



Project Bloom | Medical Cannabis Economic Analysis

May 2017

Table of Content

Context and Objectives

Executive Summary

Introduction | Medical Cannabis 101

Section 1 | Demand Analysis

- Overview Medical Cannabis Around the World in 2017
- Addressable Market Calculation Methodology
- Total Addressable Population and Volume Consumed
- Total Addressable Market
- Analysis of Different Scenarios for Costa Rica

Section 2 | Supply Analysis

- Overview of Cost Drivers
- Total Annual Costs to Produce Medical Cannabis in Costa Rica

Section 3 | Implication of Medical Cannabis Production

- Taxation Models from the U.S.A, Applicable to Domestic Sales
- Simplified View of Fiscal Implications for Domestic Market
- Job Creation Associated to the Medical Cannabis Industry
- Scenario Analysis for Exports of Medical Cannabis

Appendix



Context and Objectives

Context

- Over the five years leading to 2016, the medical cannabis industry has experienced a surge in industry revenue thanks to favourable legislation toward growing and distributing cannabis for medical purposes. Furthermore, consumer trends toward legitimizing the use of alternative medical treatments such as cannabis have also boosted demand for industry products.
- Deloitte has been commissioned to estimate the cost to initiate cultivating and manufacturing medical cannabis in Costa Rica, with the end goal of exporting most of the production.
- The purpose of this exercise is to cost the process from cultivation to manufacture using largely publicly available information and Deloitte internal subject matter experts.

Project Objectives

- 1 Assess the size and value of the medical cannabis market globally
- 2 Break down the cost structure associated with the production of medical cannabis and calculate the costs related to the initiation of production in Costa Rica
- 3 Identify existing taxation framework in mature markets and the impact of medical cannabis in terms of job creation

Executive Summary

Demand

- Medical cannabis is currently legal in 21 different countries around the world, representing a total global market of 771 million people. Of this number, 53 % or 411 million people live in countries where the local legislation allows for imports of medical cannabis
 - Our current estimation sets the addressable market at 618,653 kg of dried cannabis in 2016, corresponding to a market value of \$ 3.09 B, on its way to \$ 13.12 B in 2021

Supply

- The total cost to produce a kg of dried cannabis is \$ 573.93 if grown in a greenhouse and \$ 743.45 if grown in an indoor facility
 - Based on our calculation, producing medical cannabis in Costa Rica in the year 2021^{b,c} will require an investment of \$ 97.5 M

Taxes

- By positioning itself as an export producer, the key driver of tax revenues for Costa Rica will be corporate income taxes, which is projected at 30% of the total estimated profit, or \$ 1,277 per kg
 - Based on our forecast, exporting medical cannabis from Costa Rica could generate \$ 167 M in corporate income tax for the year 2021
 - Other tax revenues could be realized through different taxation models, as it relates to the domestic consumption of medical cannabis

Employment

- Our analysis suggests that the medical cannabis industry could create 4,079 permanent jobs by 2021 in Costa Rica, with permanent jobs representing more than 81% of all the jobs created ^b
 - This number does not include any of the additional jobs created from ancillary industries

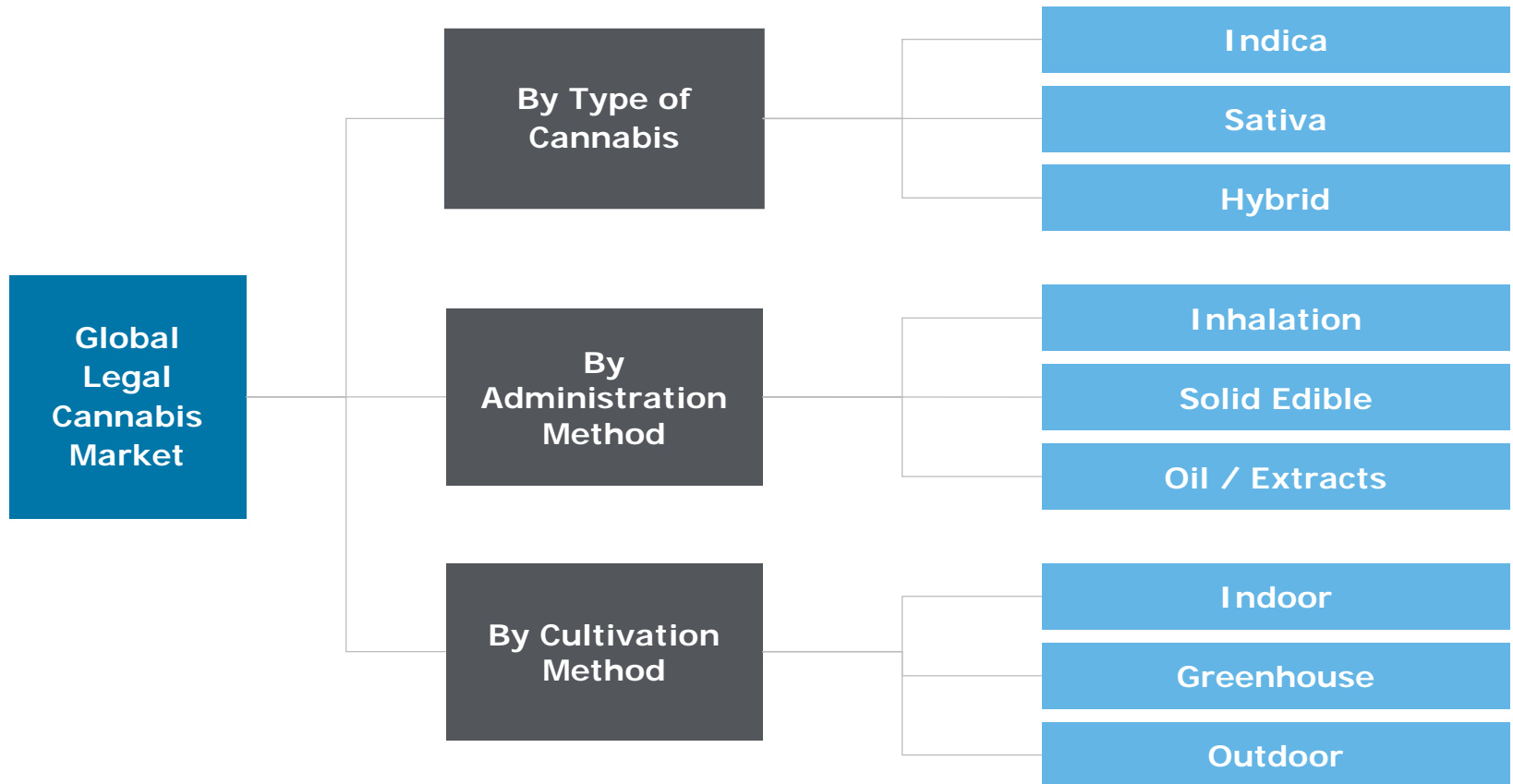
Notes : a. Deloitte Analysis ; b. Based on indoor cannabis as a baseline scenario ; c. Based on a hypothetical scenario where Costa Rica captures 5% of total market share.

Introduction

Medical Cannabis 101

Market Overview

The legal cannabis market can be broken down in many different ways, the most common ways to segment it are by plant type, administration method and production method






Notes : a. Deloitte Analysis

Sources : 1. *Global Legal Marijuana Market 2016-2020*, Technavio, 2016 ; 2. *Canadian Cannabis Industry*, Cannacord Genuity, 2016 ; 3. *The Cannabis Compendium*, Cowen and Co., 2016

Types of Cannabis

All cannabis comes a single plant genus, but selective breeding and hybridization of the Indica and Sativa species has produced many unique strains with unique characteristics

Type of Plants	 <p>Indica</p>	 <p>Sativa</p>	 <p>Hybrid</p>
<p>Main Characteristics³</p>	<ul style="list-style-type: none"> • Areas between 30 and 50 degrees latitude, mainly mountain regions • Shorter and more compact • Well suited for indoor gardens • Short flowering time • Represented 56.1% of all cannabis grown in the U.S.A. ² 	<ul style="list-style-type: none"> • Areas between 0 and degrees latitude, thrive in temperate areas closer to the Equator • Grow taller and skinnier • Ideal for growing outdoor • Longer flowering time • Represented 43.9% of all cannabis grown in the U.S.A. ² 	<ul style="list-style-type: none"> • Mix of Sativa and Indica • Can have different characteristics such as autoflowering ³ (shorter flowering cycle) and feminized (will not produce any male plants) ^b • <i>Share of American market is not available</i>
<p>Effect</p>	<ul style="list-style-type: none"> • Higher concentration of CBD and low to no levels of THC • Relaxing and full-body effect 	<ul style="list-style-type: none"> • Higher concentration of THC with lower levels of CBD • Cerebral and stimulant 	<ul style="list-style-type: none"> • Can include varying effect from both types
<p>Main Symptom Relief</p>	<ul style="list-style-type: none"> • Insomnia • Pain Relief • Muscle Spasms • Chronic Pain 	<ul style="list-style-type: none"> • Depression • ADD • Stimulates appetite • Severe Pain 	<ul style="list-style-type: none"> • Can include varying effect from both types

Notes : a. Deloitte Analysis ; b. The main difference between male and female plants is that male plants have very low levels of THC and do not produce any buds, or flower, the main purpose of the male plant is for breeding.

Sources : 1. *Canadian Cannabis Industry*, Cannacord Genuity, 2016 ; 2. *Medical & Recreational Marijuana Growing in the US*, IBIS World, Sept. 2016 ; 3. Leafly.com

Administration Methods

Users of medical cannabis have a variety of options and techniques available to them when administering their dosage

Inhalation

- Most common and well-known method for consuming cannabis is to smoke it directly, much like a cigarette
- Vaporizing is an alternative to smoking that allows users to extract cannabis's cannabinoids in a vapor form, requiring a temperature lower than cannabis' combustion point

Pros

- Vaporizing is a much more efficient method of delivery than smoking, which can reduce the amount of grams per dose required by patients

Cons

- Smoking is one of the least efficient forms of administration, as it overheats the cannabinoids responsible for marijuana's therapeutic benefits and release non-cannabinoid components potentially harmful to one's health ¹

Solid Edibles

- Cannabis can also be consumed orally; however, in order to activate the appropriate THC compounds, it must first be heated
- Typically accomplished through baking or boiling and then added to foods to be ingested as an edible

Pros

- Attractive alternative for individuals who do not enjoy the mechanics of smoking, or who have respiratory constraints

Cons

- Cooking edibles often require large quantities of cannabis
- Delayed effects from 30 minutes to an hour after consumption

Oil / Extracts

- Consist of extracting concentrated THC and/or CBD directly from cannabis and mixing it with an oil base to create a type of THC/CBD "concentrate"
- Patients can then administer their doses by putting a few drops directly under their tongue or in a beverage
- Fastest-growing method for administering cannabis is through oil and extracts products ¹

Pros

- Method of consumption is considered the most effective to ensure consistency of doses for medical users
- Attractive alternative for individuals who do not enjoy the mechanics of smoking, or who have respiratory constraint

Cons

- Extraction process is expensive and can be very complex

Notes : a. Deloitte Analysis

Sources : 1. *Canadian Cannabis Industry*, Cannacord Genuity, 2016 ; 2. *The Cannabis Compendium*, Cowen and Co., 2016 ; 3. *Medical & Recreational Marijuana Growing in the US*, IBIS World, Sept. 2016

Cultivation Methods

As outdoor cultivation is not aligned with any of the key attributes patients look for in their medical cannabis, we decided to limit our analysis to greenhouse and indoor cultivation



Pros

- No costs associated with climate control or lighting
- Low Setup Costs – little equipment needs other than tractors

Cons

- High water usage
- No control over climate or humidity level that can lead to inferior product
- Highly vulnerable to pests, weather or theft
- Poor odor control, many areas have regulations regarding odor control



Pros

- Natural lighting
- Ability to semi-control the climate year-round means growing can take place year-round.
- Low setup Costs

Cons

- Direct use of outside air that can lead to the introduction of pests and pathogens
- Low level of security, as greenhouses are easy to break through, making easy access points for theft
- Poor odor control, many areas have regulations regarding odor control



Pros

- Consistent climate and light delivery for maximum control
- Indoor facilities can be sealed, avoiding outside introduction of pests and pathogens as well as allowing for better control of climate and humidity.
- High level of security, with thick walls, solid ceiling and cameras everywhere

Cons

- High energy consumption, lights and cooling system uses a lot of electricity, leading to high monthly energy bill
- High build-out costs, whether building new or renovating an existing building, the upfront costs for an indoor cultivation facility are the highest of these three options

As the medical market continues to take shape, the following attributes will become the key differentiating factors amongst producer:

- **Product diversity** - As more medical benefits around cannabis continue to be discovered, we believe it will be important for producers to offer a sufficient variety of product in order to respond to the various needs of the growing base of patients;
- **Consistency of product** - Because medical cannabis is used as a means to provide therapeutic relief for patients, it is important for producers to demonstrate the ability to produce a consistent, dependable product (much like any medicine) in order to remain competitive in the industry;
- **Absence of pests and pathogens** – Producers who can prove their capacity to constantly produce medical grade cannabis that respect rigorous international regulation, without using large quantities of pesticides, are most likely to capture large market share.

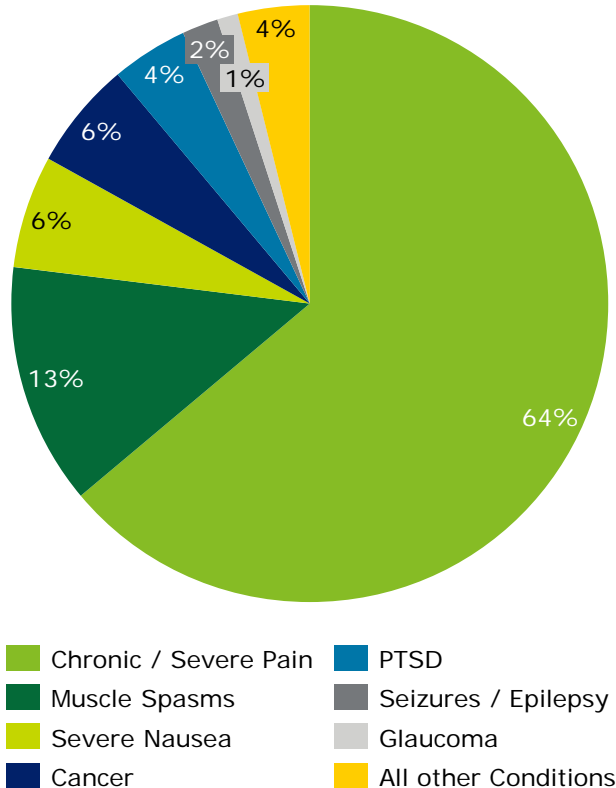
Notes : a. Deloitte Analysis ; b. See appendix for images of the main growing methods

Sources : 1. *Canadian Cannabis Industry*, Cannacord Genuity, 2016 ; 2. *The Cannabis Compendium*, Cowen and Co., 2016 ; 3. *Medical & Recreational Marijuana Growing in the US*, IBIS World, Sept. 2016

Common Medical Uses

Although research has only begun to document how patients' use medical cannabis, early data suggests that pain reduction is a primary application

Medical Cannabis Patient Breakdown ^{b,2}, 2016



Main Types of Cannabinoids ^{1,2,3}

- **THC** is the most abundant and widely known cannabinoid, it is responsible for the main psychoactive effects that make patients feel "high". It causes muscle relaxation, pain reductions, increased appetite as well as reduced nausea, but it is also associated with paranoia and short-term memory loss
- **CBD** is a non-psychoactive cannabinoid that produces most of the medical benefits associated with medical cannabis, without inducing a high. There is also some evidence that CBD content may also counteract the negative side effects of THC
- **THC-A** is not psychoactive, but some research reports benefits as topical pain relievers and to reduce symptoms associated with autoimmune disorders
- **CBN** is a middle psychoactive cannabinoid that causes sleepiness and reduces the effects of THC and it is probably the actual cause of "couch lock"
- **CBC** is the second most abundant in pot. It is an anti-depressant, improves neurogenesis (brain cell growth), relieves pain, and has antimicrobial properties

Notes : a. Deloitte Analysis ; b. Based on state programs in Nevada, Arizona, New Mexico, Minnesota, New Jersey, Montana, Colorado and Oregon ; c. Due to public concern over cannabis's psychoactive effects, early investigations focused primarily on the single psychoactive chemical compound, THC. Yet as researchers eventually found, cannabis sativa also contains more than 70 cannabinoids that are non-psychoactive but which, in some cases, affected human physiology in potentially useful ways.

Sources : 1. *Canadian Cannabis Industry*, Cannacord Genuity, 2016 ; 2. *The Cannabis Compendium*, Cowen and Co., 2016 ; 3. *Medical & Recreational Marijuana Growing in the US*, IBIS World, Sept. 2016

Section 1

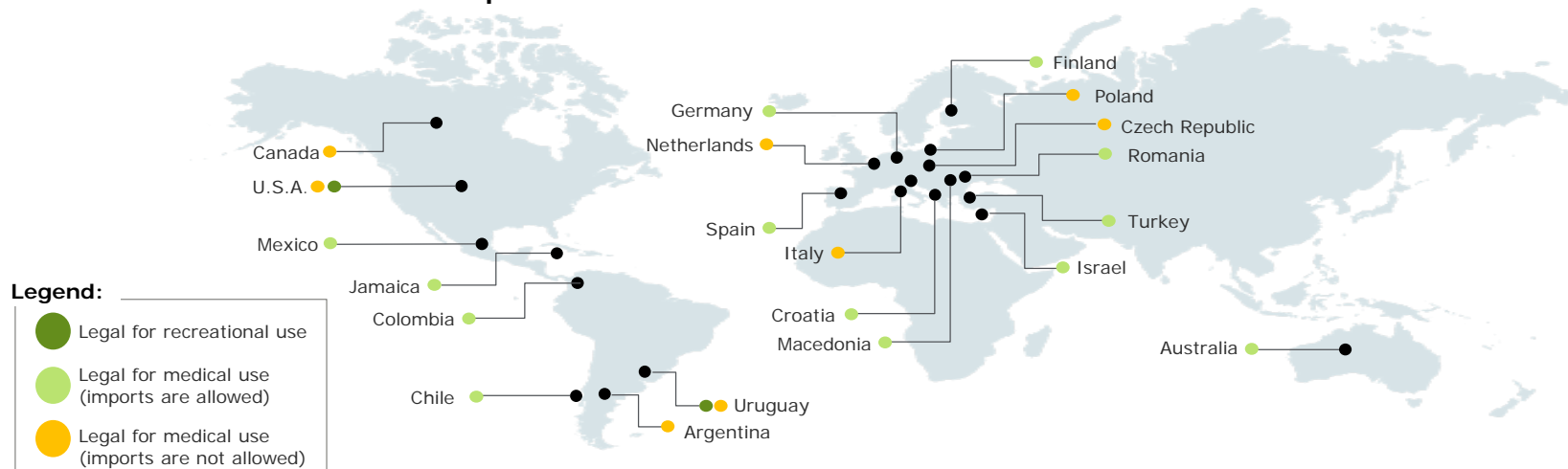
Analysis of Global Demand

Overview Medical Cannabis Around the World in 2017

The overall medical cannabis market is currently growing at a tremendous rate and is currently accessible to more than 770 million people throughout the world

- Medical cannabis is currently legal in **21 different countries** around the world, representing a global market of **771 million** people ^{a,b,c}
 - Of this number, **411 million** (or 53% of the total market) live in countries where the local legislation allows for the importation of medical cannabis
- In the U.S.A. alone, the total legal cannabis market is estimated at **\$ 6B**, en route to **\$ 50B** by 2026 ³
- In Canada, Health Canada prepared a multi-year forecast in 2012 that estimated the size of the registered Canadian patient base to reach ~**450,000** by 2024 and to increase to ~**800,000** by 2029 (or roughly 2% of the Canadian population)
 - Current estimates are showing that the industry is already **two years ahead** of the original forecast and is showing no signs of slowing down, with a patient base that is on track to triple in 2016 alone ²
- Our current estimates set the total addressable market at **\$ 3.09 B** in 2016, on its way to more than **\$ 13.1 B** by 2021
 - Considering a hypothetical scenario where all countries with legal medical cannabis were to allow importation, the total addressable market would be **\$ 6.38 B** in 2016 and **\$ 27.1 B** by 2021, under our same current set of assumptions
 - Giving a hypothetical scenario where all countries where medical cannabis is legal and countries where legislation of medical cannabis is under consideration would open their market to recreational cannabis within the next 5 years, the total addressable population could be as big as **147.2 M** people
- Based on the market share captured, Costa Rica will need to produce between **6,187 kg** and **61,865 kg** per year, representing respectively 1 % and 10 % of the global total market of medical cannabis

Import Provisions on Medical Cannabis around the World ^d

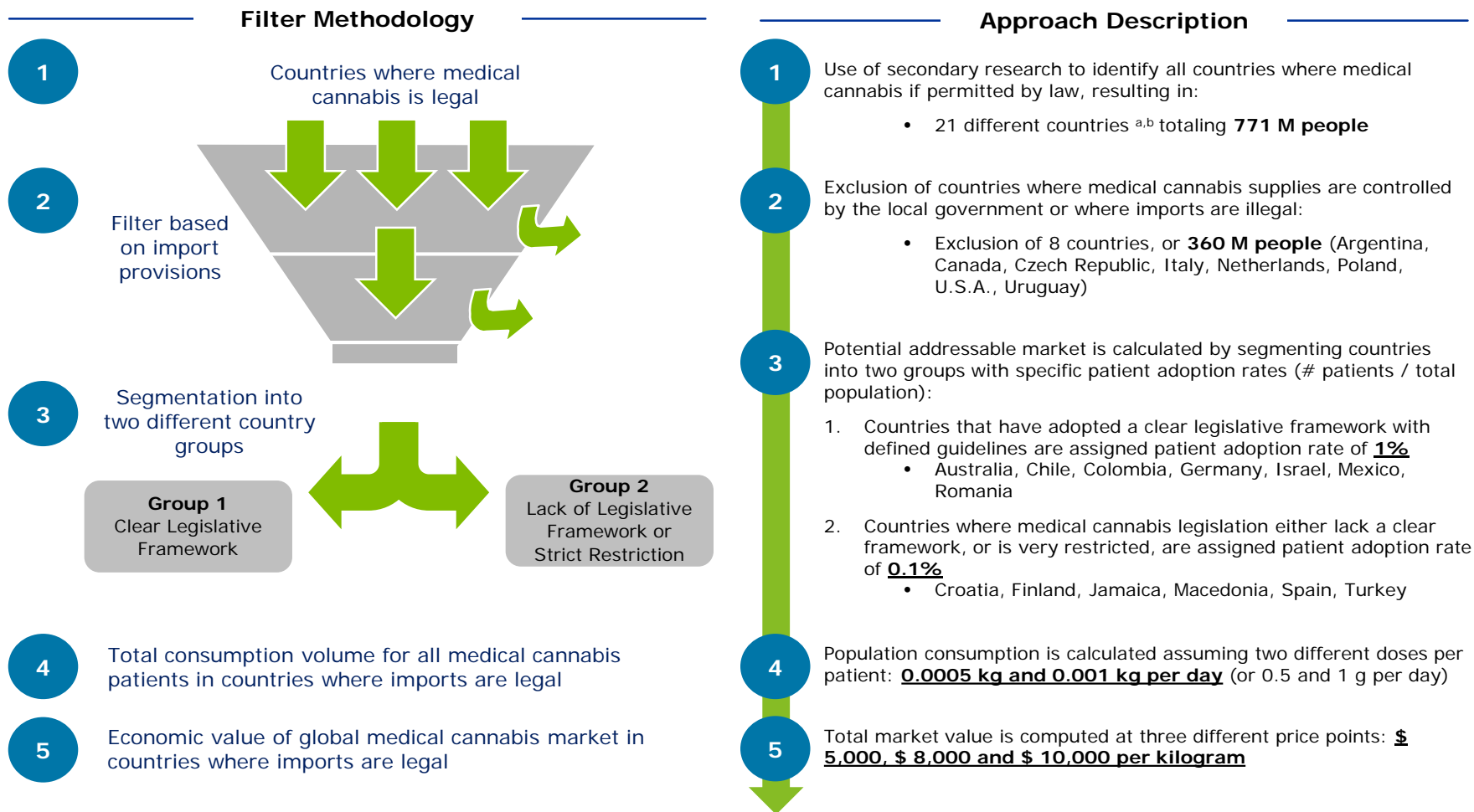


Notes : a. Deloitte Analysis ; b. Population in countries where the use of medical cannabis is only partially legal has been adjusted to reflect reality; c. Countries where legislation is currently under revision (i.e. Philippines, Bosnia, etc.) have not been included in our analysis ; d. See appendix for more detailed explanations

Sources : 1. *Global Legal Marijuana Market 2016-2020*, Technavio, 2016 ; 2. *Canadian Cannabis Industry*, Cannacord Genuity, 2016 ; 3. *The Cannabis Compendium*, Cowen and Co., 2016

Addressable Market Calculation Methodology

Based on several different sources of literature, we have developed our own methodology to estimate the total addressable market where medical cannabis is legal for importation



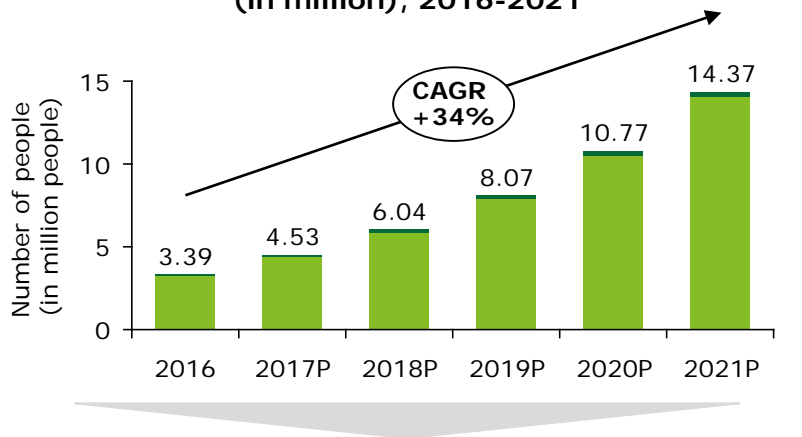
Notes : a. Medical cannabis is legal in 24 states in the U.S.A., the American addressable market is 1 414 988 000 (Sept. 2016); b. Medical cannabis is legal in 19 provinces out of 81 in Turkey, the addressable Turkish was set to 18 863 000, or 23,5% of the overall population.

Sources : 1. *The Cannabis Compendium*, Cowen and Co., Sept. 2016;

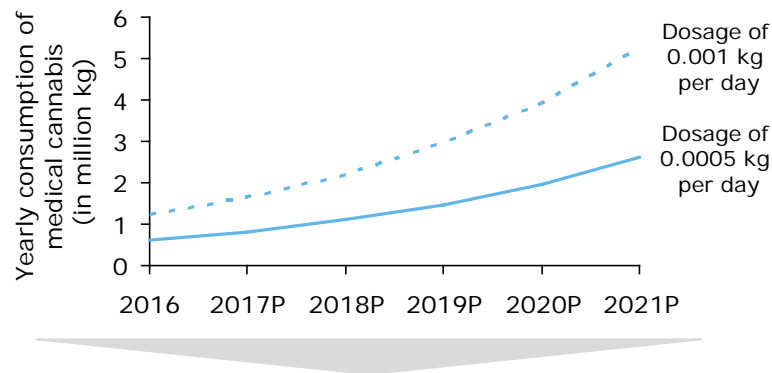
Total Addressable Population and Volume Consumed

Over the next five years, medical cannabis addressable population and total volume consumed are expected to grow at a rate 33.5 % annually

Total Addressable Population, (in million), 2016-2021



Total Annual Volume Consumed, (in million kg), 2016-2021



- We are estimating the total addressable population at **3.39 M people** in 2016
 - This number represents patient adoption rate of **0.826 %** of the total **411 M** population residing in countries where medical cannabis can be legally imported^b
 - For example, mature American states where the use of cannabis for medical purposes is becoming widely accepted, such as California, Colorado, Maine, Michigan, Oregon and Washington, all have a patient adoption rates currently oscillating between **1.8** and **2 %**³
- Based on estimates from IBIS World¹ and Cannacord Genuity², a **CAGR of 33.5 %** was applied to forecast the growth in the global market
 - We believe this reasonable (and perhaps conservative) considering that registrations for medical cannabis in Canada have been increasing at a rate of 10% month-over-month over the past two years.

- The average medical user consumes approximately **0.001 kg** (or 1 g) of cannabis per day; however, this can range from as little as **0.00025 kg** per day for anxiety and sleep disorders, to as much as **0.003+ kg** per day required for patients suffering from post-traumatic stress disorder²
- Canada represents one of the most advanced countries, both in terms of recognizing the benefits, as well as prescribing medical cannabis.
 - Taking this into consideration when building our market value calculation, we decided a conservative patient adoption rate of **0.0005 kg per day** to reflect the difference in the level of acceptance of medical cannabis from the general population

Legend:

- Countries Lacking a Clear Legislative Framework or with Strict Restriction
- Countries with Clear Legislative Framework
- All countries combined

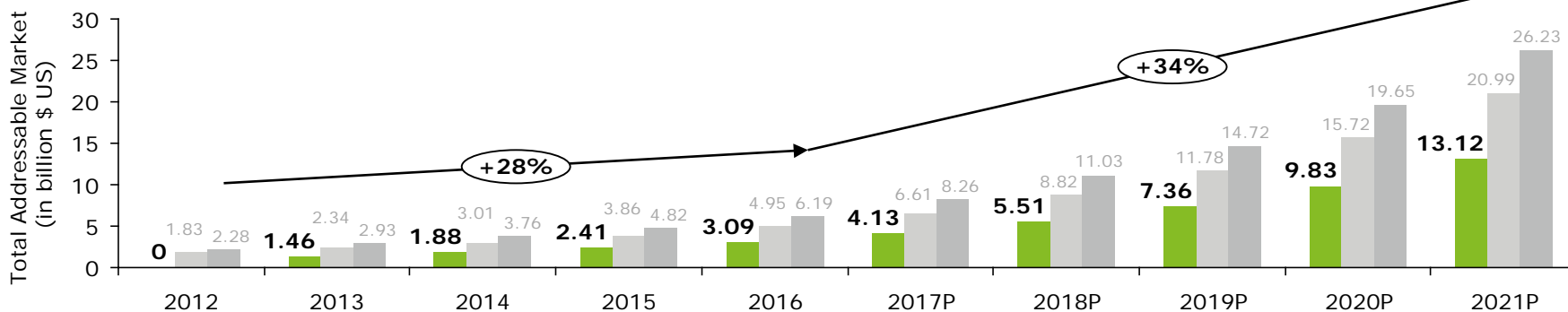
Notes : a. Deloitte Analysis ; b. Health Canada forecast a patient adoption rate of 2% as the country moves to more advanced stage

Sources : 1. *Medical & Recreational Marijuana Growing in the US*, IBIS World, Sept. 2016 ; 2. *Canadian Cannabis Industry*, Cannacord Genuity, Nov. 2016 ; 3. *The Cannabis Compendium*, Cowen and Co., Sept. 2016
 © Deloitte LLP and affiliated entities.

Total Addressable Market

Our current estimates set the total addressable market at \$ 3.09 B in 2016, on its way to more than \$ 13 B by 2021

**Total Addressable Market at Three Different Price Points
(in \$ billion US), 2012-2021¹**



- There has been no shortage of demand in recent years, as the industry has benefited from the increased acceptance and legitimacy of medical marijuana products. The aging population in most western economies has also driven demand for industry products in recent years:
 - In the U.S.A., 24.0% of customers are between the ages of 18-30; 26.0% of customers are between the ages of 31-40; 23.0% of customers are between the ages of 41-50; and 27.0% of customers are more than 50 years old.
- To capture a wide range of possibilities, we have evaluated three different price points: **\$ 5,000, \$ 8,000 and \$ 10,000 per kilogram**
 - We believe a pricing of **\$ 5,000 per kg** is a fair and conservative estimate, considering the fact that very little data is available to document pricing of medical cannabis outside of Canada and the U.S.A.
- We believe our pricing assessment to be prudent in nature, as we decided not to include the price difference between cannabis oil and dried cannabis
 - As the market continues to grow and mature, analysts believe that a larger proportion of sales will be in the form of oil and extract products, which are typically sold at a higher price point than the equivalent in dried bud
 - However, the data currently available is not robust and/or detailed enough and restrains us from making any reliable predictions in terms of global pricing

"Oil products that are on the market today have sales prices that typically range from \$150 to \$250 per 100 ml bottle. Most Canadian licensed producers assert to have a conversion ratio of ~8 g to ~10 g of bud for every 100 ml of oil produced. This equates to a sale price of ~\$ 15,000 to ~\$ 25,000 per kg (if utilized in oil products)"
 – Cannacord Genuity²

Legend:

- Low Price (\$ 5,000 / kg)
- Medium Price (\$ 8,000 / kg)
- High Price (\$ 10,000 / kg)

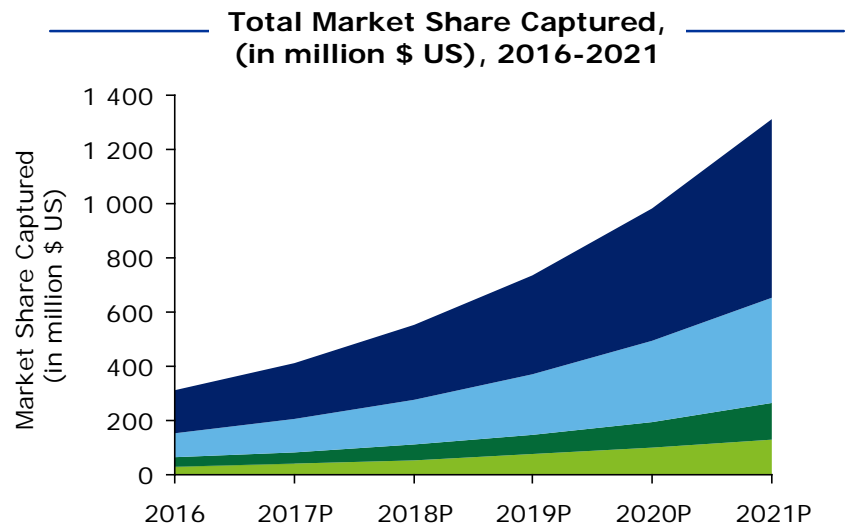
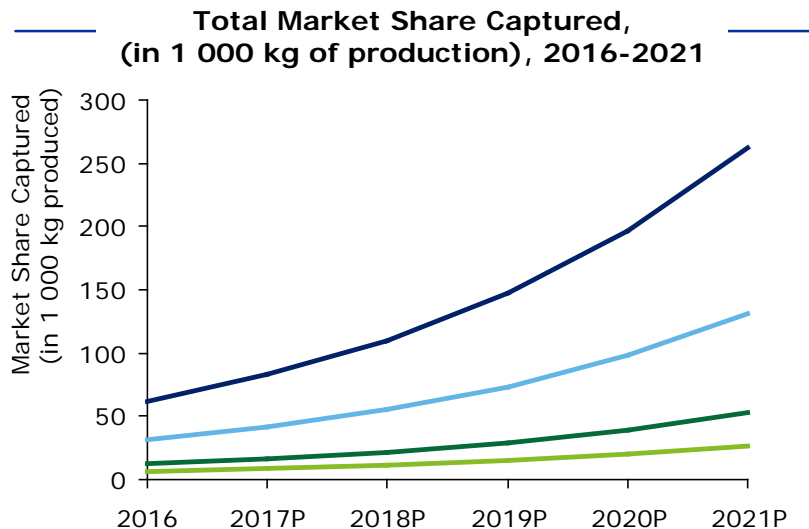
Notes : a. Deloitte Analysis

Sources : 1. *Medical & Recreational Marijuana Growing in the US*, IBIS World, Sept. 2016 ; 2. *Canadian Cannabis Industry*, Cannacord Genuity, Nov. 2016 ; 3. *The Cannabis Compendium*, Cowen and Co., Sept. 2016

© Deloitte LLP and affiliated entities.

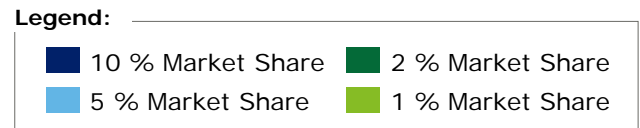
Scenario Analysis for Medical Cannabis in Costa Rica

We have looked at four different scenarios, where Costa Rica hypothetically captures 1, 2, 5 and 10 % of the total global market



Based on our calculations, if Costa Rica controlled a **1%** market share in 2016, it would result in a yearly production of **6,187 kg** of dried cannabis and an estimated **\$ 30.9 M** in revenues, in 2021 the same **1%** market share would be equal to **26,233 kg** of cannabis and **\$ 131.2 M** in revenues;

- **2%** market share would equal to **12,373 kg** of dried cannabis and around **\$ 61.9 M** in revenues, and **52,467 kg** and **\$ 262.3 M** in revenues in 2021 ;
- **5%** market share would mean **30,933 kg** of dried cannabis and roughly **\$ 154.7 M** in revenues, and **131,167 kg** and **\$ 655.8 M** in revenues in 2021 ;
- **10%** market share would translate to **61,865 kg** of dried cannabis and approximately **\$ 309.3 M** in revenues in 2016, and **262,333 kg** and **\$ 1311.7 M** in revenues in 2021.



Notes : a. Deloitte Analysis

Sources : 1. *Medical & Recreational Marijuana Growing in the US*, IBIS World, Sept. 2016 ;







Section 2

Analysis of Supply

Overview of Cost Drivers in Costa Rica

For each cultivation option, the stages of production are the same, but the elements constituting each stage and their proportion is likely to change

Description of Main Cost Drivers

 <p>Capital and Infrastructure</p> <ul style="list-style-type: none"> • Building construction costs • Land • Capital equipment and infrastructure for cultivation ^b 	 <p>Security Elements</p> <ul style="list-style-type: none"> • Fencing perimeter • CCTV facilities, to secure cultivation sites 	 <p>Cultivation Labor</p> <ul style="list-style-type: none"> • Planting seeds • Harvesting and trimming plants • Training • Management 	 <p>Cultivation Material</p> <ul style="list-style-type: none"> • Pest and weed control, nutrients and fertilizers • Seeds • Utilities • Insurances 	 <p>Transportation</p> <ul style="list-style-type: none"> • Transport from farm gate to manufacturing or shipping facility 	 <p>Fees and Compliance</p> <ul style="list-style-type: none"> • Fees related to cultivation and manufacturing of narcotics and medicines • Destruction of plant materials • Quality assurance testing
---	---	--	---	---	---

Breakdown of Cost Structure (All Annual Costs)

\$ / kg of Dried Cannabis	Greenhouse		Indoor	
Capital and Infrastructure (\$ / kg)	\$ 21.39	4%	\$ 88.43	12%
Security Elements (\$ / kg)	\$ 19.83	3%	\$ 17.98	2%
Cultivation Labor (\$ / kg)	\$ 200.90	35%	\$ 200.84	27%
Cultivation Material (\$ / kg)	\$ 0.21	0%	\$ 0.06	0%
Transportation (\$ / kg)	\$ 258.37	45%	\$ 365.17	49%
Fees and Compliance (\$ / kg)	\$ 71.56	13%	\$ 71.48	10%
Total Costs / kg of Dried Cannabis ^c	\$ 572.25	100%	\$ 743.97	100%

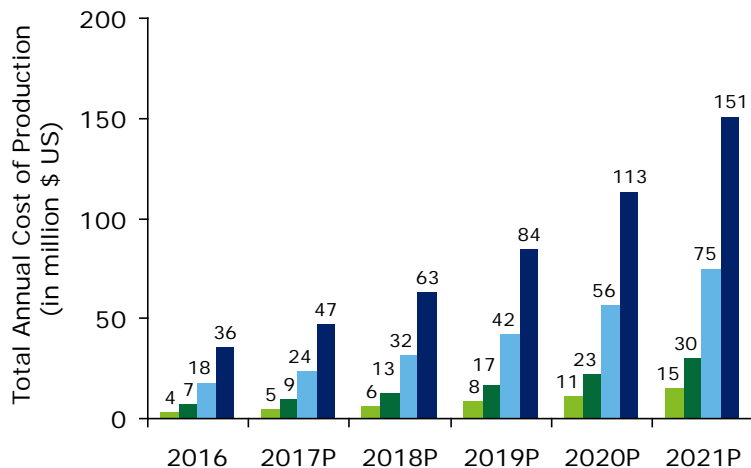
Notes : a. Deloitte Analysis ; b. Capital equipment refers to irrigation systems, lighting, drainage systems, fans, lighting and heating systems, tractors (for outdoor production) ; c. Excludes cost to transform cannabis flowers into oil, as it does not represent a mandatory step.

Sources : 1. *Modelling the cost of Medicinal Cannabis*, Deloitte Access Economics, Sept. 2016 ; 2. *Analysis Corporation report on Economies of Scale in the Production of Cannabis*, BOTEC, 2013

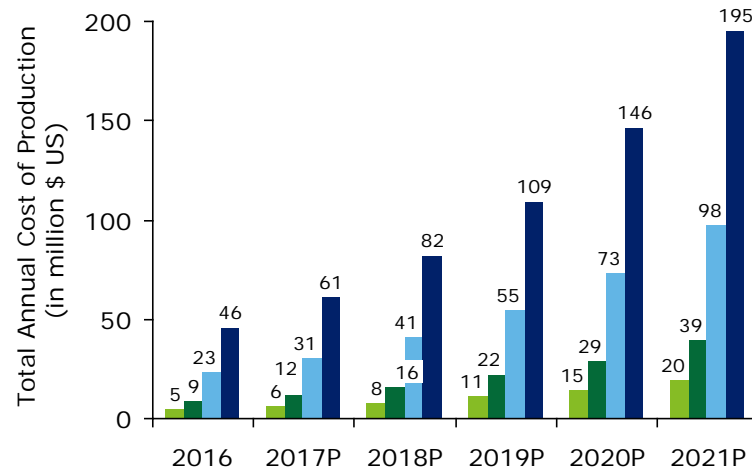
Total Annual Costs to Produce Medical Cannabis in Costa Rica

Ultimately, medical cannabis produced indoor will be 29 % more expensive than if produced in a greenhouse; however the quality of the final product might differ

Total Annual Costs for Greenhouse Production 2016-2021



Total Annual Costs for Indoor Production 2016-2021



- The difference between the two cultivation methods comes mainly from the capital cost or purchasing / building the indoor facility, the lighting equipment required as well as the overall utility bill
- Indoor cultivation might be more expensive, but other important factors that need to be considered can often offset the high costs, such as:
 - Indoor cultivation allows for consistent climate and light delivery: as the sealed and enclosed environment means outdoor climate has minimum impact on cultivation facility, allowing for maximum control over production
 - No outside air exchange required: indoor facilities can be sealed, avoiding outside introduction of pests and pathogens as well as allowing for better control of climate and humidity
 - High level of security: thick walls, solid ceiling and cameras everywhere

Notes : a. Assuming 10 years useful life for This model assumes a structure where 10 growers are controlling the supply, due to economies of scale, if the number of growers was less than 10, costs would be lower and if the number of growers was more than 10, costs would be more than what is currently presented ; b. See appendix for cost structure; c. Does not include cost to convert cannabis flowers into cannabis oil; d. Based on a 0.74 AUS\$/USD\$ FX rate, May 5th 2017;

Sources : 1. Deloitte Analysis ; 2. *Modelling the cost of Medicinal Cannabis*, Deloitte Access Economics, Sept. 2016 ; 3. *Analysis Corporation report on Economies of Scale in the Production of Cannabis*, BOTEC, 2013

Legend:

- 1 % Market Share
- 2 % Market Share
- 5 % Market Share
- 10 % Market Share

Section 3

Implication of Medical Cannabis Production

Taxation Models from the U.S.A, Applicable to Domestic Sales

Different fiscal frameworks have been observed within the U.S.A.; they all differ by having different objectives, taxation rates and accountability



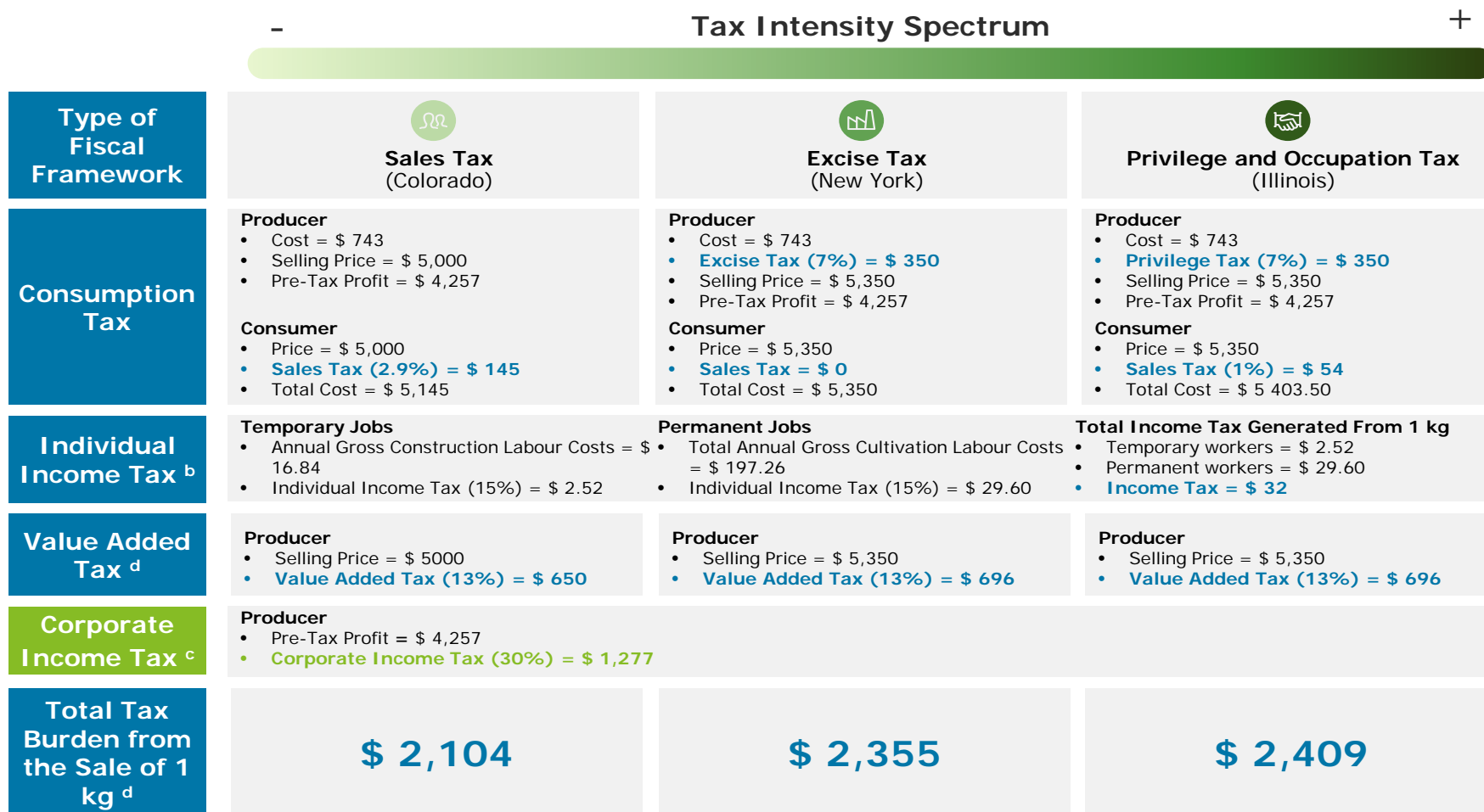
Type of Fiscal Framework	 Sales Tax	 Excise Tax	 Privilege and Occupation Tax
Legal Definition	<ul style="list-style-type: none"> • Tax imposed on the consumption of goods and services, typically levied at the point of sale 	<ul style="list-style-type: none"> • Indirect tax imposed on the producer or merchant, who passes the tax to the consumer by including it in the product's price 	<ul style="list-style-type: none"> • Tax levied in exchange for a privilege or licence granted to the taxpayer • An occupation tax is also paid by the customer, collected by the retailer and passed on to the government
Example of the Tax in Application	<ul style="list-style-type: none"> • In Colorado, medical cannabis is subject to the 2.9% state sales tax and any local sales taxes ¹ • When purchasing recreational cannabis, buyers are subject to the 10% state marijuana, 2.9% state sales tax plus any local sales taxes ¹ 	<ul style="list-style-type: none"> • New York State imposes an excise tax of 7% on the gross receipts from the sale of medical cannabis by a registered organization ² 	<ul style="list-style-type: none"> • Illinois imposes a privilege tax of 7% of sales is imposed upon the privilege of cultivating medical cannabis ^{b,3} • Medical cannabis is also subject to Retailers' Occupation Tax at the 1% rate, plus applicable local taxes ⁴

Notes : a. Costs associated with the production indoor of 1 kg of medical cannabis ; b. In Illinois, revenue generated by the privilege tax will be deposited in the Compassionate Use and Medical Cannabis Fund, to cover the cost of administering and enforcing the Act.

Sources : 1. Marijuana Taxes, Colorado Department of Revenue, 2017; 2. *Tax Requirements for New York Medical Marijuana Registered Organization*, Department of Taxation and Finance, Jan. 2016 ; 3. *Medical Cannabis Cultivation Privilege Tax Law*, Illinois Department of Revenue Regulations, 2016 ; 4. *Part 130 Retailers' Occupation Tax*, Illinois Department of Revenue Regulations, 2014 ;

Simplified View of Fiscal Implications for Domestic Market

We have simulated the potential fiscal impact associated with the domestic sale of 1 KG of dried cannabis grown indoor under three different American states^a tax models



Notes : a. For the sake of our calculations, we used the 1 % market share captured as our baseline scenario ; b. An income tax rate of 15 % was use to reflect the taxation regime applicable in Costa Rica ; c. A corporate tax rate of 30 % was use to reflect the taxation regime applicable in Costa Rica ; d. This number is a representation of taxes collected strictly from the production of cannabis, does not reflect the additional fiscal benefits created from ancillary industries.

Sources : 1. Marijuana Taxes, Colorado Department of Revenue, 2017; 2. Tax Requirements for New York Medical Marijuana Registered Organization, Department of Taxation and Finance, Jan. 2016 ; 3. Medical Cannabis Cultivation Privilege Tax Law, Illinois Department of Revenue Regulations, 2016 ; 4. Part 130 Retailers' Occupation Tax, Illinois Department of Revenue Regulations, 2014 ; 4. Costa Rica revises income tax brackets for 2016, EY, 2015

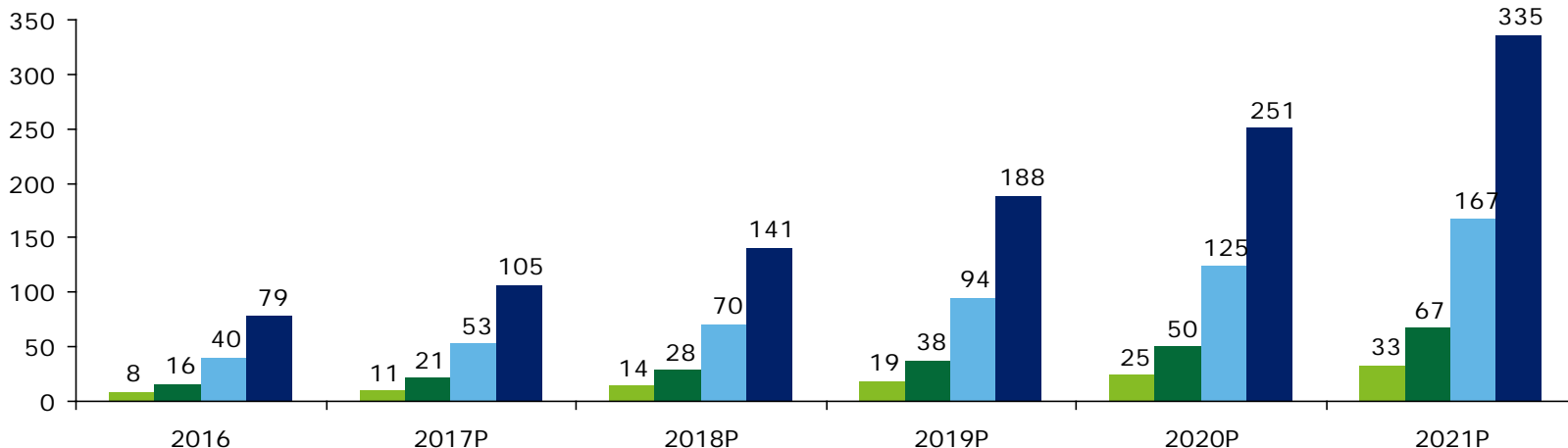
Legend:

	Tax applicable only on domestic sales
	Tax applicable on international and domestic sales

Scenario Analysis for Exports of Medical Cannabis

Looking at four different scenarios where Costa Rica hypothetically exports to 1, 2, 5 and 10 % of the total global market, we have calculated the impact of a 30% corporate income tax

**Total Fiscal Revenues from Exports,
(in million \$ US), 2016-2021**



Based on our calculations, if Costa Rica controlled a **1%** market share in 2016, it would result in a yearly production of **6,187 kg** of dried cannabis and an estimated **\$ 7.9 M** in corporate income tax, in 2021 the same **1%** market share would be equal to **26,233 kg** of cannabis and **\$ 33.5 M** in corporate income tax;

- **2%** market share would equal to **12,373 kg** of dried cannabis and around **\$ 15.8 M** in corporate income tax, and **52,467 kg** and **\$ 67.0 M** in corporate income tax in 2021 ;
- **5%** market share would mean **30,933 kg** of dried cannabis and roughly **\$ 39.5 M** in corporate income tax, and **131,167 kg** and **\$ 167.5 M** in corporate income tax in 2021 ;
- **10%** market share would translate to **61,865 kg** of dried cannabis and approximately **\$ 79.0 M** in corporate income tax in 2016, and **262,333 kg** and **\$ 335.0 M** in corporate income tax in 2021.

Notes : a. All taxation figures are a representation of taxes collected from the export of cannabis, it does not reflect the additional fiscal benefits created from ancillary industries.

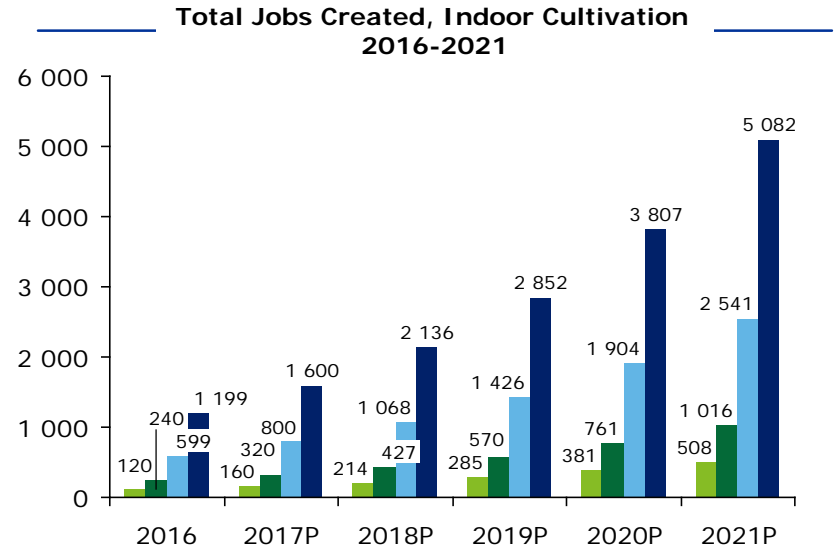
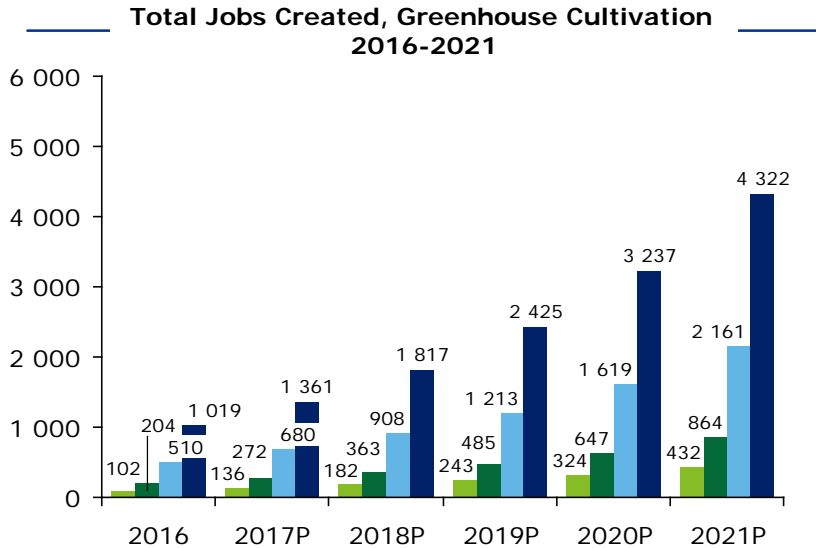
Sources : 1. Deloitte Analysis

Legend:

- 1 % Market Share
- 2 % Market Share
- 5 % Market Share
- 10 % Market Share

Job Creation Associated to the Medical Cannabis Industry

Our analysis suggests that the medical cannabis industry could create more than 4,000 permanent jobs by 2021, without even considering the impact of ancillary industries

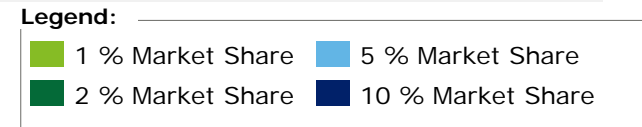


The total number of permanent jobs created directly by the production of cannabis is the nearly the same under both cultivation methods, representing **95 % of all jobs for greenhouse cultivation** and **81 % of all jobs for indoor cultivation**

- The difference between the two cultivation methods comes mainly from the temporary jobs necessary for construction work, which is much more prevalent under an indoor cultivation model
- The employment figures presented do not reflect the potential multiplier effect for both economic impact and job creation, typically associated with the ripple effect created from related industries

Based on our calculations, if Costa Rica had a **1%** market share in 2016, it would have represented **96 permanent jobs** and **408** by 2021;

- if Costa Rica had a **2%** market share in 2016, it would have represented **192** permanent jobs and **816** by 2021 ;
- if Costa Rica had a **5%** market share in 2016, it would have represented **481** permanent jobs and **2,040** by 2021 ;
- if Costa Rica had a **10%** market share in 2016, it would have represented **962** permanent jobs and **4,079** by 2021.



Notes : a. See appendix for detailed breakdown of job creation estimates

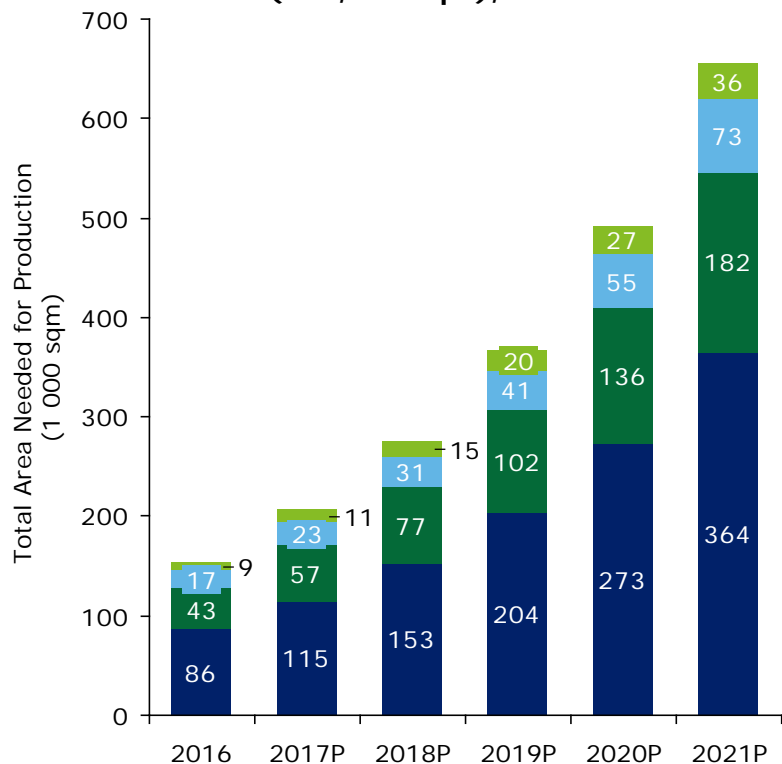
Sources : 1. Deloitte Analysis ; 2. *Modelling the cost of Medicinal Cannabis*, Deloitte Access Economics, Sept. 2016 ; 3. *Analysis Corporation report on Economies of Scale in the Production of Cannabis*, BOTEC, 2013

Appendix

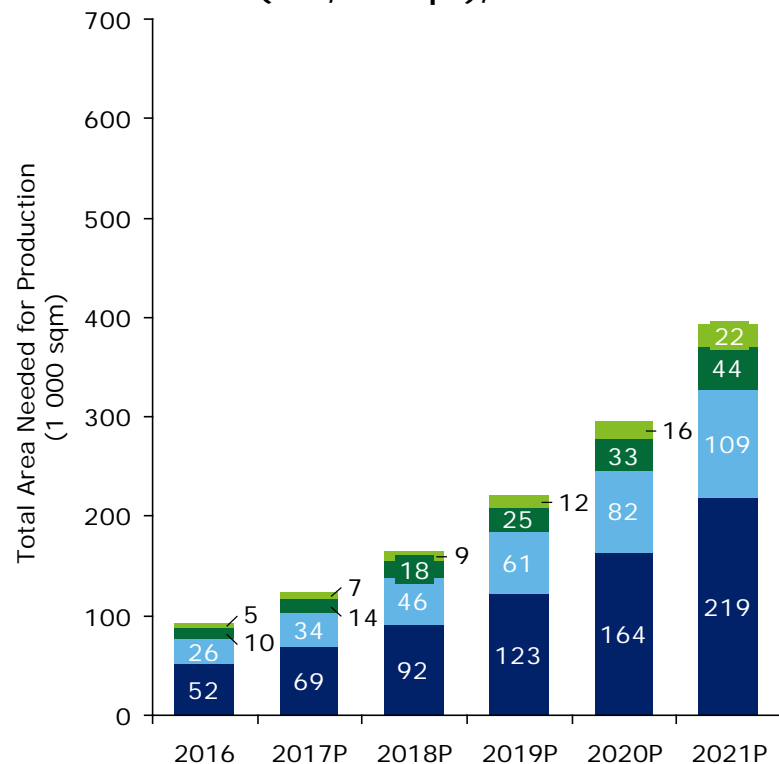
Total Area Required For Medical Cannabis Production

Greenhouse requires a significantly larger area to produce the same amount of dried cannabis, but the cost / kg difference offset these benefits, making it a cheaper alternative than growing indoor

Total Area Required for Greenhouse Production (in 1,000 sqm), 2016-2021



Total Area Required for Indoor Production (in 1,000 sqm), 2016-2021



Notes : a. See appendix for cost structure; b. Does not include cost to convert cannabis flowers into cannabis oil; c. Based on a 0.74 AUS\$/USD\$ FX rate, May 5th 2017; d. Other extraction methods exist but have not been considered in our analysis due to quality or safety issues ;

Sources : 1. Deloitte Analysis ; 2. *Modelling the cost of Medicinal Cannabis*, Deloitte Access Economics, Sept. 2016 ; 3. *Analysis Corporation report on Economies of Scale in the Production of Cannabis*, BOTEC, 2013

Legend:



Recreational Market Calculation Methodology

Giving a hypothetical scenario where all countries where medical cannabis is legal and countries where legislation of medical cannabis is under consideration would open their market to recreational cannabis in the next 5 years, the total addressable population could be as big as 147.2 million people and as small as 910.4 thousand people by 2021

Calculation of the Upper Boundary (Most optimistic scenario in 2021)

1

Use of secondary research to identify all countries where medical cannabis is permitted by law and countries where legislation of medical cannabis is being considered legally resulting in:

- 21 different countries where medical cannabis is currently legal ^a, totaling **1,008 M people**
 - 2 countries where medical marijuana is under legal consideration (i.e. Bosnia-Herzegovina and Philippines), totaling **105 M people**
 - A growth rate of 0.8 % is applied to reflect global population growth
- = Combined total population of **1.15 B** people in 2021

2

Multiply the potential combined total population by the average rate of recreational users in total population in American states where recreational cannabis is now legal:

- Combined total population of **1.15 B** people
 - Average rate of recreational users of **12.7 %** of total population ¹
- = Total addressable market of **147.2 M** potential recreational users in 2021

Calculation of the Lower Boundary (Scenario under current set of assumptions)

3

Use the current number of users in markets where recreational cannabis is legal, as of May 2017:

- Total combined population of **71.68 M** people

4

Multiply the potential combined total population by the average rate of recreational users in total population in American states where recreational cannabis is now legal:

- Combined total population of **71.68 M** people
 - Average rate of recreational users of **12.7 %** of total population ¹
- = Total addressable market of **910.4 thousand** potential recreational users

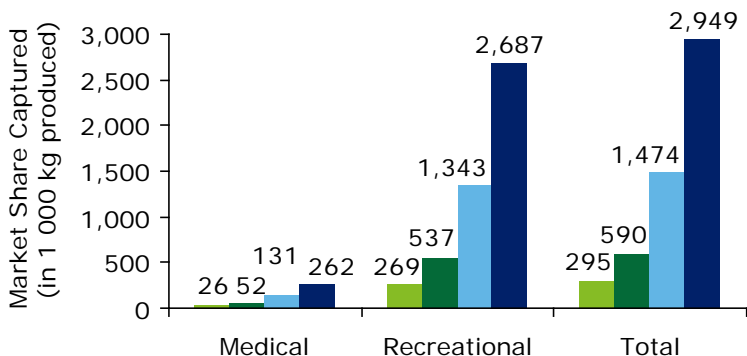
Notes : a. Considering the whole U.S. and Turkish population; b. Population in Uruguay and in the U.S. states of Alaska, Colorado, Connecticut, Maine, Massachusetts, Nevada, Oregon, Washington and Washington States.

Sources : 1. *Canadian Cannabis Industry, Cannacord Genuity, 2016*

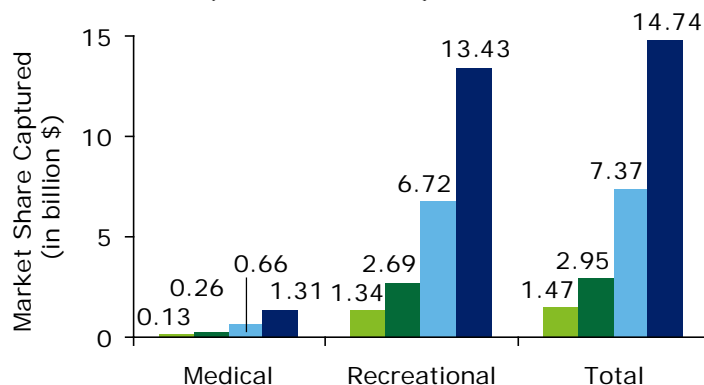
Scenario Analysis for Recreational and Medical Cannabis (1/2)

We have looked at four different scenarios, where Costa Rica hypothetically captures 1, 2, 5 and 10% of the total global demand for both the medical and recreational market ^b

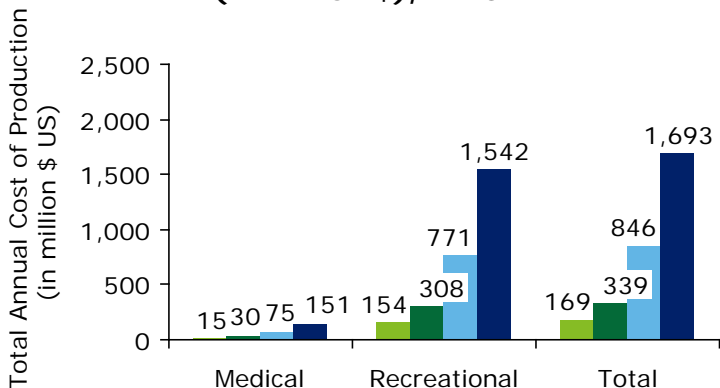
Total Market Share Captured, (in 1,000 kg of production), in 2021



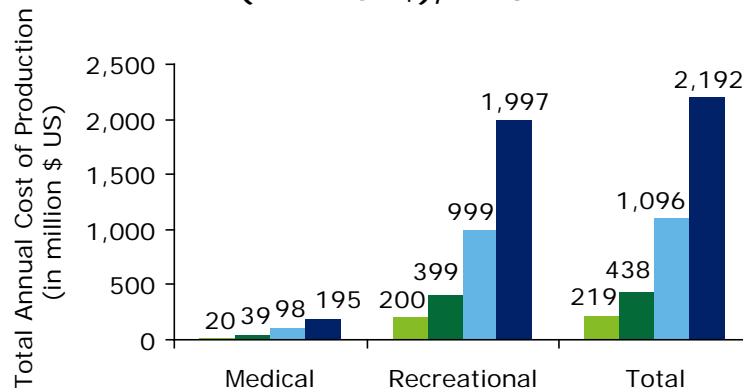
Total Market Share Captured, (in billion \$ US), in 2021



Total Annual Costs for Greenhouse Production (in million \$), in 2021



Total Annual Costs for Indoor Production (in million \$), in 2021



Legend:

- 1 % Market Share
- 5 % Market Share
- 2 % Market Share
- 10 % Market Share

Notes : a. Deloitte Analysis ; b All tables assume a consumption of 0.5 g per day and a selling price of 5 \$ per gram.
Sources : 1. Deloitte Analysis ; 2. *Modelling the cost of Medicinal Cannabis*, Deloitte Access Economics, Sept. 2016 ; 3. *Analysis Corporation report on Economies of Scale in the Production of Cannabis*, BOTEC, 2013

Scenario Analysis for Recreational and Medical Cannabis (2/2)

Total combined recreational and medical cannabis market in 2021

100 % Market Share	Medical	Recreational	Total
Market Volume (in 1000 kg / year)	2,623.3	26,866.5	29,489.9
Market Value (in B \$ / year)	13.1	134.3	147.4
Production Area Required for Greenhouse (in 1,000 sqm)	3,643.5	37,314.6	40,958.2
Production Area Required for Indoor (in 1,000 sqm)	2,186.1	22,388.8	24,574.9
Production Cost for Greenhouse (in million \$)	1,505.6	15,419.5	16,925
Production Cost for indoor (in million \$)	1,950.3	19,973.9	21,924

Notes : a. Deloitte Analysis ; b All tables assume a consumption of 0.5 g per day and a selling price of 5 \$ per gram.

Sources : 1. Deloitte Analysis ; 2. *Modelling the cost of Medicinal Cannabis*, Deloitte Access Economics, Sept. 2016 ; 3. *Analysis Corporation report on Economies of Scale in the Production of Cannabis*, BOTEC, 2013

Job Creation – Baseline Scenario

Estimation of FTE Equivalentents

Permanent (Cultivation) Jobs

	2016	2017P	2018P	2019P	2020P	2021P
1 % Market Share	96	128	171	229	306	408
2 % Market Share	192	257	343	458	611	816
5 % Market Share	481	642	857	1,144	1,528	2,040
10 % Market Share	962	1,284	1,715	2,289	3,056	4,079

Temporary Jobs (Greenhouse)

	2016	2017P	2018P	2019P	2020P	2021P
1 % Market Share	6	8	10	14	18	24
2 % Market Share	11	15	20	27	36	48
5 % Market Share	29	38	51	68	91	121
10 % Market Share	57	76	102	136	182	242

Temporary Jobs (Indoor)

	2016	2017P	2018P	2019P	2020P	2021P
1 % Market Share	24	32	42	56	75	100
2 % Market Share	47	63	84	113	150	201
5 % Market Share	118	158	211	281	376	502
10 % Market Share	237	316	422	563	751	1,003

Assumptions

Time worked per year		
Working weeks per year		47
Working hours per week		35
Working hours per year		1645
Annual Salary		
Cultivation Worker (\$ 7.30 per hour)		\$11,564.35
Administrative (\$ 9.50 per hour)		\$15,627.50
Blended Salary (weighted average)		\$12,918.73
Construction Worker (\$ 7.30 per hour)		\$11,564.35
Ratio		
Production Worker		67%
Administrative (Back Office)		33%
Construction Costs		
Share of labor costs in all construction costs		50%

Methodology

Permanent Jobs

Step 1 – Derived total cultivation costs by multiplying:

- Total production in kg x
- Cultivation labor (cost / kg produced)

= Total Cultivation Labor Costs

Step 2 – Divide total costs by weighted average annual salary

= Number of permanent jobs (production workers and administrative employees) under different market scenarios

Temporary Jobs

Step 1 – Derived total construction costs by multiplying:

- Total area required for production in sqm x
- Capital and infrastructure cost (\$ / sqm)

= Total Construction Costs

Step 2 – Derived share of total construction costs coming from labour:

- Total Construction Costs
- Share of labour costs (50%)

= Total construction labour costs

Step 3 – Divide labour total costs by annual salary of construction worker

= Number of temporary (construction) jobs under different market scenarios







Notes : a. Deloitte Analysis ; b. See appendix for detailed breakdown of cost structure

Sources : 1. *Modelling the cost of Medicinal Cannabis*, Deloitte Access Economics, Sept. 2016 ; 2. *Analysis Corporation report on Economies of Scale in the Production of Cannabis*, BOTEC, 2013

Overview of Cost Drivers – Baseline Scenario

For each cultivation option, the stages of production are the same, but the elements constituting each stage and their proportion is likely to change

Description of Main Cost Drivers

 <p>Capital and Infrastructure</p> <ul style="list-style-type: none"> • Building construction costs • Land • Capital equipment and infrastructure for cultivation ^b 	 <p>Security Elements</p> <ul style="list-style-type: none"> • Fencing perimeter • CCTV facilities, to secure cultivation sites 	 <p>Cultivation Labor</p> <ul style="list-style-type: none"> • Planting seeds • Harvesting and trimming plants • Training • Management 	 <p>Cultivation Material</p> <ul style="list-style-type: none"> • Pest and weed control, nutrients and fertilizers • Seeds • Utilities • Insurances 	 <p>Transportation</p> <ul style="list-style-type: none"> • Transport from farm gate to manufacturing or shipping facility 	 <p>Fees and Compliance</p> <ul style="list-style-type: none"> • Fees related to cultivation and manufacturing of narcotics and medicines • Destruction of plant materials • Quality assurance testing
---	---	--	---	---	---

Breakdown of Cost Structure (All Annual Costs)

\$ / kg of Dried Cannabis	Greenhouse		Indoor	
Capital and Infrastructure (\$ / kg)	\$ 21.39	1.9 %	\$ 88.43	6.3 %
Security Elements (\$ / kg)	\$ 19.83	1.7 %	\$ 17.98	1.3 %
Cultivation Labor (\$ / kg)	\$ 519.11	45.6 %	\$ 518.96	36.7 %
Cultivation Material (\$ / kg)	\$ 506.60	44.5 %	\$ 716.02	50.7 %
Transportation (\$ / kg)	\$ 0.21	0.0 %	\$ 0.06	0.0 %
Fees and Compliance (\$ / kg)	\$ 71.56	6.3 %	\$ 71.48	5.1 %
Total Costs / kg of Dried Cannabis ^c	\$ 1,138.70	100 %	\$ 1,412.94	100 %

Notes : a. Deloitte Analysis ; b. Capital equipment refers to irrigation systems, lighting, drainage systems, fans, lighting and heating systems, tractors (for outdoor production) ; c. Excludes cost to transform cannabis flowers into oil, as it does not represent a mandatory step.

Sources : 1. *Modelling the cost of Medicinal Cannabis*, Deloitte Access Economics, Sept. 2016 ; 2. *Analysis Corporation report on Economies of Scale in the Production of Cannabis*, BOTEC, 2013

High Level Costs Structure – Baseline Scenario

Breakdown of major cost drivers and other valuable data related to cannabis production

	September 2016 (All \$ USD ^c)		
	Outdoor	Greenhouse	Indoor
High Level Costs Structure (all costs are annualised) ^{a,b}			
Costs / sqm			
Capital and infrastructure (\$ / sqm)	0.15 \$	15.39 \$	106.12 \$
Security (\$ / sqm)	2.37 \$	14.28 \$	21.61 \$
Cultivation Labour (\$ / sqm)	42.99 \$	373.77 \$	622.78 \$
Transportation costs (\$ / sqm)	0.06 \$	0.15 \$	0.07 \$
Material Costs (\$ / sqm)	3.77 \$	364.82 \$	859.14 \$
Fees and Compliance (\$ / sqm)	5.99 \$	51.58 \$	85.77 \$
Total Annual Costs / sqm	55.34 \$	819.99 \$	1 695.49 \$
\$ / kg of dried cannabis			
Capital and infrastructure (\$ / kg)	1.55 \$	21.39 \$	88.43 \$
Security (\$ / kg)	28.49 \$	19.83 \$	17.98 \$
Cultivation Labour (\$ / kg)	511.49 \$	519.11 \$	518.96 \$
Transportation costs (\$ / kg)	0.69 \$	0.21 \$	0.06 \$
Material Costs (\$ / kg)	44.77 \$	506.60 \$	716.02 \$
Fees and Compliance (\$ / kg)	70.97 \$	71.56 \$	71.48 \$
Total Costs / kg of dried bud	657.96 \$	1 138.70 \$	1 412.94 \$
Annualised Extraction Costs ^d (Cost associated with converting dried bud to oil)			
Super- or sub-critical carbon dioxide extraction (\$ / kg)	34.04 \$	34.04 \$	34.04 \$
Light hydrocarbon (\$ / kg)	18.50 \$	18.50 \$	18.50 \$
Crop Yield Per Plant			
Average crop yield (g / sqm)	84	180	300
Plant per sqm	1	1	1
Crops per year	4	4	4
Total production per year (g / sqm)	336	720	1200

Notes : a. See appendix for detailed breakdown of cost structure ; b. High Level Costs Structure Associated with the Production of 11 000 kg of Dried Cannabis Flowers in Australia ; c. Based on a 0.74 AUS\$/USD\$ FX rate, May 5th 2017; d. Other extraction methods exist but have not been considered in our analysis due to quality or safety issues ;

Sources : 1. Deloitte Analysis ; 2. *Modelling the cost of Medicinal Cannabis*, Deloitte Access Economics, Sept. 2016 ; 3. *Analysis Corporation report on Economies of Scale in the Production of Cannabis*, BOTEC, 2013

Detailed Costs Structure – Baseline Scenario

Representation of a fictional production of 11 000 kg of Dried Cannabis Flowers ^b

	September 2016 (All \$ USD)		
	Outdoor	Greenhouse	Indoor
Detailed Cost structure			
Capital and infrastructure			
Construction (\$ / sqm)	\$ -	\$ 34.78	\$ 429.20
Land (\$ / sqm)	\$ 0.44	\$ 0.74	\$ 222.00
Equipment (\$ / sqm)	\$ 348.54	\$ 90.28	\$ 518.00
Land Size	13.2 hectares	1.5 hectares	0.9 hectares
Security			
Fencing (\$ / m)	\$ 260.48	\$ 260.48	\$ 260.48
CCTV (Security costs / facility or farm)	\$ 14 060.00	\$ 4 810.00	\$ 3 700.00
Labour			
Wage (\$ / hour)	\$ 18.50	\$ 18.50	\$ 18.50
Harvesting and Crop Maintenance (hour / sqm)	0.045	0.8	0.5
Training (hours / employee)	8	8	8
Management Costs (\$ / sqm)	\$ 0.07	\$ 0.07	\$ 0.07
Employee Suitability Checks (\$ / employee)	\$ 37.00	\$ 37.00	\$ 37.00
Transport			
Transportation Costs (\$ / kg)	\$ 0.64	\$ 0.16	\$ -
Distance to Manufacturer (km)	400	100	0
Materials			
Seeds / Cultivars (\$ / sqm)	5 % of all costs	1% of all costs	1% of all costs
Utilities (\$ / sqm)	\$ 0.09	\$ 261.22	\$ 714.84
Insurance (\$ / sqm)	40% of crop value	\$ 3.40	\$ 3.40
Nutrients / Pesticides (\$ / sqm)	\$ 0.14	\$ 61.42	\$ 53.28
Fees and Compliance costs			
Licenses and Permits (annual \$ / site)	\$ 74 000.00	\$ 74 000.00	\$ 74 000.00
Plant Disposal (\$ / tonnes)	\$ 588.30	\$ 588.30	\$ 588.30
Quality Sampling and Reporting (\$ / farm)	\$ 1 776.00	\$ 1 184.00	\$ 1 184.00
Secure Transport	N/A	N/A	N/A
Security Infrastructure	N/A	N/A	N/A
Quality Assurance Testing	\$ 592.00	\$ 185.00	\$ 185.00

Notes : a. Based on a 0.74 AUS\$/USD\$ FX rate ; b. Model based on a fictional production of 11 000 kg of dried cannabis in Australia

Sources : 1. Deloitte Analysis ; 2. *Modelling the cost of Medicinal Cannabis*, Deloitte Access Economics, Sept. 2016 ; 3. *Analysis Corporation report on Economies of Scale in the Production of Cannabis*, BOTEC, 2013

Images of Primary Cultivation Methods

Outdoor Farm



Indoor Farm



Greenhouse



Sources : 1. Google searches

© Deloitte LLP and affiliated entities.

Deloitte, one of Canada's leading professional services firms, provides audit, tax, consulting, and financial advisory services. Deloitte LLP, an Ontario limited liability partnership, is the Canadian member firm of Deloitte Touche Tohmatsu Limited.

Deloitte refers to one or more of Deloitte Touche Tohmatsu Limited, a UK private company limited by guarantee, and its network of member firms, each of which is a legally separate and independent entity. Please see www.deloitte.com/about for a detailed description of the legal structure of Deloitte Touche Tohmatsu Limited and its member firms.

The information contained herein is not intended to substitute for competent professional advice.

© Deloitte LLP and affiliated entities.