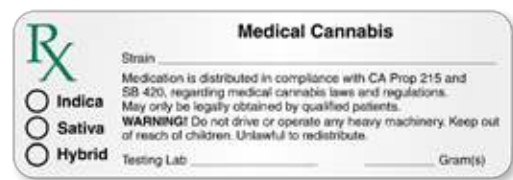


### Consumer Product Labeling and Dosage

As cannabis products become more accessible for consumers, the need for transparency and clarity in the labeling of origin and content becomes a greater priority. Product labeling provides consumers with the information required for them to differentiate between the growing numbers of available products and to make informed purchases. In addition, the current practice for cannabis dosing is simply a process of “self-titration.” Consumers typically determine dosage based on their subjective experiences and a period of trial and error. Dosing schedules are continuously being refined by cannabis-product providers but such dosages lack meaningful support by scientific medical research, and the emergence of government oversight will be required to provide consistent and uniform dosing schedules or recommendations.

Depending on the jurisdiction, consumer products must be labeled with some or all of the following information and warnings: (i) a statement about the source and the date of cultivation and/or manufacture; (ii) the phrases “Schedule I Controlled Substance,” “Keep Out of Reach of Children and Animals,” “For Medical Use Only,” “The Intoxicating Effects of This Product May Be Delayed by Up to Two Hours” (for edibles only), and “This Product May Impair the Ability to Drive or Operate Machinery. Please Use Extreme Caution”; (iii) the weight (dried flower only); and (iv) the amount of THC and CBD.

### Product Labels



## ■ Cannabinoid-based Therapeutics

The cannabinoid-based therapeutics market consists of (i) nonregulated cannabinoid-based products used for medicinal applications and (ii) regulated, government-approved cannabinoid-based pharmaceutical products. Today, nonregulated cannabinoid-based products—such as concentrated cannabidiol or concentrated CBD—that are used for medicinal applications represent the vast majority of the therapeutics market.

In the United States, scientific medical research on cannabis continues to be illegal because of federal prohibition. However, an increasing amount of research is being conducted internationally in an effort to better understand the medicinal applications of cannabinoids. Today, only a limited number of cannabinoid-based pharmaceutical products are available on the market; however, we expect the cannabinoid-based pharmaceuticals market to grow significantly after the end of federal prohibition on cannabis.

### Concentrated Cannabidiol (CBD)

Concentrated CBD is a high-CBD, low-THC concentrate extracted from cannabis flower. Concentrated-CBD products provide a physical effect without the “high” effect of THC. Concentrated CBD is most commonly delivered in oils and can be mixed into food or taken in a pill or capsule. CBD tinctures are liquid cannabis extractions that are typically applied under the tongue. Due to the lack of FDA regulation, these products vary widely in quality and are generally marketed as “botanical” products. Consumers typically use concentrated CBD to treat a range of medical conditions, including arthritis, chronic pain, depression, epilepsy, insomnia and migraines.

#### *Concentrated Cannabidiol Forms*

Tincture



Capsules



### Cannabinoid-based Pharmaceuticals

Cannabinoid-based pharmaceuticals are drugs that have been developed to release cannabinoids, primarily THC and CBD. The pharmaceuticals market consists of both natural, plant-derived cannabinoid-based products and synthetic cannabinoid-based products. In the United States, the FDA has approved a limited number of synthetic cannabinoid-based pharmaceuti-



cals, but no natural, plant-derived pharmaceuticals. The international market includes a limited number of both synthetic and natural, plant-derived cannabinoid-based pharmaceuticals: these drugs are being used to treat a number of medical conditions, including epilepsy, multiple sclerosis (MS), chemotherapy-induced nausea and vomiting (CINV), and cachexia. Examples of cannabinoid-based pharmaceuticals follow.

**Epidiolex**, by GW Pharmaceuticals, is the lead candidate in phase III clinical trials for treatment of rare, severe pediatric epilepsies. Epidiolex is an investigational new drug (IND) that incorporates a natural, plant-based purified form of CBD and has not yet been approved for use by the FDA.

**Sativex**, by GW Pharmaceuticals, is an oral spray derived from a natural, plant-based cannabis source. Sativex is approved in 28 countries (excluding the United States) for patients with moderate to severe MS spasticity. Sativex is a 1:1 combination of CBD and THC, and it interacts with CB<sub>1</sub> and CB<sub>2</sub> receptors.

**Marinol**<sup>®</sup>, by Abbvie, is a synthetic THC compound taken orally as a pill. In 1985, Marinol was approved by the FDA for use by patients with CINV who do not respond to traditional medications. Marinol is classified as a Schedule III substance under the CSA.

**Dronabinol**, by Insys Therapeutics, is a generic version of Marinol distributed in THC capsules. In 1992, dronabinol was approved by the FDA as a second-line treatment for CINV and for anorexia associated with weight loss in patients with AIDS.

**Cesamet**<sup>®</sup> (nabilone), by Meda Pharmaceuticals, is another synthetic cannabinoid. In 1985, Cesamet was approved by the FDA for use by patients with CINV who did not respond to traditional medications. Cesamet is classified as a Schedule II substance under the CSA.





## CHAPTER IV

# U.S. Cannabis Market Estimates

The RAND Corporation estimated that the illegal U.S. market for cannabis was approximately \$40 billion in 2010. Despite federal prohibition, it is estimated that approximately 20 million people in the United States consume cannabis on a monthly basis. For comparison, the annual U.S. retail market for tobacco is approximately \$100 billion, with approximately 45 million consumers. As more states legalize cannabis for recreational and medicinal consumption and provide the legal infrastructure for a retail dispensary system, an increasing portion of the illegal market will continue to transition to the legal market.

We divide the cannabis market into two categories: the current cannabis consumer market for recreational and medicinal use, and the future market for cannabinoid-based pharmaceuticals. We estimate that the U.S. cannabis consumer market for legalized recreational and medicinal use was \$4.4 billion in 2015, with 4.1 million consumers, and will grow to \$9.5 billion in 2019, with 7.3 million consumers. Once legalized federally, we estimate that this market will grow to \$37 billion within 5 years, with 22 million consumers, and \$50 billion within 10 years, with 30 million consumers. We believe that within 10 years after the end of federal prohibition, the cannabinoid-based pharmaceuticals market may exceed \$50 billion annually, with more than 20 million consumers. Therefore, we believe that the combined total market for cannabis in the United States may ultimately reach \$100 billion annually, with more than 50 million consumers.

While this report focuses on the U.S. market, we believe that the international market has the potential to exceed \$500 billion annually, with more than one billion consumers worldwide. In 2013, Uruguay became the first nation to legalize cannabis for recreational use. Canada has a national medical cannabis program and a newly elected prime minister who has stated his intention to legalize cannabis for recreational purposes. In December 2015, the president of Colombia signed a decree legalizing and regulating the cultivation, processing and exportation of medical cannabis in Colombia. In addition, numerous other countries—including Brazil, Chile, Mexico, Poland, Portugal and Switzerland—have expressed interest in legalizing or decriminalizing the use of cannabis. Similar to the United States, we expect the worldwide trend of legalizing cannabis to continue and accelerate. Over time, we believe that U.S. companies will be leading participants in the global cannabis market as it develops.

### ■ Key Market Growth Drivers

The cannabis market has numerous growth drivers, including the following:

- ***Large Base of Potential Cannabis Consumers*** Approximately 45% of the U.S. population currently resides in a state that has legalized recreational or medicinal cannabis use, representing a

large pool of potential cannabis users. Even prior to the potential end of federal prohibition, this pool of potential consumers is expected to increase significantly as additional states legalize the use of cannabis. In addition, we believe that the number of cannabis consumers will continue to increase as the general population is more exposed to cannabis use, the culture continues to shift toward cannabis destigmatization and the potential medicinal benefits of cannabis are better understood.

- ***Potential End of Federal Prohibition*** We believe that it is a question of when, but not if, the federal prohibition on cannabis will end. We also believe that the end of prohibition may trigger rapid growth in the market, launched by interstate commerce and the emergence of the cannabinoid-based pharmaceuticals market.
- ***Advancements in Alternative Forms and Ingestion Methods*** Product innovation and advancements in flower strains, concentrates, edibles, vaporizing technology and cannabinoid-based therapeutics will drive consumer adoption and consumption.
- ***Branded Products and Product Platforms*** Because the cannabis industry is in its infancy, participants in each industry segment have the opportunity to create recognizable brands and product platforms in their respective markets. Over time, providers will differentiate their brands through marketing, distribution, packaging, selection, quality and pricing.
- ***Economies of Scale*** As the cannabis industry develops, the benefits of economies of scale are beginning to be realized in selected segments, enabling more competitive solutions to reach the market; however, the benefits of true economies of scale will not be realized until after the end of federal prohibition.
- ***Technology Leverage and Digital Media*** Mobile applications, e-commerce and digital media will drive growth with existing and new consumers. As dispensaries and others adopt e-commerce solutions and provide on-demand home delivery, the ease of online ordering will drive consumer adoption and consumption. Also, cannabis-related online content, directories and social networking will increasingly heighten awareness of the recreational and medicinal benefits of cannabis products.

## ■ Market Estimate Methodology

### Legalized U.S. Cannabis Consumer Market: Before the End of Federal Prohibition

Our methodology for estimating the legalized U.S. cannabis consumer market is based primarily on the following factors: (i) the number of eligible consumers in each state, based on age and gender; (ii) the penetration rate for each age bracket and gender; and (iii) the average monthly consumption rate for each age bracket and gender.

**Eligible U.S. Consumers**

Using U.S. Census data, we began by determining the number of people in the United States aged 21 or older. While some medicinal applications are targeted at people under 21 years of age, we excluded this group of consumers from our estimates. For future periods, we then assumed a number of additional state legalizations and applied a nominal annual growth rate to the U.S. population. The following table lists the U.S. population aged 21 or older, segmented by age group and gender.

U.S. Population Aged 21 or Older (000s): 2015							
	21 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 and Over	Total
Men	19,747	20,614	22,438	21,615	15,105	14,285	113,806
Women	20,240	21,128	22,997	22,154	15,481	14,641	116,644
Total	39,987	41,742	45,435	43,769	30,586	28,926	230,450

Source: Ackrell Capital estimates, based on U.S. Census data

We then looked at the number of people aged 21 or older in the 23 states and the District of Columbia where cannabis consumption has been legalized. The following table lists the U.S. population aged 21 or older in these legalized states versus prohibited states, segmented by age group.

Population Aged 21 or Older in Legalized States versus Prohibited States (000s): 2015							
	21 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 and Over	Total
Legalized States	18,644	19,520	21,406	20,477	14,044	13,300	107,394
Prohibited States	21,343	22,222	24,029	23,292	16,542	15,626	123,056
Total	39,987	41,742	45,435	43,769	30,586	28,926	230,450

Source: Ackrell Capital estimates, based on U.S. Census data

**Consumer Penetration Rates**

After determining the size of the potential pool of eligible cannabis consumers in the United States, we addressed current and prospective consumer penetration rates on a state-by-state basis. To avoid paying taxes on recreational cannabis—which can range from 10% to 35% or more, depending on the jurisdiction—recreational consumers often obtain a doctor’s prescription to qualify as a medical consumer. Given the overlap between recreational and medicinal usage, we estimated the number of recreational and medical consumers as a group, rather than separately. Based on our own and third-party surveys, we believe that men represent approximately two-thirds of the market, and the average user is about 40 years old.

To forecast consumer penetration rates, we first assessed the penetration rate in states where recreational consumption is legalized and recreational dispensaries exist. Based on a collection of national surveys and data from Colorado, Oregon and Washington, we believe that the combined penetration rates in 2015 for the consumption of cannabis in legalized recreational states, based on gender and age group, approximate the rates shown in the following table.

Consumer Penetration Rates of Cannabis in Legalized Recreational States: 2015							
	21 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 and Over	Weighted Avg.
Men	24.5%	18.6%	15.3%	10.7%	5.3%	2.7%	13.7%
Women	12.3%	9.3%	7.7%	5.3%	2.7%	1.3%	6.9%
Average	18.4%	14.0%	11.5%	8.0%	4.0%	2.0%	10.2%

Source: Ackrell Capital estimates

For medicinal-only states, we applied discounts to the preceding penetration rates, depending on the state and the stage of development of each state's dispensary and qualified caregiver market.

We view the penetration rates in legalized recreational states as representative of the market after the end of federal prohibition. However, an end to federal prohibition may significantly increase penetration rates as negative perceptions associated with recreational cannabis use diminish.

### Monthly Cannabis Consumption

After addressing the size of the potential pool of consumers through demographic analysis and expected penetration rates, we turned to an assessment of monthly cannabis consumption, in dollars. We grouped cannabis consumers based on consumption levels (low, moderate and heavy), and used a weighted average to estimate the overall market. Based on our own surveys, a collection of national surveys and data from Colorado, Oregon and Washington, we believe that the monthly cannabis consumption levels in legalized states approximate the levels shown in the following table.

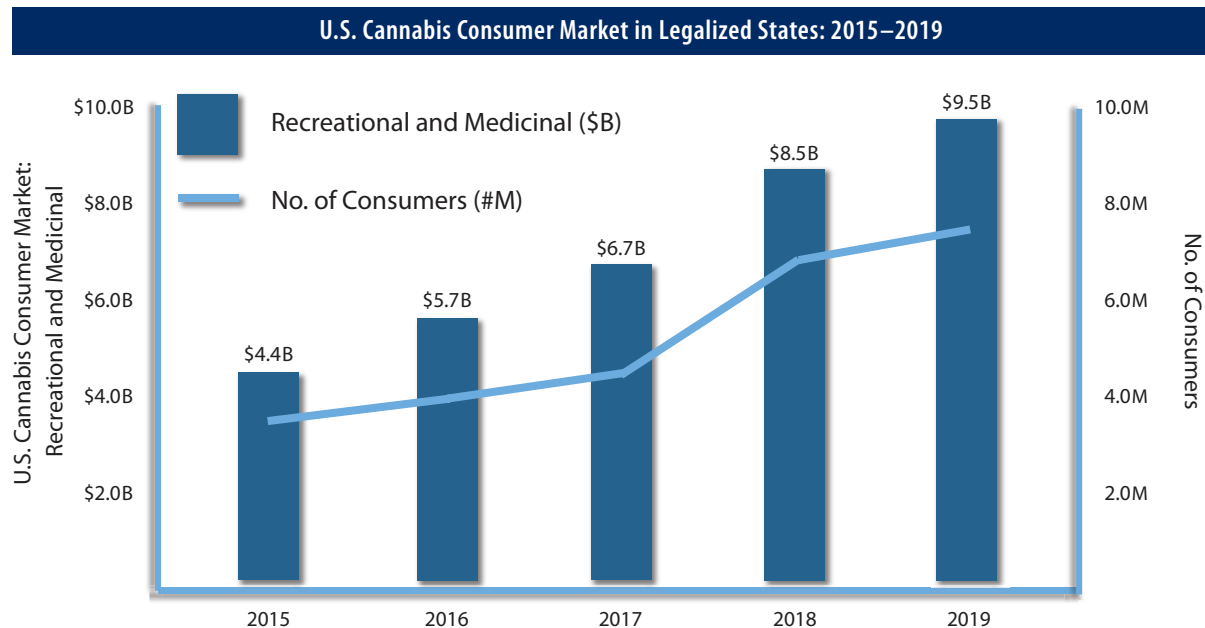
Monthly Cannabis Consumer Consumption Levels in Legalized States: 2015				
Consumer Type	Monthly Medicinal / Recreational Consumption			
	Low	High	Average	%
Low	\$20	\$50	\$35	40%
Moderate	\$50	\$150	\$100	40%
Heavy	\$200	\$400	\$300	20%
Weighted Average	\$68	\$160	\$114	

Source: Ackrell Capital estimates

We believe that heavy consumers represent approximately 20% of the total number of consumers but account for 60% to 70% of total consumption. We used the weighted average total based on consumer type (low, moderate or heavy user) and applied a consumption factor based on age group. We then applied a nominal growth factor to these results. Like most retail products, pricing has a large influence on consumption. At this early stage of the cannabis market, product availability (access to licensed dispensaries) is the primary driver of consumption as long as retail pricing remains close to pricing in the illegal market. After the end of federal prohibition, we believe that it will take a few years before sufficient economies of scale are realized by large industry players to substantially affect pricing and demand.

### ***U.S. Cannabis Consumer Market for Legalized Recreational and Medicinal Use***

Based on the preceding methodology, our estimate of the U.S. cannabis consumer market for legalized recreational and medicinal use is as follows.



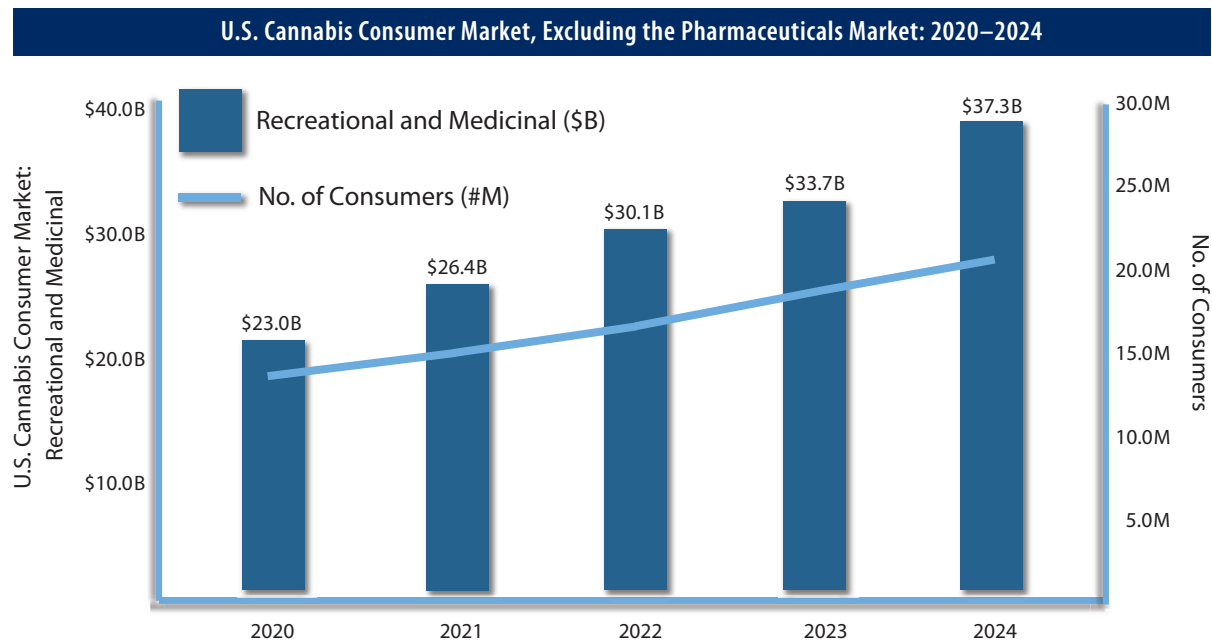
Source: Ackrell Capital estimates

### **Legalized U.S. Cannabis Consumer Market: After the End of Federal Prohibition**

We developed 5-year and 10-year forecasts, starting after the assumed end of federal prohibition. For our estimates, we assume the end of prohibition by 2020. After the end of prohibition, we expect (i) consumer penetration rates and the number of consumers to increase in states that were legalized prior to the end of prohibition, (ii) new states to become legalized, and (iii) the regulated pharmaceuticals market to develop. At least initially, we expect consumer penetration in states that become legalized after the end of prohibition to be lower than penetration rates in states that became legalized before the end of prohibition.

### ***U.S. Cannabis Consumer Market, Excluding the Pharmaceuticals Market***

Based on the preceding methodology, our estimate of the U.S. cannabis consumer market after the end of federal prohibition, excluding the pharmaceuticals market, is as follows.



Note: Assumes the end of the federal prohibition on cannabis by 2020.

Source: Ackrell Capital estimates

### ***U.S. Cannabis Consumer Market for Cannabinoid-based Pharmaceuticals***

For our market estimates, we assume that the U.S. market for cannabinoid-based pharmaceuticals does not develop until after the end of federal prohibition. Until such time, it will continue to be illegal in the United States to conduct research and development on cannabis.

More than 40 medical conditions are listed as qualifying conditions in numerous legalized states. Many of these conditions affect millions of people, and most of these conditions currently have multi-billion-dollar annual treatment costs. As the efficacy of cannabinoid-based treatments becomes better understood, we believe that cannabinoid-based pharmaceuticals may become viable treatment alternatives in these large, addressable markets.

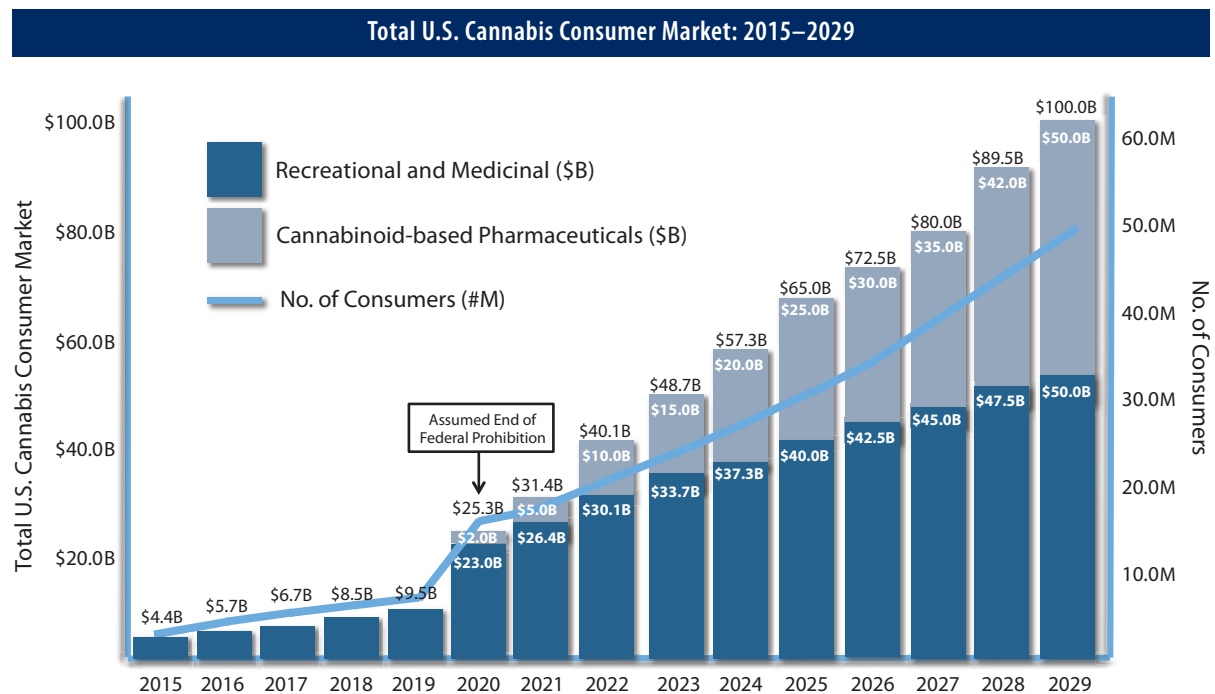
Our methodology for estimating the U.S. consumer market for cannabinoid-based pharmaceuticals is based on the following: (i) the estimated market size of the more than 40 potential medical conditions treatable with cannabinoid-based pharmaceuticals, and (ii) the penetration rate for consumers to adopt cannabinoid-based pharmaceuticals as an alternative treatment. In addition, given the anticipated ramp-up period in U.S. medical research of cannabinoid-based treatments after the end of federal prohibition and the lengthy FDA-drug approval process, we believe that the U.S. market for



cannabinoid-based pharmaceuticals will start slowly after the end of federal prohibition, then will begin to accelerate. We also believe that early users of cannabinoid-based pharmaceuticals will primarily be the existing recreational and medicinal users of cannabis. We believe that the cannabinoid-based pharmaceuticals market may ultimately exceed \$50 billion annually, with more than 20 million consumers.

## ■ The Total U.S. Cannabis Consumer Market

Based on the preceding methodology, and assuming the end of the federal prohibition on cannabis by 2020, our estimates of the total U.S. cannabis consumer market are shown in the following table.



Source: Ackrell Capital estimates

## Methodology and Estimates: Sanity Check

We now offer a sanity check on our methodology and estimate of market size by comparing the total U.S. cannabis consumer market to markets for other stimulants and pharmaceuticals. We believe that this comparison is useful because cannabis is often consumed recreationally in much the same way as alcohol, coffee and tobacco are enjoyed. In addition, we believe that cannabis may ultimately be a legal pharmaceutical alternative for a broad range of medical conditions. The following table offers a comparison of the estimated penetration rate, average monthly spending per consumer and U.S. retail market size for a number of common stimulants and pharmaceutical substances.

Comparison between Cannabis and Common Stimulants and Substances						
	Alcohol	Coffee	Tobacco	Painkillers	Anti-depressants	Cannabis (Future)
Primary Usage	Recreational	Recreational	Recreational	Medicinal	Medicinal	Recreational / Medicinal
Adult Penetration %	50%	50%	17%	40%	25%	20%
Consumer Monthly Spending	\$45 to \$200	\$80 to \$100	\$40 to \$80	\$50 to \$200	\$50 to \$100	\$50 to \$500
U.S. Retail Market Size	\$200B	\$35B	\$100B	\$300B	\$60B	\$100B

Source: Ackrell Capital estimates

This table demonstrates that our metrics and market-size estimates for the U.S. cannabis consumer market are in line with other U.S. retail markets for recreational stimulants and pharmaceutical substances.

## CHAPTER V

# Industry Segmentation

The cannabis industry has begun to develop and diversify into numerous segments. We have divided the cannabis industry into 6 primary segments and 14 subsegments, each with its own unique role in the market, distinct business model, opportunities and risks. Certain segments of the industry that “touch” the flower are considered illegal under federal law, while a number of segments that do not touch the flower have emerged to provide cannabis-related products, services and solutions. The legal framework for companies continues to be challenging because many companies operate in more than one segment. We believe that leaders in the various segments will emerge as the cannabis industry continues to mature and the legal framework is clarified.

Cannabis Industry Segmentation						
Production			Retail Distribution		Business Software	Business Solutions
Cultivation	Production Equipment and Supplies	Laboratory-Testing Equipment and Services	Dispensaries	E-Commerce	Business Services	
Consumer Products			Cannabinoid-based Therapeutics		Online Content and Networking	Digital Media
Flower and THC Concentrates	Edibles, Topicals and Nutraceuticals	Vaporizers and Accessories	CBD Concentrates	Pharmaceuticals	Online Directories	

### ■ Production

This segment includes cultivators/growers, providers of production equipment and supplies, and providers of laboratory-testing equipment and services.

#### Cultivation

The cultivation market consists of hundreds of growers, large and small. Cultivators generally need a state license to cultivate cannabis and typically have limitations placed on the size of their operations, based on square footage, number of plants or output. In some states, vertical integration is required for cultivation and dispensary operations.

Advancements in cultivation technology have enabled cultivators to grow thousands of unique cannabis strains to meet the needs of recreational or medical consumers. Cannabis strains vary substantially in cannabinoid content, aroma, flavor and potency. As a result, due to the number of variables in the cultivation process, cannabis-flower strains are difficult to replicate consistently across cultivation cycles.

### ***Cultivation Operations and Distribution***

Cultivators have to address numerous operational issues as they develop and grow their businesses: (i) license acquisition and ongoing legal compliance, (ii) facility design and construction, (iii) facility management, (iv) strain acquisition and management, (v) strain research and development, (vi) process development and engineering, (vii) supply-chain management, (viii) yield optimization, (ix) cultivation management, (x) staff management and (xi) security. Many cultivators seek outside expertise in one or more facets of the cultivation process, although some have the expertise and resources to manage the entire process in-house.

Cultivators often sell their flower wholesale to dispensaries or concentrate manufacturers, but some retail their products direct to consumers. To reach consumers and to create a strong brand at the early stages of the market, cultivators must develop relationships with leading dispensary operators or have their own dispensary operations, while providing high-quality and consistent products at competitive prices. Longer-term, e-commerce capabilities will be crucial in driving the reach of most cultivators.

### ***Legal and Compliance Issues***

Because cultivators “touch” the flower, they are regulated by state law and generally must be licensed prior to engaging in business activities in selected states and locally approved jurisdictions where commercial cultivation has been approved. Despite state laws, cultivation is still not legal under federal law. In the past, the federal government has raided cannabis cultivation facilities and has prosecuted operators. Currently, the federal government has reduced its scrutiny of cultivation facilities in deference to state regulation and oversight.

In addition to having a state license, cultivators must comply with any existing state regulations for product testing, labeling and security. In many jurisdictions, the cultivator must also satisfy state residency requirements, usually ranging from 2 to 5 years. The cultivation licensing process generally takes from 6 to 12 months to complete. Certain states limit the number of licenses granted, whereas other states, such as Colorado, have no limit. The licensing application usually includes the following requirements: (i) main application, (ii) business plan, (iii) proof of financial stability and (iv) background information on all applicants.

### ***Production Equipment and Supplies***

It all starts with the seed: cultivators can purchase more than a thousand different strains of cannabis seeds from commercial seed suppliers (seed banks) or selectively breed their own proprietary seeds. These seed suppliers are located both in the United States and internationally.

Next, cultivators require cost-effective production equipment and supplies. Suppliers of production equipment include integrated system manufacturers, as well as suppliers of point solutions, which address only one aspect of the cultivation process. While cannabis can be grown outdoors, the majority

of legal cannabis cultivation occurs indoors. A typical large indoor grow room includes the following production equipment: (i) basic production and lighting equipment; (ii) air filtration and circulation systems; (iii) irrigation systems; (iv) nutrient management systems; (v) drying, curing and storage equipment; and (vi) a computer-controlled, automation and monitoring system. In indoor grow rooms, lighting is extremely important. LED lights are becoming popular in grow rooms because of their low energy requirements, low heat output and wide spectrum. Fertilizers are also important to the cultivation process, and a growing number of suppliers provide customized fertilizers to the market.

Cannabis can be processed into a variety of concentrates for consumption or use in the making of cannabis-infused products. Most cannabis concentrates are produced using complex, solvent-based extraction equipment and techniques, whereby the essential oils of the plant are stripped using either a specific chemical solvent or a combination of heat and pressure. Many manufacturers use blended gases to create signature products with unique consistencies and flavor profiles. Commercial-scale extraction equipment may cost hundreds of thousands of dollars.

#### *Extraction Equipment*



### **Laboratory-Testing Equipment and Services**

Cannabis-based products generally must be tested for safety, potency and quality prior to sale to consumers. A summary of test results generally must be provided on the product label at the point of sale, with full test results available upon request. Testing is generally focused on four areas: (i) cannabinoid and terpenoid profiling, (ii) microbiological/residual-solvent testing, (iii) mycotoxin screening and (iv) pesticide screening. Molds—which are ubiquitous in cannabis products—are particularly undesirable because exposure to high levels of molds and bacteria is known to cause health problems. Pesticides may also be found in cannabis products. Because cannabis is illegal under federal law, no pesticide residual tolerance limits have been established by the U.S. Environmental Protection Agency; however, some states that have legalized the use of cannabis have outlawed the use of pesticides in the cultivation of cannabis.

Dispensaries typically are responsible for testing and usually employ third-party laboratory-testing service providers. Testing can be done in a laboratory, or more limited testing can be performed on location, at the dispensary or cultivator, using portable testing systems. Laboratory testing equipment usually consists of a liquid chromatography system (LC), a liquid chromatography/mass spectrometry

try system (LC/MS), a gas chromatography system (GC), a gas chromatography/mass spectrometry system (GC/MS), a thin-layer chromatography system (TLC) and an infrared spectroscopy system.

### **Laboratory Testing Equipment**



Laboratory-testing service providers are generally certified by a state health authority. Most states require some form of testing, but testing requirements vary greatly from state to state. We expect that uniform standards for testing cannabis-based products will eventually be established.

## **Production Opportunities**

We believe opportunities in this segment include:

- ***Specialized, Highly Integrated Production Solutions*** Given the difficulty in replicating cultivation environments from one cultivation cycle to the next, providers of specialized cultivation solutions that enable optimized replication should gain market share. In addition, companies that provide integrated systems that automate, monitor and control the production process—rather than point solutions—are more likely to succeed in the long term. In addition, we expect strong demand for specialty extraction equipment that minimizes the use of harmful or dangerous solvents or varies the types of concentrates that can be created.
- ***Advanced Lighting Technology*** As we anticipate an increasing percentage of cannabis to be grown indoors, we expect the number and size of indoor grow facilities to increase substantially. This will create a significant opportunity for suppliers of advanced lighting equipment, especially those suppliers that can provide lighting equipment that improves plant yields and reduces energy use.
- ***Branded Laboratory Test Certification*** Given the importance of testing to the cannabis industry, we believe that leading high-quality testing-service providers may have an opportunity to establish an industry-recognized “certification.” Such certification may become a key factor in consumer demand for particular products.
- ***Mobile, In-field Laboratory Testing*** To avoid potential legal liability from transporting and taking possession of cannabis products in the laboratory, some testing-service providers elect to analyze cannabis products at either the dispensary or the cultivator. Given the need for quick turnaround times and the reduced legal exposure of testing in the field, we believe that there

is a sizable market opportunity for suppliers of portable or remote testing systems that can be deployed cost-effectively.

## Production Challenges

Challenges in this segment include:

- ***Lack of Testing Standards*** Because regulators and industry participants have not developed a uniform and reliable set of testing standards for cannabis products, testing is currently performed ad hoc, and reliable comparison of testing results is not possible. Until uniform testing standards for the cannabis industry are implemented, it may be difficult for any testing-service provider to develop an industry-wide brand and reputation for quality.
- ***Marketing and Distribution*** Production-equipment providers may struggle to develop optimal marketing and distribution relationships because of the current lack of industry organization, the geographically dispersed nature of cannabis cultivators and the breadth of products likely to be on the market.
- ***Access to Capital*** Participants in the production sector generally will require significant amounts of capital to compete, given the scale of operations required and the cost of developing, purchasing and maintaining equipment. Companies in this sector may struggle to raise enough capital to compete effectively.

## Production Outlook

In the near term, we expect leading branded cultivators to emerge on a statewide basis. We believe well-managed and well-financed cultivators will distinguish themselves by creating consistent, high-quality strains, developing strong distribution relationships and offering competitive pricing. Once federal prohibition ends, we believe that the market will be dominated by large cultivators that are able to realize the economies of scale of a centralized production and distribution business model. In addition to branded cultivators, we also believe that significant market opportunities exist for extraction-equipment providers, LED-lighting suppliers and laboratory-testing service providers.

Today, because of the federal prohibition on cannabis, many large agriculture and agricultural equipment suppliers that could effectively compete in the cannabis industry are reluctant to enter the market. This dynamic has created an opportunity for smaller players to enter and establish leading positions in the cannabis industry. However, as the legal environment clarifies, we expect competition in the production sector to increase as large players with significant resources enter the market.

## ■ Retail Distribution

This segment includes medicinal and recreational cannabis dispensaries, and consumer and business e-commerce companies.

### Dispensaries

Cannabis dispensaries are retail establishments that have received a state license and/or approval from local jurisdictions to sell cannabis-based products. Currently, medicinal dispensaries are legalized in 20 states, whereas recreational dispensaries are legalized in only 4 states. While e-commerce and



home-delivery services are becoming more popular, dispensaries are currently the primary source for consumers to buy cannabis products. Dispensaries range in size from less than 1,000 to more than 10,000 square feet of retail space and operate much like typical retail stores, with displays and customer service staff, or “tenders.”

#### *Dispensary Exterior Views*



Dispensaries typically offer 25 to 50 different strains of cannabis-flower products and a variety of concentrates, edibles, topicals and accessories. Dispensaries can either acquire cannabis flower from specialty cultivators or cultivate their own cannabis: some states require vertical integration of cultivation and dispensing. Cannabis-flower products are generally displayed in large clear jars or see-through canisters, or in small samples, with the bulk of the inventory stored out of sight.

While most dispensaries cater to walk-in consumers, some are adopting e-commerce strategies to reach a broader group of consumers. e-Commerce purchases are currently limited to intrastate delivery and can be provided through on-demand home delivery in selected jurisdictions.

#### *Dispensary Interior Views*



Depending on the jurisdiction, dispensaries are operated as either for-profit or non-profit enterprises and can be organized in the form of a collective or a cooperative. The capital required to open and operate a dispensary ranges from \$500,000 to several million dollars, depending on the size and quality of the facility.

### **Legal and Compliance Issues**

Dispensaries “touch” the flower and so generally must be state-licensed prior to engaging in business activities. Despite state laws that authorize legal dispensaries, dispensaries are not legal under federal law. In the past, the federal government has raided cannabis dispensaries and prosecuted operators; currently, the federal government has reduced its scrutiny of dispensaries in deference to state regulation and oversight. In addition to having a state license, dispensaries must comply with any existing regulations for product testing, packaging and labeling, security, health and sanitary standards and tax collection. In many cases, applicants must also satisfy state residency requirements, usually ranging from 2 to 5 years. The licensing process, which generally takes from 6 to 12 months to complete, usually includes the following requirements: (i) main application, (ii) business plan, (iii) proof of financial stability and (iv) background information on all applicants.

Dispensaries in some states are required to track cannabis products from “seed to sale” and to collect taxes on behalf of the state. While reporting requirements vary from state to state, in general, dispensaries must report each transaction, whether buying or selling, and other information regarding consumer purchases. In states where recreational use is approved, existing medicinal dispensaries are usually eligible to become licensed for the sale of cannabis for recreational use before other new recreational licenses are granted.

### **e-Commerce Market**

We believe that the e-commerce market for cannabis will experience significant growth if federal prohibition ends. Currently, e-commerce is limited to intrastate transactions—typically on-demand home deliveries made by dispensaries to local consumers. Once prohibition ends and interstate commerce is permitted, consumers will be able to make price comparisons for particular strains of cannabis or other products on a national or international basis. Dispensaries and e-commerce providers will need to be able to provide a superior mobile buying experience based on ease of use and functionality, combined with an engine that facilitates price comparisons on the broadest possible selection of products. In addition, customer service and support will be critical factors in retaining customers, given the ease with which consumers will be able to change vendors.

### **Retail Distribution Opportunities**

We believe opportunities in this segment include:

- ***Mobile e-Commerce and On-demand Home Delivery Market*** Although a visit to a dispensary can be entertaining for some consumers, most will value the ability to purchase cannabis-based products online. As dispensaries develop a deeper relationship with consumers and deploy easy-to-use mobile e-commerce applications, consumers will likely concentrate their purchases from a small group of dispensaries, based on pricing, selection and overall customer service. The ability to deliver cannabis-based products on-demand represents an attractive distribution channel and growth opportunity for dispensaries.

- ***e-Commerce Exchange or Commerce Platform*** Given the dynamics of the cannabis market, we believe that an e-commerce exchange or commerce platform will enable businesses and consumers to obtain optimal pricing and selection for cannabis products. The “Kayak” or “Amazon.com” of cannabis will likely emerge in several forms as aggregators begin to optimize the online purchasing process.
- ***Consumption Platform with Subscription Services*** Dispensaries and e-commerce providers have the opportunity to create a consumption platform for their customers, with the possibility of delivering products to frequent consumers on a subscription basis. As e-commerce solutions evolve and proliferate, it will be important for dispensaries to launch their own mobile e-commerce solutions to provide a more efficient purchasing experience, even enabling consumers to track purchases and usage. By providing a seamless and high-value relationship with consumers, providers will be able to enhance customer loyalty and drive repeat business.

## Retail Distribution Challenges

Challenges in this segment include:

- ***Customer Acquisition Costs*** Similar to most e-commerce businesses in other industries, dispensaries and e-commerce providers face intense competition and will be challenged to minimize customer acquisition costs.
- ***Customer Retention*** Given the ease with which consumers can change their vendor loyalties, dispensaries and e-commerce providers will likely be challenged to retain customers in the face of increasing competition.

## Retail Distribution Outlook

We believe that well-managed dispensaries are generating significant cash flow at compelling margins in the early stage of the cannabis industry. We expect this trend to continue, especially as dispensaries introduce e-commerce solutions and on-demand home delivery becomes legal and more available. In addition, we believe dispensaries that have built their own cultivation operations will have a significant advantage, as will those that develop strategic and sometimes exclusive relationships with specialty cultivators and other providers of cannabis-based products. The most defensible businesses will also find a way to generate loyalty among their customers and provide cannabis-based solutions that address specific customer needs and preferences.

After the end of federal prohibition, mobile e-commerce solutions will likely become the dominant form of distribution. We believe that the e-commerce market will be dominated by companies that provide a “killer app” buying experience, offering access to the broadest selection of high-quality products at reasonable prices. While we envision that an “Amazon.com” for cannabis will eventually emerge, companies that provide real-time price comparisons of thousands of products should be able to succeed if they can reach critical mass and create a loyal following.

## ■ Consumer Products

This segment includes branded providers of cannabis flower, THC concentrates, edibles, topicals, nutraceuticals and providers of vaporizers and accessories.

### Flower and THC Concentrates

There are thousands of different strains of cannabis flower, with different cannabinoid contents, aromas, flavors and potency. Cannabis flower usually contains 15% to 30% THC and nominal levels of CBD and other cannabinoids. Cannabis can be processed into a variety of concentrates. Extracting THC in a concentrated form enables producers to offer a broad array of alternatives for ingestion and enables users to consume cannabis in a form with higher potency than is possible from smoking or vaporizing cannabis flower. THC content can range from 20% to 80% and higher in concentrates. Historically, the most common form of cannabis concentrate was hashish. Today, in addition to hashish, there are several other popular forms of concentrated cannabis, including kief, oil, rosin and infused butter. Cannabis flower and THC concentrates account for the majority of cannabis-based products sold in the market.

### Edibles, Topicals and Nutraceuticals

Cannabis edibles are food-based products, in either solid or liquid form, that have been infused with concentrated THC, CBD or other cannabinoids. Edibles are typically formulated with cannabis-infused butter or infused oil. In addition to the stereotypical “pot” brownie, almost any recipe can be transformed into a cannabis-infused edible. The most popular edibles are in the form of candies, cookies and brownies. Edibles generally deliver body-focused effects, which are preferred by consumers who suffer from pain, nausea or lack of appetite. For consumers who want to avoid inhaling smoke or vapor, edibles are a preferred form for consumption.

Cannabis-infused topicals include many forms: lotions, balms, oils, lubricants and patches. In addition to THC, CBD and other cannabinoids, other ingredients and essential oils may be incorporated into topical products; such ingredients include cayenne, wintergreen and clove. Because they are nonpsychoactive, topicals are often preferred by patients who want a therapeutic benefit without the euphoria associated with certain consumption methods.

Nutraceuticals made from cannabis include isolated nutrients, dietary supplements and herbal products and often take the form of processed foods and beverages. Depending on the ingredients and the marketing claims, a particular nutraceutical may be regulated as a drug, dietary supplement, food ingredient or food product.

### Legal and Compliance Issues

Except for providers of vaporizers and accessories, most providers in this segment “touch” the flower and so must be state-licensed prior to engaging in business activities. Because cannabis remains illegal under federal law, cannabis-based products currently are not subject to FDA regulations. However, they are subject to numerous state regulations, which may include regulations for product dosage, potency, testing, packaging and labeling. The lack of uniformity of state regulations may result in consumer confusion in the market and a potential for overconsumption of a particular product or

ingredient, potentially resulting in negative side effects. As the market continues to develop, states that have legalized cannabis are beginning to establish regulations for testing and labeling. Once testing and labeling standards are uniform and effective, consumers will be better able to select the right product and dosage for a desired effect.

## Vaporizers

Cannabis vaporizers have rapidly become a popular method for inhaling cannabis—a “healthier” alternative to smoking. Hundreds of vaporizers are currently marketed, ranging from simple to complex. We categorize vaporizers based on their functionality and price range: (i) disposable e-cigarette type devices that range in price from \$10 to \$20; (ii) commodity vaporizer pens that range in price from \$20 to \$100; (iii) mid-range premium devices that range in price from \$100 to \$250; and (iv) high-end premium devices that range in price from \$250 to \$500 or more.

## Legal and Compliance Issues

In jurisdictions where cannabis is legal, vaporizers are legal to purchase. In jurisdictions where cannabis is illegal, vaporizers are still sold, but marketed as a product to be used for consuming tobacco or other legal herbs.

## Consumer Products Opportunities

We believe opportunities in this segment include:

- ***Health-minded Consumer Product Brands*** Given the multitude of edibles, topicals and nutraceuticals, we believe that there is a significant opportunity for companies to develop leading brands of cannabis-based products for the health-minded consumer. Marketing many products under a common brand or family of products will provide significant competitive advantages.
- ***e-Commerce Distribution*** Currently, providers of consumer products sell their products primarily wholesale to dispensaries. As the e-commerce market expands and product awareness develops, we expect many consumers to migrate to online purchasing in order to broaden their product options and optimize pricing—enabling consumer-product companies to sell directly to consumers.
- ***Advanced Vaporizer Functionality*** Significant advances continue to occur in vaporizing technology, including new and improved heating technologies. In the future, functionality may include programming to identify the type, composition and potency of the cannabis being consumed or to monitor consumption. In addition, a high-end vaporizer may someday be synced with a software application that tracks consumption and enables re-ordering of product automatically or at the touch of a button.

## Consumer Products Challenges

Challenges in this segment include:

- ***Marketing and Customer Loyalty*** As more products become available through dispensaries and e-commerce solutions, consumers may experience confusion in product selection, requiring providers to allocate large budgets for marketing to drive customer loyalty.



- ***Wholesale and Retail Distribution*** Similar to other types of consumer-product companies, providers of cannabis products may struggle to develop wholesale and retail distribution relationships due to the breadth of products likely to be on the market. Providers need to develop strong relationships with a large number of dispensary operators, directly or through a distributor, in order to obtain preferred shelf placement.

## Consumer Products Outlook

We believe that there is a significant opportunity for a number of well-recognized brands to develop in the various product categories in this segment. In particular, we believe that there is significant market opportunity for branded-flower providers and specialty providers of concentrates. In addition, given the customer perception of vaporizers and edibles as healthy alternatives for ingesting cannabis, we believe that high-end vaporizer and edible providers may build loyal followings. However, even for the most successful companies, we anticipate that significant marketing budgets will be required. We also believe that many companies will struggle in this sector because of the low barriers to entry. As the legal environment clarifies, we expect national brands to emerge from companies that have large marketing budgets, operational scale and a reputation for and ability to manufacture quality products.

## ■ Cannabinoid-based Therapeutics

The cannabinoid-based therapeutics market consists of (i) nonregulated cannabinoid-based products used for medicinal applications and (ii) regulated, government-approved cannabinoid-based pharmaceutical products. Today, nonregulated cannabinoid-based products—such as concentrated cannabidiol or concentrated CBD—that are used for medicinal applications represent the vast majority of the therapeutics market. These products are purchased by consumers for a wide range of medicinal applications.

### Concentrated Cannabidiol (CBD)

Concentrated cannabidiol is a high-CBD, low-THC concentrate extracted from cannabis flower. Concentrated-CBD products provide a high level of CBD potency without the euphoria associated with THC. Concentrated CBD is most commonly delivered in oils and can be mixed into food or taken in a pill or capsule. CBD tinctures are liquid cannabis extractions that are typically applied under the tongue. Due to the lack of FDA regulation, these products vary widely in quality and are generally marketed as “botanical” products. Consumers typically use concentrated CBD to treat a range of medical conditions, including arthritis, chronic pain, depression, insomnia and migraines.

### Cannabinoid-based Pharmaceuticals

Cannabinoid-based pharmaceuticals are drugs that have been developed to release cannabinoids, primarily THC and CBD. The pharmaceuticals market consists of both natural, plant-derived cannabinoid-based products and synthetic cannabinoid-based products. To date, only a limited number of cannabinoid-based pharmaceutical products are available on the market; however, we expect the phar-

maceuticals market to grow significantly after the end of federal prohibition. In the United States, the FDA has approved a limited number of synthetic cannabinoid-based pharmaceuticals, but no natural, plant-derived pharmaceuticals. A limited number of both synthetic and natural, plant-derived cannabinoid-based pharmaceuticals are available in the international market. These drugs are being used to treat a number of medical conditions, including epilepsy, multiple sclerosis (MS), chemotherapy-induced nausea and vomiting (CINV), and cachexia.

### ***Legal and Compliance Issues***

In the United States, scientific medical research on cannabis continues to be illegal because of federal prohibition. However, an increasing amount of research is being conducted internationally in an effort to better understand the medicinal applications of cannabinoids. Assuming that federal prohibition ends, cannabinoid-based pharmaceuticals will likely be regulated by the FDA.

### **Cannabinoid-based Therapeutics Opportunities**

We believe opportunities in this segment include:

- ***Broad Product Opportunities*** More than 40 medical conditions have been identified as candidates for treatment with cannabinoid-based pharmaceuticals.
- ***New Discoveries*** Given the limited research to date on cannabinoid-based pharmaceuticals, we believe that it is likely that additional applications for cannabinoid-based therapeutics will be discovered as more resources are devoted to the segment.
- ***FDA Approval*** FDA approval of cannabinoid-based pharmaceuticals could dramatically increase usage as consumers became more comfortable with cannabinoid-based treatment alternatives.

### **Cannabinoid-based Therapeutics Challenges**

Challenges in this segment include:

- ***Time and Research Cost*** Assuming that federal prohibition ends, it will take considerable time for manufacturers to bring FDA-approved products to market, and research and development costs for cannabinoid-based pharmaceuticals will be considerable.
- ***FDA Approval Risk*** Even though companies may invest considerable time and money into research and development and then conduct clinical trials, a particular product may be denied FDA approval.
- ***Health-insurance Applicability*** Even after FDA approval, there is the risk that insurance companies will not cover expenses related to cannabis-based therapies.
- ***Unproven Claims*** Today, the cannabis industry is replete with unproven claims relating to the efficacy of cannabis-related products for medicinal applications. The growth in the use of cannabinoid-based therapeutics will be muted until more evidence of efficacy is produced.

### **Cannabinoid-based Therapeutics Outlook**

After the end of federal prohibition, think “Big Pharma.” Given the anticipated ramp-up period in U.S. medical research of cannabinoid-based treatments and the lengthy FDA drug-approval process,



we believe that the U.S. market for cannabinoid-based pharmaceuticals will start slowly after the end of federal prohibition, and then will begin to accelerate—ultimately becoming a very large market. We also believe that early users of cannabinoid-based pharmaceuticals will primarily be the existing recreational and medicinal users of cannabis. Prior to the end of federal prohibition, consumers will continue to use nonregulated cannabinoid-based products for medicinal applications. While a few of the suppliers of these products may make the transition to providing FDA-approved pharmaceuticals, we expect most of these suppliers will not have the resources or expertise to make such a transition. However, we expect the market for nonregulated cannabinoid-based products for medicinal applications will continue even after the end of federal prohibition.

## ■ Business Solutions

This segment includes providers of business software that automates cannabis business operations and providers of business services, such as legal, compliance, operational consulting, staffing, financial services (including payment processing) and real estate services. Because these providers are not directly involved with production or distribution, they generally do not need a specific cannabis-related license to conduct business.

### Business Software

The cannabis business software market is in its infancy, with niche providers just emerging. There are numerous opportunities, both within the business enterprise and throughout the cannabis supply chain, for specialized software solutions. While software solutions from other manufacturing or retail industries may be repurposed for the cannabis industry, we will likely see the development of numerous industry-specific solutions. Early entrants will likely focus on point solutions targeting bottlenecks in the value chain; however, as the market begins to mature, broader platform players will emerge and begin to consolidate capabilities (both through original development and acquisition). In the near term, we see industry-specific software applications likely being developed for the following areas:

- **Cultivation** Cultivation production management, including cultivation cycle management, nutrient and water management, automation and tracking from seed to harvest
- **Extraction** Infused-product management, from extraction to infused-product manufacturing for concentrates, edibles and topicals
- **Testing and Compliance** Product-testing management and compliance for cannabinoid potency and composition
- **Retail Operations** Retail-operations management, including point of sale, inventory management, tax reporting and compliance management
- **Mobile Solutions** Mobile e-commerce solutions, including storefront applications, order management and delivery, and customer service
- **Supply-chain Management** Inventory management solutions for raw materials, work in process and finished goods, including receiving, stocking and shipping
- **Customer Relationship Management** CRM solutions for managing current and future customers, data analytics, loyalty marketing programs and social media

- ***Management Reporting and Business Intelligence*** Dashboards and other tools for business analytics and data analysis

## Business Services

The cannabis business services market includes the following segments: (i) operational consulting, including facility planning and construction; (ii) financial services, including payment processing; (iii) legal, compliance, accounting and other professional advisory services; (iv) security; (v) temporary and full-time staffing; and (vi) real estate services. These services are generally provided by specialty consulting firms or service providers focused on the cannabis industry.

## Business Solutions Opportunities

We believe opportunities in this segment include:

- ***Niche Solutions*** Targeted solutions customized for the cannabis industry have a significant market opportunity as the industry emerges. Point-solution providers may be acquisition targets as larger players enter the market in the future.
- ***Integrated Platforms*** “Seed-to-sale” solutions integrated in a platform to optimize the interoperability of deployed solutions will be ideally positioned.
- ***“Big Data” Analytics*** As a greenfield segment, the opportunity to develop substantial (and potentially proprietary) datasets is tremendous. These datasets will be strategic advantages to organizations who establish substantial reach early, and also may be licensed more broadly to enhance targeting, services, cross-sales and product development.

## Business Solutions Challenges

Challenges in this segment include:

- ***Emerging Ecosystem with Limited Operational Expertise*** The pioneers in the cannabis industry will likely be entrepreneurs with strong segment knowledge, but with limited experience running and scaling enterprises. Therefore, execution and implementation risk could be as much of a factor as product risk.
- ***Varying Stages of Cross-industry Maturity*** Certain sectors of the cannabis industry are more mature than others which makes developing end-to-end, scalable business models challenging—not all links in the value chain will be able to operate cohesively or at the same level of performance.
- ***Development and Deployment Risk*** Due to the time and investment necessary to develop software and the emerging nature of the market, there is a risk that solutions will not be effective or that effective solutions will not reach critical mass in adoption.

## Business Solutions Outlook

The cannabis industry presents a significant market opportunity for software and services providers because of the large number of potential new clients and the need for industry-specific solutions. In particular, we believe that substantial opportunities exist for providers of “big data” and cloud-based solution providers. We also believe that financial, legal and compliance service providers are well positioned. Similar to the production segment, large software and services companies serving traditional industries have been reluctant to enter the market due to concerns over the regulatory landscape. While this dynamic has created a short-term opportunity for certain smaller players, as the regulatory environment clarifies, we expect competition in this segment to increase significantly as large players enter the market.

## ■ Digital Media

This segment includes providers of online content, networking and directory platforms. Because these providers are not directly involved with production or distribution, they generally do not need a specific cannabis-related license to conduct business.

### Online Content, Networking and Directories

Given the limited amount of capital required to enter this segment, the digital media segment of the cannabis industry has seen more development than other segments. Digital media focused on cannabis is a niche industry within the broader digital media market. Companies in this segment compete for viewers and subscribers and generally draw revenue from advertisement and subscription fees. The cannabis digital media industry has been focused on developing websites with popular cannabis-related domain names and pop-culture references. Content spans a broad spectrum and the quality of content varies significantly. More popular sites include news related to the cannabis industry and legalization efforts as well as humor and entertainment focused on specific cannabis-user demographics. Networking sites are focused on creating communities with a common interest in cannabis through social or business networking. Social networking sites allow users to share photos and information related to their cannabis activities. Business networking sites are focused on providing access to potential service providers within the industry. Directory sites serve to provide consumers with information identifying those businesses primarily related to obtaining medical cards and dispensaries.

### Digital Media Opportunities

We believe opportunities in this segment include:

- **Premium Content** We believe that there will be opportunities at the upper end of the market to establish industry-specific publications for both business-to-business and business-to-consumer consumption. These media companies should be able to establish themselves as the legitimate voices of the industry, and as such, should receive a preponderance of the media and subscription revenues. Much like Dow Jones, Thomson Reuters and Bloomberg, we believe that these companies will also leverage industry data aggregation as a way to support and extend their publishing platforms.

- **Mobile Apps** Cannabis e-commerce and media are well positioned for mobile deployment. The target demographic of this industry is mobile-enabled and we see a proliferation of mobile services coming to market, even in the early phases of the industry.
- **Enabling Technology** Continued development of core (and shared) technology platforms remains an opportunity for digital media companies seeking to provide a better viewer experience. In addition, technologies that provide more targeted experiences will enable digital media companies to receive greater return on their investments.
- **e-Commerce** As the regulatory landscape is increasingly clarified, the e-commerce opportunities will expand across numerous product categories.

## Digital Media Challenges

Challenges in this segment include:

- **Limited Advertisers** Companies are currently competing for limited advertising revenue targeted at the cannabis-user demographic. Broad, general market advertisers are not participating in the industry due to the constrained regulatory landscape on cannabis. Currently, advertisers limit their focus to cannabis accessories or services that are related to the cannabis industry.
- **Federal Law Limitations** Federal law limits the ability of cannabis-focused digital media companies to monetize their platforms. Current monetization efforts are limited to advertising, subscriptions and e-commerce sales of accessories.
- **Venues** Established digital media companies—such as Facebook, Google, Twitter and Yelp—limit the activities of cannabis-based companies on their sites in accordance with their company policies. In the near term, this creates opportunities for niche publishers. In the long run, however, these niche publishers will want to be aware of and prepare for changes in policy at these major media channels—we believe that, in time, the major media channels will see cannabis as a mainstream industry.

## Digital Media Outlook

The opportunity for cannabis-oriented digital media is substantial. As we look out over the coming years, we will see what are currently disparate and fragmented services consolidate into integrated offerings that will blend publishing, mobile and commerce. We believe there are still opportunities for certain providers to emerge as the premium players and voices of the industry. However, these markets will not form overnight, as there still exist both significant regulatory constraints and the core, shared platforms upon which the industry will increasingly rely are in their very early stages of development.

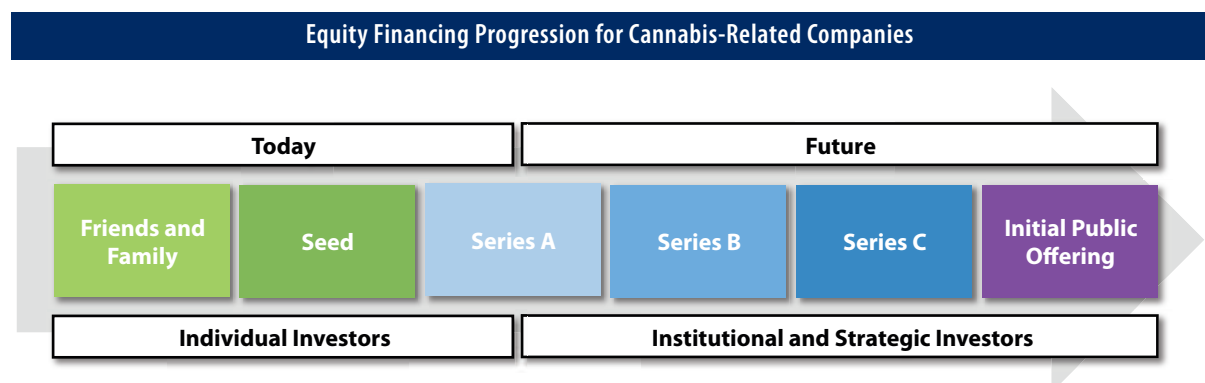
## CHAPTER VI

# Capital Markets for Cannabis Companies

### ■ Overview

In this early stage of the cannabis industry, a significant number (hundreds, if not thousands) of cannabis-related companies are seeking to raise capital—thus presenting investment opportunities for sophisticated investors who want to participate in the cannabis industry. While an increasing number of institutional and strategic investors are now participating in the cannabis industry, most investors in the industry today are retail or individual investors. We expect this trend to continue until companies in the industry mature and the legal environment for the industry becomes more settled.

Today, most of the cannabis-related companies that are raising capital are in a very early stage of development. As with most start-ups in other industries, emerging cannabis-related companies will follow the typical progression of raising equity capital as illustrated in the following graphic.



Debt capital is not often available to most early-stage companies, irrespective of industry. Cannabis-related companies face an additional hurdle because they are precluded from accessing the commercial banking system in the United States due to the federal prohibition on cannabis. Therefore, until federal

prohibition ends, cannabis-related companies will need to rely on primarily equity capital and cash flow from operations in order to fund their growth.

Most emerging cannabis-related companies seeking to raise capital are doing so through the private markets. Similar to other industries, this capital may be available from (i) “friends and family,” (ii) more formalized groups and networks of “angel” investors, (iii) a growing number of online funding platforms and (iv) to a lesser extent, institutional or strategic investors.

There are more than 60 publicly-traded companies in the United States and in international markets that participate in the cannabis industry in some manner. Publicly-traded cannabis-related companies seeking to raise capital will try to do so primarily through retail investors. Most of these companies are at a very early stage of development and did not become publicly-traded through a traditional underwriting process, but utilized nontraditional ways—including through reverse mergers or being acquired by shell companies or other types of holding companies. Most of these publicly-traded companies are “penny” stocks. With few exceptions, the publicly-traded cannabis-related companies (i) trade at less than \$1.00 per share, (ii) have a market capitalization of less than \$100 million (many are below \$10 million), (iii) are traded over the counter, not on an exchange, (iv) are very illiquid and (v) have little or no institutional support. The Securities and Exchange Commission (SEC) and the Financial Industry Regulatory Authority (FINRA) have historically expressed concerns regarding the “penny stock” industry. In addition, both the SEC and FINRA have issued alerts to warn investors about potential scams associated with cannabis-related stocks. In our view, cannabis-related companies should avoid becoming publicly-traded until such time as they qualify for listing on an established exchange.

In order to provide a comprehensive overview of the market, we would typically provide a summary of the publicly-traded companies in the industry, including their stock price performance, financial data and valuation metrics. However, given the size of the publicly-traded companies and the trading dynamics of “penny” stocks, we believe that most of this data would not be meaningful and therefore we are not providing the analysis at this time. We intend to continue to track the universe of publicly-traded cannabis-related companies, and we may provide the analysis in the future, as it becomes more relevant.

Although the risks continue to be significant for sophisticated investors wanting to participate in the cannabis industry, there are opportunities both in the private and public markets. In view of the preceding discussion and rapidly changing industry dynamics, we believe that emerging private companies comprise the most attractive investment opportunities. See Chapter VIII: Industry Risk Factors.

## ■ Selected Precedent Transactions

### Selected Financings

Given the accelerating activity in the cannabis industry, we are starting to see an increase in the number of financings for cannabis-related companies. However, the size of the transactions continues to be small, with participation mostly from retail investors. In the future, we anticipate more institutional and strategic investors will be making investments in the industry. The following table lists selected cannabis-related financings in 2015 with an identified transaction value.

## Selected Financings 2015: Ranked by Dollar Value

(\$ in millions)

Date	Issuer	Amount
April 2015	Privateer Holdings	\$75.0
June 2015	PAX Labs	47.0
August 2015	Zynerba Pharmaceuticals (Nasdaq: ZYNE)	42.0
April 2015	Minnesota Medical Solutions	16.6
October 2015	Leafline Labs	14.9
May 2015	Syqe Medical	10.3
April 2015	Eaze Solutions	10.0
December 2015	Aphria (CVE: APH)	8.4
December 2015	MJ Freeway	8.0
November 2015	Ebbu	7.0
August 2015	NEMUS Bioscience (OTC: NMUS)	5.7
October 2015	Bio-Tech Medical Software	5.0
January 2015	Two Rivers Water & Farming (GrowCo) (OTC: TURV)	4.4
July 2015	Two Rivers Water & Farming (GrowCo) (OTC: TURV)	4.0
December 2015	Hifi Farms	2.8
August 2015	Potbotics	2.4
June 2015	Compassionate Care Center of New York	2.3
April 2015	Hypur	2.0
January 2015	CanCore Concepts	1.4
August 2015	Auntie Dolores	1.3
February 2015	Canopy Boulder	1.2
September 2015	CannTrust	1.1
July 2015	MassRoots (OTC: MSRT)	1.1



## Selected M&A Transactions

We are starting to see M&A activity in the industry as well, and we expect such activity to increase significantly as the industry grows and matures. Similar to the equity financings, the size of the transactions continues to be small. The following table lists selected cannabis-related mergers and acquisitions in 2015 with an identified transaction value.

Selected M&A Transactions 2015: Ranked by Dollar Value			
(\$ in millions)			
Date	Buyer	Seller	Amount
August 2015	Canopy Growth (CVE: CGC)	Bedrocan Cannabis (TSX: BED)	\$46.4
September 2015	CSA Holdings (OTC: CSAX)	Canna Security America	24.8
April 2015	Grow Solutions (OTC: GRSO)	Light Touch Vein & Laser	23.1
July 2015	MMJ Phytotech (ASX: MMJ)	MMJ Bioscience	19.8
October 2015	Canadian Cannabis (OTC: CCAN)	Hydropothecry	16.3
March 2015	Saratoga Electronic Solutions (CVE: SAR)	Abba Medix	6.2
September 2015	Gleneagle Gold	Zelda Therapeutics	5.7
October 2015	Canopy Growth (CVE: CGC)	MedCannAccess	4.4
February 2015	Windfire Capital (CVE: WIF)	Rosebud Productions	4.2
February 2015	Mountain High Acquisitions (OTC: MYHI)	GreenLife BotaniX	4.0
May 2015	PUF Ventures (CSE: PUF)	VapeTronix	2.7
January 2015	GrowPros Cannabis Ventures (CVE: MZO)	GrowPros MMP	2.7
May 2015	International Goldfields (ASX: IGS)	Winter Garden Biosciences	2.4
August 2015	Alta Vista Ventures (CSE: AVV)	Thor Pharma	1.9
June 2015	Havana Holdings	GreenStar Payment Solutions	1.4
March 2015	General Cannabis (OTC: CANN)	Iron Protection Group	1.3
October 2015	Genovation Capital	MKHS Investor	1.1
November 2015	GrowPros Cannabis Ventures (CVE: MZO)	Export Hydro	1.0
May 2015	Medical Enterprises (OTC: MDCN)	TWYNS	1.0

## CHAPTER VII

# Top 100

# Private Cannabis Companies 2016

In this section, we introduce our inaugural list of the Top 100 Private Cannabis Companies. Our list is extremely subjective and is primarily meant to be representative of the types of companies participating in the industry. Our list includes (i) privately-held companies, (ii) mainly U.S. companies with a few international companies, (iii) companies that we believe have a strong reputation or position in their segment of the market and (iv) companies that are pursuing a line of business that we view as attractive. We intend to update this list annually, and we expect this list to change significantly over time.

Most of the companies on this list are at a very early stage of development. A number of them will need to raise capital in order to be successful. While having access to capital is certainly not the only criteria for success, it usually helps. Raising capital for most early-stage companies is extremely challenging in any industry—and the cannabis industry is no exception. Given the early stage of development of these companies and the industry in general, we hope the companies on this list ultimately prove to be successful, but we expect that a number of the companies may eventually go out of business for any number of factors, including lack of access to capital. Inclusion in our list does not represent an investment recommendation or an endorsement of any particular company or product. For additional disclosures and disclaimers, see page 107.

## Top 100 Private Cannabis Companies 2016

AbsoluteXtracts	Gold Coast Extracts	Meadow	Sensible Seeds
Advanced Nutrients	Good Meds Network	Medical Jane	Shango
Analytical 360	Green Man Cannabis	Medically Correct	SPARC
Apeks Supercritical	Green Wolf Collective	Medicine Man	SpeedWeed
Auntie Dolores	Grow OP Farms	Merry Jane	Starbuds
Berkeley Patients Group	GrowHealthy	MIINDFUL	Steep Hill Labs
Bhang	Harborside Health Center	MJ Freeway	StickyGuide
Bio-Tech Medical Software	Haze Technologies	Monarch	Storz & Bickel
Bondi Farms	Hello MD	Monkey Grass Farms	Syqe Medical
Cannabase	HerbaBuena	Native Roots	THC Laboratories
Cannasseur	Hifi Farms	Nature's AZ Medicines	The Apothecarium
Care By Design	High Times	New Vansterdam	The Clinic Colorado
Chalice Farms	Hypur	NWT Holdings (Firefly)	The Green Solution
Colorado Harvest Company	Iunu	O.penVAPE	Tradiv
Columbia Care	Kandypens	PalliaTech	TRiQ Systems
CW Analytical	Kenevir Research	PAX Labs	TruMed Dispensary
CW Botanicals	KIVA Confections	PharmaCannis	Uncle Ike's
Dixie Elixirs	Leafline Labs	PharmPods	VapeWorld
Duby	Leafly	Phytects	VapeXhale
Eaze Solutions	Leafs By Snoop	Potbotics	Vireo Health
Eden Labs	LivWell Enlightened Health	Revolution Enterprises	Web Joint
Eufloa	Loto Labs	Rocky Mountain High	WeedClub
Flow Kana	Main Street Marijuana	SC Labs	Weedmaps Media
FunkSac	Marley Natural	Scrubbed	Wellness Connection of Maine
G FarmaLabs	Mary's Medicinals	Seed Supreme Seedbank	White Rhino Products

**AbsoluteXtracts****Santa Rosa, CA****[www.absolutextracts.com](http://www.absolutextracts.com)**

AbsoluteXtracts is a producer of branded strain-specific cannabis concentrates. The company provides a range of high-THC products including concentrate cartridges, oils, soft gels, sprays and straws. The company focuses on providing concentrates of the most popular cannabis flower strains and sells its products through medicinal cannabis dispensaries in California.

**Advanced Nutrients****Abbotsford, BC****[www.advancednutrients.com](http://www.advancednutrients.com)**

Advanced Nutrients is a provider of fertilizers and other nutrients for hydroponic plant cultivation. The company markets a variety of branded growing-solution products that are targeted toward optimizing the yield of the plant. Advanced Nutrients' products are designed for indoor cannabis cultivation and are available across North America, Australia, the United Kingdom, the Netherlands, Germany and Spain.

**Analytical 360****Seattle, WA****[www.analytical360.com](http://www.analytical360.com)**

Analytical 360 is a lab-testing company that tests cannabis and cannabis-based products for potency, pesticides and microbiology. The company provides each product's result as a QR Code technology-enabled Certification of Analysis, which is then printed on product labels by dispensaries and scanned by cannabis consumers at the point of sale.

**Apeks Supercritical****Johnstown, OH****[www.apekssupercritical.com](http://www.apekssupercritical.com)**

Apeks Supercritical is a provider of botanical oil-extraction systems that utilize subcritical and/or supercritical CO<sub>2</sub> gas as a solvent. The company's fully automated systems range in size from a 1-liter benchtop system to a 40-liter production system; all models provide consistent extraction results for the production of cannabis concentrates.



## Auntie Dolores

Oakland, CA  
[www.auntiedolores.com](http://www.auntiedolores.com)

Auntie Dolores is a producer of branded cannabis-infused edibles. The company produces a variety of edibles: pretzels, biscuits, brownies, cookies, corn and nuts. The company's products are sold directly to medicinal cannabis patients and through medicinal cannabis dispensaries in California. The company raised \$1 million in August 2015.



## Berkeley Patients Group

Berkeley, CA  
[www.mybpg.com](http://www.mybpg.com)

Berkeley Patients Group is a licensed medicinal-cannabis dispensary. The company retails a broad variety of cannabis products, including flower, pre rolls, concentrates, edibles, topicals, seeds and accessories. The company operates an online e-commerce portal and offers a limited same-day delivery service to licensed medicinal cannabis patients in Berkeley, CA, and the surrounding area.



## Bhang

Long Beach, CA  
[www.gotbhang.com](http://www.gotbhang.com)

Bhang is a producer of branded cannabis-infused edibles, cannabis concentrates and vaporizer accessories. The company produces cannabis-infused chocolate bars and truffles, concentrate cartridges and disposable vaporizer pens and sells these products through medicinal and recreational dispensaries in 12 states.

## Bio-Tech Medical Software



Ft. Lauderdale, FL  
[www.biotrackthc.com](http://www.biotrackthc.com)

Bio-Tech Medical Software is a provider of compliance software and business management software for the retail cannabis industry. The company's core solution, BioTrackTHC™, is a software platform for inventory and sales management that can track the seed-to-sale process. The company's software is used by recreational and medicinal dispensaries, cultivators and state governments. The company raised \$5 million in October 2015.



## Bondi Farms

Longview, WA  
[www.bondifarms.com](http://www.bondifarms.com)

Bondi Farms is a licensed indoor recreational-cannabis cultivator. The company operates a Tier 3 producer license and cultivates various strands of cannabis flower in a 21,000-square-foot warehouse. The company's cannabis flower is sold to recreational and medicinal dispensaries in Washington State.



## Cannasseur

Pueblo West, CO  
[www.cannasseur.co](http://www.cannasseur.co)

Cannasseur is a licensed recreational and medicinal dispensary, cultivator and concentrate producer. The company's three dispensary locations retail flower, pre rolls, concentrates, edibles, topicals and branded accessories. The company operates its own cultivation and extraction facilities and produces several of its own strains of cannabis flower as well as a line of concentrates, under the "Dabtek" brand.



## Cannabase

Denver, CO  
[www.cannabase.io](http://www.cannabase.io)

Cannabase™ is a business e-commerce and social media platform focused on the cannabis industry. The company operates the Cannabase Marketplace, a private network that hosts an online business-to-business wholesale cannabis marketplace for Colorado cultivators and dispensaries. The company also provides Cannabase Maps, an online dispensary finder and social network for cannabis consumers.



## Care By Design

Santa Rosa, CA  
[www.cbd.org](http://www.cbd.org)

Care By Design is a branded cannabis concentrates company. The company provides a range of sprays, oils and capsules containing high-CBD cannabis concentrates. The company's products are available in medicinal dispensaries throughout California.

## Chalice Farms



Portland, OR  
[www.chalicefarms.com](http://www.chalicefarms.com)

Chalice Farms is a licensed recreational and medicinal dispensary and cultivator. The company's four dispensary locations retail flower, pre rolls, concentrates and edibles. Exclusive varieties of cannabis strains are cultivated at the company's indoor facility. The company brands its proprietary growing and curing process as producing a sweeter and smoother inhalation experience.

## Colorado Harvest Company



Denver, CO  
[www.coloradoharvestcompany.com](http://www.coloradoharvestcompany.com)

Colorado Harvest Company is a licensed recreational and medicinal dispensary and cultivator. The company's three dispensary locations retail flower, concentrates and edibles. The company operates its own indoor hydroponic grow facility and brands its growing process as "all natural."

## Columbia Care



New York, NY  
[www.col-care.com](http://www.col-care.com)

Columbia Care is a licensed medicinal dispensary and cultivator. The company operates 19 medicinal dispensaries across 5 states and the District of Columbia. The company operates its dispensaries under several brands including Columbia Care, Curative Health, Patriot Care and SWC Arizona. The company operates cultivation facilities in states where it is required to do so.

## CW Analytical



Oakland, CA  
[www.cwanalytical.com](http://www.cwanalytical.com)

CW Analytical is a cannabis lab-testing company that tests cannabis and cannabis-based products for potency, pesticides and microbiology. The company also consults with dispensaries and edibles companies to provide best-practices for product handling and product labeling.



## CW Botanicals



Colorado Springs, CO  
[www.cwbotanicals.com](http://www.cwbotanicals.com)

CW Botanicals™ provides over-the-counter high-CBD/low-THC hemp products for a variety of wellness needs. The company also produces a proprietary genetic strain of industrial hemp seed for its products. Its cannabis-infused extract oil, dietary supplement and topical-based products are marketed under the “Charlotte’s Web™” brand. The company’s products have been used in the treatment of epilepsy.

## Dixie Elixirs



Denver, CO  
[www.dixieelixirs.com](http://www.dixieelixirs.com)

Dixie Elixirs produces branded cannabis-infused edibles. The company produces more than 30 products, including chocolate-based edibles, beverages, capsules, mints, energy shots, topicals and disposable vaporizer pens. The company’s products are sold through recreational and medicinal dispensaries in more than 300 locations in California and Colorado.

## Duby



Denver, CO  
[www.duby.co](http://www.duby.co)

Duby is a cannabis-focused social-networking mobile application. The company’s mobile application is a community of legal medicinal and recreational-cannabis users who seek to share information based on their common interests. The company integrates anonymous video and image sharing within its community of users.

## Eaze Solutions



San Francisco, CA  
[www.eazeup.com](http://www.eazeup.com)

Eaze Solutions is a developer and provider of an on-demand medicinal cannabis delivery-service application that enables patients to access medical cannabis delivery via their mobile devices. The company’s mobile application allows users to access a daily menu of medicinal cannabis for purchase and direct-to-consumer delivery. The company raised \$10 million in April 2015.

**Eden Labs**

Seattle, WA  
[www.edenlabs.com](http://www.edenlabs.com)

Eden Labs is a producer of botanical oil-extraction systems that utilize supercritical fluid CO<sub>2</sub> as a solvent. The company's extraction equipment ranges from a 4-liter tabletop system to a 60-liter commercial-grade extraction system and produces high-quality concentrates by allowing for faster extraction times and higher yields.

**Euflora**

Denver, CO  
[www.eufloracolorado.com](http://www.eufloracolorado.com)

Euflora™ is a licensed recreational dispensary offering flower, pre rolls, concentrates, topicals, edibles and branded accessories. The company focuses on creating an immersive consumer experience—the “Apple Store of Weed.”

**Flow Kana**

San Francisco, CA  
[www.flowkana.com](http://www.flowkana.com)

Flow Kana is a provider of an on-demand medicinal-cannabis delivery service that enables patients to access medicinal cannabis via web- and mobile-based applications. The company allows users to access a daily menu of cannabis flower—sourced directly from licensed outdoor cultivators—for purchase and direct-to-consumer delivery.

**FunkSac**

Denver, CO  
[www.funksac.com](http://www.funksac.com)

FunkSac is a provider of compliant-packaging solutions for the legal medicinal- and recreational-cannabis industry. The company has a comprehensive product line of FDA-approved and eco-friendly cannabis packaging solutions that are highly secure. FunkSac retails its products to cultivators, dispensaries and edibles manufacturers.

**G FarmaLabs**

Anaheim, CA  
[www.gfarmalabs.com](http://www.gfarmalabs.com)

G FarmaLabs is a producer of branded cannabis-infused edibles, cannabis concentrates and vaporizer accessories. The company produces pre rolls, beverages, chocolate-based edibles, honey, concentrate cartridges and injectors and sells its products through medicinal dispensaries in California, and both medicinal and recreational dispensaries in Washington State. The company brands its products as being produced from “100% indoor flower.”

**Gold Coast Extracts**

Los Angeles, CA  
[www.goldcoastusa.com](http://www.goldcoastusa.com)

Gold Coast Extracts is an extraction consultant and branded-cannabis concentrates producer. The company provides extraction consulting services to cultivators and concentrates producers. The company also produces its own line of branded-cannabis concentrates in shatter and wax form. The company’s award-winning products are sold through medicinal dispensaries in California.

**Good Meds Network**

Lakewood, CO  
[www.goodmedsnetwork.com](http://www.goodmedsnetwork.com)

Good Meds Network is a licensed medicinal dispensary and cultivator. The company’s two dispensary locations retail flower, pre rolls, concentrates, topicals, edibles and vaporizer accessories and its indoor grow facility produces more than 80 premium strains, including a proprietary, award-winning medicinal hybrid strain.

**Green Man Cannabis**

Denver, CO  
[www.greenmancannabis.com](http://www.greenmancannabis.com)

Green Man Cannabis is a licensed medicinal and recreational-cannabis dispensary and cultivator. The company’s two dispensary locations retail flower, pre rolls, concentrates and edibles and its indoor grow facility produces numerous proprietary, award-winning flower strains for medicinal and recreational use.



### Green Wolf Collective

Los Angeles, CA

[www.greenwolfcollective.com](http://www.greenwolfcollective.com)

Green Wolf Collective is a licensed medicinal and recreational-cannabis dispensary and cultivator. The company operates a medicinal dispensary in California and a recreational dispensary in Oregon: both locations retail flower and concentrates. The company, which also operates its own cultivation facility, produces numerous award-winning flower strains and branded concentrates, under the “Loud Pack Extracts” brand.



### Grow OP Farms

Spokane, WA

[www.growopfarms.com](http://www.growopfarms.com)

Grow OP Farms is a licensed indoor cultivator and producer of branded-flower strains and concentrates. The company operates its own cultivation facility and produces proprietary flower strains under the “Phat Panda” brand. The company also produces branded shatter concentrates under the “Sticky Frog” brand. Their products are sold to more than 50 dispensaries in Washington State.

### GrowHealthy



West Palm Beach, FL

[www.growhealthy.com](http://www.growhealthy.com)

GrowHealthy is an indoor cultivator that plans to operate a 185,000-square-foot grow facility for production of medicinal flower. Once licensed and operational, the facility is expected to be the largest in the United States. The company plans to distribute its flower to medicinal dispensaries in Florida.



### Harborside Health Center

Oakland, CA

[www.harborsidehealthcenter.com](http://www.harborsidehealthcenter.com)

Harborside Health Center is a licensed medicinal dispensary. The company’s two locations retail flower, pre rolls, concentrates, edibles, seeds, topicals and accessories. The company sources its cannabis flower products from local cultivators.

**Haze Technologies**

Eden Prairie, MN  
[www.hazevaporizers.com](http://www.hazevaporizers.com)

Haze Technologies is a vaporizer technology company that designs and manufactures branded dual-chamber convective and conductive heating vaporizers. The company's portable model may be used to vaporize either concentrates or flower-based products.

**Hello MD**

San Francisco, CA  
[www.hellomd.com](http://www.hellomd.com)

Hello MD is a digital healthcare platform. The company provides prescriptions for medicinal-cannabis patients via online, live video consultations. The company also provides a dispensary locator and cannabis product reviews. d

**HerbaBuena**

San Rafael, CA  
[www.herbabuena.com](http://www.herbabuena.com)

HerbaBuena is a licensed, delivery-only medicinal-cannabis collective. The company provides a membership-based direct-to-consumer delivery service for medicinal-cannabis products. The company retails flower, pre rolls, concentrates, raw cannabis juice, edibles and topicals, as well as branded-product packs. The company also has its own line of branded consumer products.

**Hifi Farms**

Hillsboro, OR  
[www.hififarms.com](http://www.hififarms.com)

Hifi Farms is a licensed indoor cultivator. The company operates its own sustainable cultivation facility and produces a variety of strains under the organic Clean Green Certified™ certification. The company's products are currently sold to 12 dispensaries in the Portland, OR, region. The company raised \$3 million in December 2015.

**High Times**

New York, NY  
[www.hightimes.com](http://www.hightimes.com)

High Times® is a digital and print media company focused on the cannabis industry. The company publishes a monthly print magazine and operates a digital media website covering a wide range of topics, including the latest cannabis trends, politics, activism, sex, music and film. The company sponsors the annual High Times Cannabis Cup® event.

**Hypur**

Scottsdale, AZ  
[www.hypur.com](http://www.hypur.com)

Hypur is a payment software-technology company. The company provides a compliance-technology payment platform that helps customers satisfy regulatory requirements and enables consumers to pay on-site from any mobile device. The company's technology can be integrated with most point-of-sale systems. The company raised \$2 million in April 2015.

**Iunu**

Seattle, WA  
[www.iunu.com](http://www.iunu.com)

Iunu™ is a cultivation-lighting technology company that develops and manufactures lighting components utilizing plasma lighting technology. The company's Dual Plasma® lighting product provides full spectrum lighting and integrates active and passive cooling.

**Kandypens**

Santa Barbara, CA  
[www.kandypens.com](http://www.kandypens.com)

Kandypens is a vaporizer technology company that designs and manufactures branded conductive-heating vaporizers. The company's portable vaporizer allows for use of concentrates and flower-based products.

**Kenevir Research****White City, OR****[www.kenevirresearch.com](http://www.kenevirresearch.com)**

Kenevir Research is a lab-testing company that tests cannabis and cannabis-based products for potency, pesticides and microbiology. The company also consults cultivators, dispensaries and cannabis-infused-edibles companies in providing formula and dose standardization and labeling.

**Leafline Labs****Minneapolis, MN****[www.leaflinelabs.com](http://www.leaflinelabs.com)**

Leafline Labs is a licensed medicinal-cannabis dispensary, cultivator and concentrates producer. The company's dispensary retails concentrates. The company cultivates its own cannabis flower for medicinal use. The company utilizes a supercritical CO<sub>2</sub> extraction process in the production of concentrates. The company raised \$15 million in October 2015.

**KIVA Confections****San Leandro, CA****[www.kivaconfections.com](http://www.kivaconfections.com)**

KIVA Confections<sup>TM</sup> is a producer of branded cannabis-infused edibles in chocolate-based candies. The company's award-winning products are sold through medicinal-cannabis dispensaries in California.

**Leafly****Seattle, WA****[www.leafly.com](http://www.leafly.com)**

Leafly is an online directory and content platform for cannabis consumers that provides information about locations of dispensaries, news pertaining to the cannabis industry and the effects of different cannabis strains. The company is controlled by Privateer Holdings.





## Leafs By Snoop

Denver, CO  
[www.leafsbysnoop.com](http://www.leafsbysnoop.com)

Leafs By Snoop is a producer of branded cannabis flower and cannabis-infused products for recreational use. The company's branded flower, concentrates, and cannabis-infused chocolate and candies are available in recreational dispensaries throughout Colorado.

## LivWell Enlightened Health



Denver, CO  
[www.livwell.com](http://www.livwell.com)

LivWell Enlightened Health™ is a licensed medicinal and recreational dispensary and cultivator. The company operates 10 retail locations and retails flower, pre rolls, concentrates, edibles, topicals and branded accessories. The company operates an indoor cultivation facility and is recognized as the largest cannabis-sector employer in Colorado.



## Loto Labs

Redwood City, CA  
[www.evokevape.com](http://www.evokevape.com)

Loto Labs is a vaporizer technology company. The company's vaporizer is based on induction-heating technology and its portable vaporizer uses concentrates or flower-based products.



## Main Street Marijuana

Vancouver, WA  
[www.mainstmj.com](http://www.mainstmj.com)

Main Street Marijuana is a licensed recreational dispensary. The company retails flower, pre rolls, concentrates, edibles and topicals. The company is noted for being the Portland, OR, area's oldest recreational cannabis shop.



## Marley Natural

New York, NY  
[www.marleynatural.com](http://www.marleynatural.com)

Marley Natural is a branded cannabis-infused products company. The company is named after the Jamaican musician Bob Marley. The products were developed by his family in conjunction with Privateer Holdings: heirloom cannabis strains, hand-crafted accessories, lotions and balms made of cannabis and tropical oils.



## Mary's Medicinals

Denver, CO  
[www.marysmedicinals.com](http://www.marysmedicinals.com)

Mary's Medicinals is a branded cannabis-concentrates company. The company provides a range of transdermal patches and pens, topicals and powders featuring cannabinoid-based concentrates. The company's award-winning products provide cannabinoids beyond THC and CBD, such as THCA, CBN and CBC. The company's products are available in eight states for medicinal and recreational use.

## Meadow

San Francisco, CA  
[www.getmeadow.com](http://www.getmeadow.com)

Meadow is a provider of an on-demand medicinal-cannabis delivery service. The company has developed a mobile application that enables patients to access medical cannabis via their mobile devices. The mobile application allows users to access a menu of medicinal cannabis for purchase and direct-to-consumer delivery.



## Medical Jane

Los Angeles, CA  
[www.medicaljane.com](http://www.medicaljane.com)

Medical Jane is an online content and directory platform focused on the cannabis industry. The company's website allows users to review different strains of cannabis and share their experiences as dispensary customers. The company also provides cannabis-related news and information centered on medicinal applications for cannabis.

**Medically Correct**

Lakewood, CO

[www.medicallycorrect.com](http://www.medicallycorrect.com)

Medically Correct is a producer of branded cannabis-infused edibles, concentrates and concentrate extraction equipment. The company retails its edibles through the “Incredibles” brand, providing chocolate-based edibles and fruit candies. The company also retails a line of concentrates under the “Incredible Extracts” brand as well as a line of cannabis extraction equipment under the “Incredible Extractor” brand. The company’s products are available in Colorado and Arizona.

**Medicine Man**

Denver, CO

[www.medicinemandenver.com](http://www.medicinemandenver.com)

Medicine Man is a licensed recreational and medicinal dispensary and cultivator. The company’s two retail locations provide flower, edibles, concentrates, topicals, seeds and branded accessories. The company operates its own indoor cultivation facility and provides consulting services for cultivation and dispensary operations through an affiliated company, Medicine Man Technologies.

**Merry Jane**

Los Angeles, CA

[www.merryjane.com](http://www.merryjane.com)

Merry Jane is a digital media content platform focused on the cannabis industry. The company’s website provides commentary on recent events, pop culture, business, politics and health-related news. The company provides strain reviews and information as well as a dispensary locator.

**MiNDFUL**

Denver, CO

[www.bemindful.today](http://www.bemindful.today)

MiNDFUL is a licensed recreational and medicinal dispensary. The company’s four retail locations in Colorado and Illinois offer flower, concentrates, edibles, topicals and branded accessories.

**MJ Freeway**

Denver, CO  
[www.mjfreeway.com](http://www.mjfreeway.com)

MJ Freeway is a provider of enterprise management software for the cannabis industry. The company's core solution, SuccessMap®, is a software platform for inventory and sales management to track the seed-to-sale process in compliance with state requirements. The company's software is used by recreational and medicinal dispensaries, infused-product manufacturers and cultivators. The company raised \$8 million in December 2015.

**Monarch**

Scottsdale, AZ  
[www.monarchaz.org](http://www.monarchaz.org)

Monarch is a licensed medicinal dispensary. The company retails flower, pre rolls, concentrates, edibles, topicals and vaporizer accessories.

**Monkey Grass Farms**

Wenatchee, WA  
[www.monkeygrassfarms.com](http://www.monkeygrassfarms.com)

Monkey Grass Farms is a licensed cultivator. The company operates as a Tier 3 Washington State producer. The company grows more than 30 strains of cannabis flower for distribution to dispensary retailers throughout Washington State. The company also provides clone and seed sales.

**Native Roots**

Denver, CO  
[www.nativeroots303.com](http://www.nativeroots303.com)

Native Roots is a licensed medicinal and recreational dispensary and cultivator. The company operates 13 dispensaries and retails flower, pre rolls, concentrates, edibles and vaporizer accessories. The company sells a line of branded hash-oil concentrates under the "Native Roots Extracts" brand. The company operates its own indoor cultivation facility and has won numerous industry awards for its operations.



## Nature's AZ Medicines

Phoenix, AZ

[www.naturesmedicines.com](http://www.naturesmedicines.com)

Nature's AZ Medicines is a licensed medicinal dispensary. The company's two retail locations provide flower, pre rolls, concentrates, edibles and vaporizer accessories. The company offers more than 40 flower strains for purchase.



## New Vansterdam

Vancouver, WA

[www.newvansterdam.com](http://www.newvansterdam.com)

New Vansterdam is a licensed recreational and medicinal dispensary. The company operates five locations in Washington and Oregon. The company's dispensaries provide over 300 different products, including flower, pre rolls, concentrates, edibles and topicals.



Firefly

## NWT Holdings (Firefly)

San Francisco, CA

[www.thefirefly.com](http://www.thefirefly.com)

NWT Holdings is a vaporizer technology company. The company designs and manufactures branded convective heating vaporizers under the "Firefly" brand. The company's portable vaporizer allows for use of concentrates and flower-based products.



## O.penVAPE

Denver, CO

[www.openvape.com](http://www.openvape.com)

O.penVAPE is a producer of branded vaporizers, cartridges and smoking accessories. The company retails vaporizers, glass-based smoking accessories, storage devices and branded apparel. The company retails its products through an e-commerce site and wholesales to dispensary and other retail locations in eight states.

**PalliaTech**

Sea Cliff, NY  
[www.palliatech.com](http://www.palliatech.com)

PalliaTech is a licensed medicinal cannabis dispensary, vaporizer manufacturer, extraction company and cultivator. The company manufactures a tabletop medicinal-cannabis vaporizer and produces a line of branded medicinal concentrates under the “Palliaceutical™” brand. The company raised \$10 million in July 2013.

**PAX Labs**

San Francisco, CA  
[www.paxvapor.com](http://www.paxvapor.com)

PAX Labs is a vaporizer technology company. The company designs and manufactures branded conductive-heating vaporizers. The company’s portable vaporizer allows for use of flower-based products. The company raised \$47 million in June 2015.

**PharmaCannis**

Oak Park, IL  
[www.pharmacannis.com](http://www.pharmacannis.com)

PharmaCannis™ is a licensed medicinal dispensary and cultivator. The company operates eight dispensary locations in Illinois and New York and two cultivation facilities in Illinois. The company offers a range of cannabis-based products targeted for medicinal use only. The company raised \$20 million in October 2014.

**PharmPods**

Denver, CO  
[www.pharmpods.com](http://www.pharmpods.com)

PharmPods is a provider of cultivation production products. The company provides “shipping container” cultivation modules for indoor cannabis cultivation. The company provides cultivation consulting services in conjunction with its product offerings. The company’s products are sold in the United States and Canada.

## Phytects



Los Angeles, CA  
[www.phytects.com](http://www.phytects.com)

Phytects is a cannabinoid-based research company focused on developing cannabinoid-based treatments that target the human endocannabinoid system. The company is initially focused on developing products that do not require FDA approval: cosmetics, skin-care products, nutraceuticals and food supplements.

## Potbotics



Palo Alto, CA  
[www.potbotics.com](http://www.potbotics.com)

Potbotics is a technology platform that blends robotics, artificial intelligence, DNA analysis and cannabis research for several applications. The company's core products include PotBot, a medical-marijuana recommendation engine for patients; BrainBot, a wireless EEG helmet enabling doctors to analyze a patient's neural response to specific cannabis strains; and Nano-Pot, an advanced DNA reader that scans cannabis seeds to optimize cultivation yields. The company raised \$2 million in December 2014 and \$2 million in August 2015.

## Revolution Enterprises



Poway, CA  
[www.revolutionenterprises.co](http://www.revolutionenterprises.co)

Revolution Enterprises is a licensed cultivator and lab-testing services company. The company operates two cultivation facilities in Illinois with more than 75,000 square feet of indoor growing space. The company supplies its products to medicinal dispensaries in Illinois.

## Rocky Mountain High



Denver, CO  
[www.rockymountainhigh.co](http://www.rockymountainhigh.co)

Rocky Mountain High is a licensed recreational and medicinal dispensary and cultivator. The company's eight locations retail flower, pre rolls, edibles and a branded infused-concentrates line. The company operates dispensaries in Colorado and New Jersey. The company operates its own indoor cultivation facility and has won awards for its proprietary strains of cannabis.



## SC Labs



Santa Cruz, CA  
[www.sclabs.com](http://www.sclabs.com)

SC Labs is a cannabis lab-testing company. The company tests cannabis and cannabis-based products for potency, pesticides and microbiology. The company adheres to FDA, EPA and ELAP guidelines in its testing. The company also provides consulting services to cultivators, dispensaries and cannabis-infused edibles companies to implement industry best-practices procedures.



## Scrubbed

San Francisco, CA  
[www.scrubbed.net](http://www.scrubbed.net)

Scrubbed is an outsourced bookkeeping, accounting and tax firm serving the cannabis industry. The company has a dedicated cannabis practice that provides clients with comprehensive, turnkey accounting and tax solutions.

## Seed Supreme Seedbank



Durham, UK  
[www.seedsupreme.com](http://www.seedsupreme.com)

Seed Supreme Seedbank is an online e-commerce cannabis seedbank. The company provides seeds of the most popular cannabis strains sourced from global cannabis breeders and seed-genetic companies. The company's products vary across THC- and CBD-content and indicas, sativas and hybrids, for medicinal and recreational cultivation.



## Sensible Seeds

Surrey, UK  
[www.sensibleseeds.com](http://www.sensibleseeds.com)

Sensible Seeds is an online e-commerce cannabis seedbank. The company provides more than 3,000 strains of cannabis flower sourced globally from cannabis breeders, genetics companies and cultivators. The company's products vary across THC- and CBD-content and indicas, sativas and hybrids, for medicinal and recreational cultivation.

## Shango



Portland, OR  
[www.goshango.com](http://www.goshango.com)

Shango is a licensed recreational dispensary and producer of branded cannabis products. The company's two dispensaries retail "Shango" branded flower, concentrates, edibles and vaporizer accessories. The company's branded products are available at more than 50 locations in Oregon.

## SPARC



San Francisco, CA  
[www.sparcsf.com](http://www.sparcsf.com)

SPARC is a licensed medicinal dispensary, cultivator and lab-testing company. In addition to the company's retail dispensary location, the company provides a direct-to-consumer delivery system for flower, pre rolls, concentrates, edibles, seeds and accessories. The company performs in-house testing of its products and operates its own cultivation facility.

## SpeedWeed



Los Angeles, CA  
[www.speedweed.com](http://www.speedweed.com)

SpeedWeed is licensed delivery-only medical marijuana collective. The company operates as a membership. The company offers flower, pre roll, concentrates and edibles to its members for medicinal use. The company has more than 25,000 members.

## Starbuds



Denver, CO  
[www.starbuds303.com](http://www.starbuds303.com)

Starbuds is a licensed medicinal and recreational dispensary and cultivator. The company's six locations retail flower, concentrates, edibles, topicals and branded accessories. The company operates its own indoor cultivation facility and produces numerous award-winning cannabis strains.

**Steep Hill Labs**

Berkeley, CA  
[www.steephill.com](http://www.steephill.com)

Steep Hill Labs is a cannabis lab-testing company. The company tests cannabis and cannabis-based products for potency, pesticides and microbiology. The company has developed QuantaCann2™, an in-field cannabis testing technology system; GenKit™, a male cannabis-plant identification system; and Strain Fingerprint™, a graphical depiction of a strain's most common cannabinoids. The company has locations in California, Colorado, Nevada, New Mexico and Washington.

**StickyGuide**

Los Angeles, CA  
[www.stickyguide.com](http://www.stickyguide.com)

StickyGuide is an online content and directory site focused on medicinal-cannabis consumers. The company's site provides detailed cannabis-strain information as well as reviews. The company also provides a dispensary locator. The website maintains an active member base and an online user-generated content forum.

**Storz & Bickel**

Oakland, CA  
[www.storz-bickel.com](http://www.storz-bickel.com)

Storz & Bickel is a vaporizer technology company that develops and manufactures branded handheld and tabletop vaporizers using conductive and convective heating. The company's vaporizers include Crafty, a portable handheld vaporizer; Mighty, a portable handheld vaporizer; and the Volcano, a tabletop vaporizer.

**Syqe Medical**

Tel Aviv, Israel  
[www.syqemedical.com](http://www.syqemedical.com)

Syqe Medical is a vaporizer technology company. The company develops and manufactures a branded handheld vaporizer that uses either flower or concentrates in the company's proprietary cartridge packing system. The company targets medicinal users and markets a "metered-dose delivery" feature to obtain more consistent dosing. The company raised \$10 million in May 2015.

### THC Laboratories



Denver, CO  
[www.thclaboratories.com](http://www.thclaboratories.com)

THC Laboratories is a cannabis lab-testing company. The company tests cannabis and cannabis-based products for potency, pesticides and microbiology. The company also consults cultivators, dispensaries and cannabis-infused edibles companies in cultivation methods, safety, packing and labeling.

### The Apothecarium



San Francisco, CA  
[www.apothecariumsf.com](http://www.apothecariumsf.com)

The Apothecarium is a licensed medicinal dispensary. The company retails flower, concentrates, edibles and topicals for medicinal use only. The company was recognized by the City of San Francisco for its community engagement programs.

### The Clinic Colorado



Denver, CO  
[www.thecliniccolorado.com](http://www.thecliniccolorado.com)

The Clinic Colorado is a licensed medicinal and recreational dispensary. The company's six locations retail flower, concentrates, edibles and accessories. The company has won numerous industry awards for its dispensary operations, proprietary concentrates and flower.

### The Green Solution



Denver, CO  
[www.tgscolorado.com](http://www.tgscolorado.com)

The Green Solution is a licensed medicinal and recreational dispensary. The company's 12 locations retail flower, pre rolls, concentrates, edibles, topical, seeds, vaporizers and branded accessories. The company produces its own line of branded concentrates and edibles under the "NectarBee<sup>TM</sup>" brand.

**Tradiv****Boulder, CO****[www.tradiv.com](http://www.tradiv.com)**

Tradiv is a business e-commerce company that facilitates business-to-business wholesale cannabis transactions between cultivators and dispensaries for cannabis-infused products. Buyer and seller dashboards are available for cannabis businesses to place orders and to customize shipping and order tracking.

**TRiQ Systems****Bend, OR****[www.triqsystems.com](http://www.triqsystems.com)**

TRiQ Systems is a cannabis cultivation supplies and equipment company. The company designs and develops cultivation equipment, including greenhouses and industrial cannabis drying equipment. The company's Vulcan50 product integrates software technology to automate the cannabis drying process.

**TruMed Dispensary****Phoenix, AZ****[www.trumedaz.com](http://www.trumedaz.com)**

TruMed Dispensary is a licensed medicinal dispensary and cultivator. The company retails flower, pre rolls, concentrates, edibles, topicals and branded accessories. The company operates its own cultivation facility and grows a variety of strains for medicinal use.

**Uncle Ike's****Seattle, WA****[www.uncleikespotshop.com](http://www.uncleikespotshop.com)**

Uncle Ike's is a licensed recreational dispensary. The company retails flower, pre rolls, concentrates, edibles, topicals and accessories.

## VapeWorld



Boca Raton, FL  
[www.vapeworld.com](http://www.vapeworld.com)

VapeWorld is an online e-commerce website. The company retails products produced by leading vaporizer manufacturers, as well as parts and accessories. The company provides online content to provide consumers with information about vaping.

## VapeXhale



Foster City, CA  
[www.vapexhale.com](http://www.vapexhale.com)

VapeXhale is a vaporizer technology company. The company develops and manufactures a branded tabletop vaporizer. The company's branded vaporizer uses convective heating technology. The company's products allow for the use of flower or concentrates.

## Vireo Health



Minneapolis, MN  
[www.vireohealth.com](http://www.vireohealth.com)

Vireo Health is a licensed medicinal dispensary and cultivator. The company is the parent company of Minnesota Medical Solutions and Empire State Health Solutions, operating in Minnesota and New York. The company provides products for medicinal use only. The company raised \$17 million in April 2015.

## Web Joint



Los Angeles, CA  
[www.webjoint.com](http://www.webjoint.com)

Web Joint is an online technology software-as-a-service company. The company provides software for medicinal dispensaries to manage point-of-sale transactions, online ordering and delivery management. The company's software integrates with a dispensary's website for a white-labeled software solution.

## WeedClub



San Francisco, CA  
[www.weedclub.com](http://www.weedclub.com)

WeedClub is an online business networking and directory platform. The company's platform connects verified cannabis entrepreneurs with contacts and resources to build their businesses. The company currently has more than 1,000 members in its network. The company also hosts marketing events highlighting new cannabis start-ups to prospective investors. The company is an affiliate of RecMD, which offers a mobile application to obtain a medicinal cannabis card.

## Weedmaps Media



Orange County, CA  
[www.weedmaps.com](http://www.weedmaps.com)

Weedmaps Media is an online networking and content directory site. The company allows users to locate and view reviews of local dispensaries. The company also provides user-generated strain reviews.

## Wellness Connection of Maine



Portland, ME  
[www.mainewellness.org](http://www.mainewellness.org)

Wellness Connection of Maine is a licensed medicinal dispensary. The company's four locations retail flower, concentrates, edibles and accessories for medicinal use.

## White Rhino Products



Salt Lake City, UT  
[www.whiterhinoproducts.com](http://www.whiterhinoproducts.com)

White Rhino Products is a vaporizer technology company. The company uses conductive and convective heating technology. The company produces branded portable handheld vaporizers, electronic nails and vaporizer accessories. The company's products can be used with flower or concentrate-based products.





## CHAPTER VIII

# Industry Risk Factors

Companies in the cannabis industry are subject to numerous risks. Any one of such risks could have a material adverse effect on their businesses and results of operations and on their investors and owners. The following highlights some, but not all, of these risks.

### Risks Related to Federal Prohibition

- The manufacture, distribution, dispensing and possession of cannabis in any form is illegal under federal law. A business that deals in cannabis, as well as any person who knowingly facilitates such activities, is committing a federal crime, irrespective of whether the business or person complies with state law. The federal government could choose at any time to enforce such laws, which could result in the seizure of business assets or the arrest and criminal prosecution of the principals, employees, agents and investors.
- The federal prohibition of cannabis precludes interstate commerce in cannabis and cannabis-based products, which renders it more difficult and costly, and in some cases impossible, for certain types of cannabis-related companies to operate across state lines and prevents the centralization of operations to gain economies of scale and efficiency.
- Federal income tax regulations do not allow cannabis-related companies to deduct certain operating expenses for income tax purposes, effectively resulting in higher federal income tax rates compared to companies in other industries.
- Due to the federal prohibition of cannabis, cannabis-related companies may not be able to open a bank account or access commercial banking services such as credit facilities and payment processing. This lack of access to banking services increases the time, effort and expense related to ongoing operations and increases the risk of theft for businesses that hold large amounts of cash.
- Due to the federal prohibition of cannabis, cannabis-related companies may not be able to obtain federal trademark registration for certain products and may not be able to employ the federal bankruptcy process.
- The federal government may pursue legal action related to state cannabis laws against a state in which a cannabis business operates, and any such legal action may result in significant changes to the state's legal landscape as it relates to cannabis businesses.

## Risks Related to State and Local Laws and Regulations

- States that have legalized cannabis could reverse their positions and make the substance illegal or significantly modify their cannabis laws in ways that are not foreseeable or conducive to a particular cannabis business model.
- Some states prohibit for-profit enterprises related to cannabis.
- States and local jurisdictions may impose significant taxes on commercial cannabis activity, and they may do so unpredictably.
- Some state laws either limit the number of participants that may obtain a state license to conduct a cannabis business or place a variety of restrictions on the type of person who is permitted to apply for, operate or own a cannabis business in that state.
- There is currently a lack of broad interstate reciprocity with respect to cannabis laws.
- Even when cannabis is legalized by a state, bans or restrictions may be enacted by municipalities or other local jurisdictions that hinder or effectively prevent the operation of cannabis-related business activities within their boundaries.

## Risks Related to Product Use

- As are companies in other industries that provide regulated consumable products, cannabis companies are subject to a variety of product-related risks and potential liabilities, including risks related to product liability, adulterated products, insufficiently packaged or labeled products and risks related to product use by underage or out-of-jurisdiction consumers.
- Future adverse events related to cannabis product usage may have a negative impact on individual companies, on public perception and on the industry as a whole.

## Risks Related to Early-Stage Companies

- Most cannabis companies are in the early stage of development and have a limited operational history so it is difficult for these companies to accurately predict and forecast business operations. Many cannabis companies will fail.
- Most early-stage cannabis companies have limited resources to operate and may run out of capital prior to becoming profitable.
- There is no assurance that any cannabis company will generate cash flow from operations.
- Cannabis companies will be subject to most other normal business operation risks, including claims of infringement or dispute, pricing and cost pressures, product development and quality issues.

## Other Risks Related to the Cannabis Industry

- The cannabis industry is extremely competitive in most segments, with select companies having some unique competitive advantage, including greater capital resources, first-mover advantage, scale or brand awareness.
- There is no assurance that cannabinoid-based pharmaceuticals will ever prove effective in treating medical conditions. To date, only limited research has been conducted on cannabinoid-based pharmaceuticals due to the federal prohibition on cannabis. If cannabinoid-based pharmaceuticals do not prove effective, the cannabinoid-based pharmaceuticals market will not develop, and any entity or person that invested in such industry may not recoup all or any of their investment.
- Given the emerging nature of the market, management teams have limited industry experience and will struggle to hire qualified and experienced personnel.
- Due to the federal cannabis prohibition, there is a significant black market for cannabis and cannabis-related products. State law-compliant cannabis businesses face competition from black market participants, which are subject to different market forces than compliant participants.



## Chapter IX

# Glossary of Terms

**Ackrell Capital** a leading independent investment bank focused on the cannabis industry

**Aeroponics** the process of growing plants in an air or mist environment without the use of soil

**Afghanica** a hybrid strain of cannabis that is short and stocky with broad leaves, a lush canopy and dense buds; distinguished at maturity by a covering of fine white hairs

**Blunt** a cigar filled with cannabis, typically rolled with a tobacco leaf “wrapper” from an inexpensive cigar

**Bong** an ingestion device used to consume cannabis via a water chamber through which the cannabis smoke passes prior to inhalation; commonly made out of glass or plastic

**Bud** the most consumable part of the cannabis plant; appears at the top and main body of the female plant

**Budder** a form of wax concentrate

**Calyx** the usually green outer whorl of a flower, located under the sugar leaves and containing high concentrations of glands that secrete THC and other cannabinoids

**Cannabichromene (CBC)** a nonpsychoactive cannabinoid found in cannabis that may play a role in the anti-inflammatory and antiviral effects of cannabis and may contribute to the overall analgesic effects of medicinal cannabis

**Cannabichromic acid (CBCA)** a nonpsychoactive cannabinoid found in cannabis that appears to have anti-inflammatory and antibacterial effects

**Cannabidiol (CBD)** the second most abundant cannabinoid found in cannabis; produces physical effects without psychoactive effects and is considered to have a broad range of medicinal applications

**Cannabidiolic acid (CBDA)** a nonpsychoactive cannabinoid found in cannabis that appears to have anti-emetic, antiproliferative, anti-inflammatory and antibacterial effects

**Cannabigerol (CBG)** a nonpsychoactive cannabinoid found in cannabis and, in higher concentrations, in hemp

**Cannabigerolic acid (CBGA)** a cannabinoid found in cannabis; acts as a precursor to THCA/THC, CBDA/CBD, CBCA/CBC and CBG

**Cannabinoid** a class of diverse chemical compounds that act on cannabinoid receptors in brain cells that repress neurotransmitter release

**Cannabinol (CBN)** a weak psychoactive cannabinoid found only in trace amounts in cannabis; produces a sedative effect and may have anti-inflammatory, anticonvulsive and antibacterial effects

**Cannabis** a genus of flowering plants that includes four different species: Cannabis sativa and Cannabis indica are used for medicinal and recreational purposes, whereas Cannabis ruderalis and Cannabis afghanica generally are not

**CBC** *See Cannabichromene*

**CBCA** *See Cannabichromic acid*

**CBD** *See Cannabidiol*

**CBDA** *See Cannabidiolic acid*

**CBG** *See Cannabigerol*

**CBGA** *See Cannabigerolic acid*

**CBN** *See Cannabinol*

**Clone** an exact copy of a cannabis plant; retains all the qualities of the original mother plant

**Cola** the terminal bud on a female cannabis plant; a main cola (apical bud) forms at the very top of the plant and smaller colas occur along other budding sites below

**Concentrate** potent consolidation of cannabinoids made by dissolving a cannabis plant into a solvent

**Crumble** a form of wax concentrate

**Curing** part of the cultivation and harvesting process whereby sugars in the cannabis are broken down to help develop aroma, taste and smoothness of the product

**Dab** a highly concentrated extract of the psychoactive cannabinoid THC

**Drying** part of the cultivation and harvesting process whereby plants are dried at room temperature in a dark space at an optimal temperature between 60°F and 70°F

**Edibles** edible goods that have been infused with cannabis extracts; commonly baked goods, flavored drinks, breads or candies

**Extracts** concentrates that have been extracted from cannabis and are significantly more potent than hashish or cannabis flower

**Flower** the part of the female cannabis plant that users consume after it is harvested and dried

**Ganja** popular name for cannabis

**Germination** the process by which the cannabis seeds sprout and the root emerges

**Hashish (hash)** a cannabis product composed of compressed or purified preparations of stalked resin glands (trichomes); contains the same active ingredients as cannabis but often in higher concentrations than flower



**Hash oil** also known as hashish oil, butane hash or honey oil (BHO), cannabis oil or liquid cannabis; obtained by extraction of cannabis flower or hashish

**Hemp** a fibrous product that can be produced from the male cannabis plant and used in the manufacture of rope, paper, beauty products, clothing and CBD oil-based products

**Hit** slang term for one inhalation from a cannabis smoking device or vaporizer

**Hybrid** a cannabis plant that is a genetic cross between two or more separate strains of cannabis

**Hydroponics** a method of growing plants using mineral nutrient solutions in water, without soil

**I-Hybrid** an indica-based hybrid species of cannabis

**Indica** one of two most common species of cannabis plants, having a higher ratio of THC to CBD compared to sativa and known for its sedative effect when ingested

**Kief** resin glands (or trichomes) of cannabis that may accumulate in containers or be sifted from loose dry cannabis flower with a mesh screen or sieve; a low-quality extract consumed by smoking or vaporizing

**Kush** a subset of strains of Cannabis indica

**Leaf** the leafy part of the cannabis plant that is the least used for consumption

**LED** a light-emitting diode used for growing cannabis indoors

**Marijuana** general term for female cannabis plants or their dried flower

**Oil** concentrate that is extracted from cannabis

**PEG** polyethylene glycol, the chemical that can be found in pre-filled cannabis oil cartridges to give the product a more fluid consistency

**Pinching** a method similar to topping that causes lower branches to grow more rapidly; performed by firmly pinching the apical meristem(s) so as to substantially damage vascular and structural cells without totally breaking the stem

**Pipe** a common ingestion device used to consume cannabis, commonly made out of metal, glass or wood

**Pistil** tiny red-orange hairs on the calyx that serve to collect pollen from males

**Rolling papers** used to roll cannabis cigarettes, usually by hand

**Ruderalis** a species of the cannabis plant that produces only trace amounts of THC, but is very rich in CBD

**Sativa** one of two most common species of cannabis plants, having a higher ratio of CBD to THC compared to indica and known for its cerebral high when ingested

**Shatter** an extract with an amber glass transparency and a reputation for being the purest and cleanest type of extract

**S-hybrid** a sativa-based hybrid species of cannabis

**Sinsemilla** highly potent cannabis from female plants that are specially tended and kept seedless by preventing pollination in order to induce a high resin content

**Strain** a specific variety of a cannabis plant species, usually developed to produce distinct, desirable traits

**Sugar leaves** tiny leaves under or in a bud

**Tender or budtender** a person who interacts with consumers in a dispensary, giving recommendations on cannabis forms and consumption

**Terpene** hydrocarbon found in THC and other cannabinoids that affects the aroma and flavor of cannabis; may have medicinal applications

**Tetrahydrocannabinol (THC)** the principal psychoactive cannabinoid found in cannabis

**Tetrahydrocannabinolic acid (THCA)** a biosynthetic precursor of THC occurring in variable quantities in fresh, undried cannabis but progressively decarboxylated to THC with drying

**Tetrahydrocannabivarin (THCV)** a mildly psychoactive cannabinoid of cannabis

**THC** *See Tetrahydrocannabinol*

**THCA** *See Tetrahydrocannabinolic acid*

**THCV** *See Tetrahydrocannabivarin*

**Tincture** a liquid cannabis extract, usually made with alcohol or glycerol, that is often administered with a dropper; usually flavored and placed under the tongue for quick absorption

**Topical** a cannabis product created by extracting and adding the active properties of the flower to a lotion or a cream that is applied to the skin

**Trichome** the hairlike crystal growths that secrete resin and are found on the leaves, stems, calyxes and bud of the cannabis plant

**Vaporizer** an ingestion device used to consume cannabis by heating flower or cannabis-infused oil to a temperature that produces a cannabinoid-laced vapor to be inhaled

**Wax** a form of concentrate; refers to the softer, opaque oils that have lost their transparency after extraction

**Weed** slang term for cannabis

## Disclosures, Disclaimers, Sources and Use of This Report

This report has been compiled for informational purposes only, and is not a research report. This report is not and should not be construed as an offer to sell securities or a solicitation of an offer to buy securities. Readers should not rely on this report in making any investment decisions regarding the topics herein. Readers should not assume that this report is complete, and should conduct their own analysis and investigation of the cannabis industry and consult with their own financial, legal, tax and other business advisors before making any investment decision related to the cannabis industry or any company participating therein.

The information in this report is of a general nature, and this report should not be construed, relied upon or acted upon as investment, legal, medical, health or tax advice. Readers should obtain advice applying to their circumstances from a qualified attorney or other investment, medical or tax professional before acting or not acting. Ackrell Capital, LLC, its affiliates and others associated with it ("Ackrell Capital") expressly disclaim liability in respect of any action taken or not taken based on information in this report.

None of the companies referenced in the report, including those companies referenced in the Top 100 Private Cannabis Companies 2016 and The Green Field 2016, have seen this report prior to publication; therefore, there is no endorsement of the contents of this report or the inclusion in the Top 100 Private Cannabis Companies 2016 or The Green Field 2016 by any company referenced. In fact, some companies referenced in this report may object to being included in a document describing the cannabis industry. In addition, any display of any company's logo included in this report is meant solely as an efficient communications method of identifying the company so referenced.

Ackrell Capital has made investments in and conducted investment banking services for companies mentioned in this report, and may do so in the future. Readers should be aware that Ackrell Capital may have a conflict of interest that could affect the objectivity of this report.

Ackrell Capital does not make any representation or warranties as to the accuracy or completeness of this report. This report relies on data and insights from a wide range of sources, both public and private, including surveys, market research reports and personal interviews with individuals. Information in this report has been obtained from sources believed to be reliable.

Some of our opinions and viewpoints in this report are based partly on the data we received from our surveys of consumers and business operators. Opinions and estimates constitute our judgment as of the date of this report and are subject to change without notice. Any statements that are not statements of historical fact (including statements containing the words "believes," "expects," "anticipates," "estimates" and similar expressions) should be considered our personal opinions. A number of important factors could cause actual results or events to differ materially from those indicated by such opinions. We assume no obligation to update our opinions in this report. Readers are cautioned not to place undue reliance on our opinions, which speak only as of the date hereof. The statements, information and estimates contained herein are based on information that we believe to be reliable as of the date hereof.

Any tax advice contained in this report is not intended as a thoroughgoing analysis, and is not to be relied on for any legal purpose. It may fail to analyze various facts and laws important to any complete, particularized legal analysis. Readers are urged to consult with their own tax advisors to determine the tax consequences of any planned course of action.

While this report includes information developed by others, our original contributions are protected by copyright. We are not looking to prevent others from using our work, however. You are free to copy and distribute this report or portions of it, so long as you credit Ackrell Capital, LLC. More specifically, we are using the same license used by Wikipedia. Thus, this report is licensed under the Creative Commons Attribution ShareAlike 3.0 License (CC-BY-SA). You are free to use, re-use, share, reproduce and make derivative works of the report, provided you comply with the requirements of the CC-BY-SA, which can be found at: <https://creativecommons.org/licenses/by-sa/3.0>.

## Ackrell Capital Team Leaders



**Mike Ackrell**

Founder

[mackrell@ackrell.com](mailto:mackrell@ackrell.com)



**Shannon Soqui**

Head of Cannabis  
Investment Banking

[ssoqui@ackrell.com](mailto:ssoqui@ackrell.com)

Mr. Ackrell founded Ackrell Capital in 2003. Previously, Mr. Ackrell was the Head of ABN AMRO's U.S. Technology Investment Banking Group and the Head of Investment Banking at WR Hambrecht+Co. Mr. Ackrell also was a Senior Vice President in the Technology Investment Banking Group of Donaldson, Lufkin & Jenrette, where he began his investment banking career in 1988. Mr. Ackrell has completed more than 150 financing transactions, including more than 50 initial public offerings, and more than 100 M&A transactions, totaling more than \$15 billion in value. Mr. Ackrell serves on the Board of Directors of a number of companies, including American Giant, Scrubbed and Vator.tv. Mr. Ackrell holds a B.S. in Economics, *summa cum laude*, with majors in Finance and Accounting, from the Wharton School of the University of Pennsylvania.

Mr. Soqui joined Ackrell Capital in 2015. Previously, Mr. Soqui was an investment banker for 15 years with Donaldson, Lufkin & Jenrette, Credit Suisse, UBS and Pacific Crest Securities. Mr. Soqui has completed more than 100 financing transactions, including more than 25 initial public offerings, and more than 60 M&A transactions, totaling more than \$10 billion in value. Mr. Soqui was also a securities lawyer with Brobeck, Phleger & Harrison and Gunderson Dettmer in Palo Alto, CA, and was a Certified Public Accountant with KPMG in San Jose, CA. Mr. Soqui's clients have included Advanced Micro Devices, Amazon.com, Data Domain, Drugstore.com, Force10 Networks, Freescale, MEMC Electronics, MetricStream, Netscape, Realtor.com and VeriSign. Mr. Soqui holds a B.A. in Economics with an emphasis in Accounting from the University of California at Santa Barbara and a J.D., *magna cum laude*, from the Santa Clara University School of Law.



# ACKRELL CAPITAL

## THE GREEN FIELD 2016

### Cultivators



### Production Equipment and Supplies



### Laboratory-Testing Equipment and Services



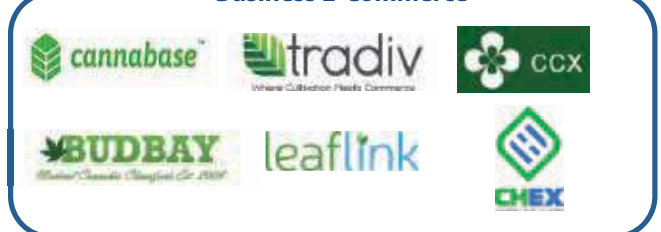
### Recreational and Medicinal Dispensaries



### Consumer E-Commerce



### Business E-Commerce



# ACKRELL CAPITAL

## THE GREEN FIELD 2016

### Branded Flower and THC Concentrates



### Edibles, Topicals and Nutraceuticals



### Vaporizers and Accessories



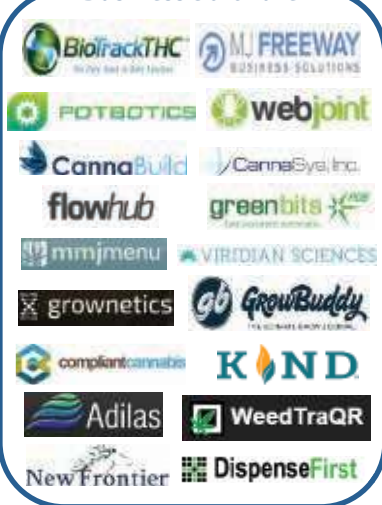
### CBD Concentrates



### Cannabinoid-based Pharmaceuticals



### Business Software



### Business Services



### Digital Media



Inclusion in The Green Field 2016 does not represent an investment recommendation or an endorsement of any particular company. Our intent in providing this industry landscape is to provide a graphical representation of the cannabis industry, its segments and participants. This landscape is necessarily subjective. Numerous companies operate in multiple segments. None of the companies referenced in The Green Field 2016 have seen The Green Field 2016 prior to publication; therefore, there is no endorsement of The Green Field 2016 or the inclusion in The Green Field 2016 by any company referenced. In addition, any display of any company's logo is meant solely as an efficient communications method of identifying the company so referenced.



# ACKRELL CAPITAL

## TOP 100 PRIVATE CANNABIS COMPANIES 2016

AbsoluteExtracts	Gold Coast Extracts	Meadow	Sensible Seeds
Advanced Nutrients	Good Meds Network	Medical Jane	Shango
Analytical 360	Green Man Cannabis	Medically Correct	SPARC
Apeks Supercritical	Green Wolf Collective	Medicine Man	SpeedWeed
Auntie Dolores	Grow OP Farms	Merry Jane	Starbuds
Berkeley Patients Group	GrowHealthy	MiNDFUL	Steep Hill Labs
Bhang	Harborside Health Center	MJ Freeway	StickyGuide
Bio-Tech Medical Software	Haze Technologies	Monarch	Storz & Bickel
Bondi Farms	Hello MD	Monkey Grass Farms	Syqe Medical
Cannabase	HerbaBuena	Native Roots	THC Laboratories
Cannasseur	Hifi Farms	Nature's AZ Medicines	The Apothecarium
Care By Design	High Times	New Vansterdam	The Clinic Colorado
Chalice Farms	Hypur	NWT Holdings (Firefly)	The Green Solution
Colorado Harvest Company	lunu	O.penVAPE	Tradiv
Columbia Care	Kandypens	PalliaTech	TRiQ Systems
CW Analytical	Kenevir Research	PAX Labs	TruMed Dispensary
CW Botanicals	KIVA Confections	PharmaCannis	Uncle Ike's
Dixie Elixirs	Leafline Labs	PharmPods	VapeWorld
Duby	Leafly	Phytects	VapeXhale
Eaze Solutions	Leafs By Snoop	Potbotics	Vireo Health
Eden Labs	LivWell Enlightened Health	Revolution Enterprises	Web Joint
Euflora	Loto Labs	Rocky Mountain High	WeedClub
Flow Kana	Main Street Marijuana	SC Labs	Weedmaps Media
FunkSac	Marley Natural	Scrubbed	Wellness Connection of Maine
G FarmaLabs	Mary's Medicinals	Seed Supreme Seedbank	White Rhino Products

None of the companies referenced in the report, including those companies referenced in the Top 100 Private Cannabis Companies 2016 and The Green Field 2016, have seen this report prior to publication; therefore, there is no endorsement of the contents of this report or the inclusion in the Top 100 Private Cannabis Companies 2016 or The Green Field 2016 by any company referenced. In addition, any display of any company's logo included in this report is meant solely as an efficient communications method of identifying the company so referenced. Inclusion in the Top 100 Private Cannabis Companies 2016 and the Green Field 2016 does not represent an investment recommendation or an endorsement of any particular company or product.



# ACKRELL CAPITAL

Ackrell Capital, LLC  
38 Keyes Avenue, Suite 200  
San Francisco, CA 94129

[www.ackrell.com](http://www.ackrell.com) | [info@ackrell.com](mailto:info@ackrell.com) | 415.995.2000

This report has been compiled for informational purposes only, and is not a research report. This report is not and should not be construed as an offer to sell securities or a solicitation of an offer to buy securities. The information in this report is of a general nature, and this report should not be construed, relied upon or acted upon as investment, legal, medical, health or tax advice. Ackrell Capital has made investments in and conducted investment banking services for companies mentioned in this report, and may do so in the future. Readers should be aware that Ackrell Capital may have a conflict of interest that could affect the objectivity of this report. Ackrell Capital, LLC is a member of FINRA and SIPC. © 2016 Ackrell Capital, LLC.