

## GDPO Situation Analysis

July 2018

# The Environmental Impacts of the Legalization of Cannabis in California<sup>1</sup>

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### Subject

In November 2016, Proposition 64 was passed in California allowing for the legalization of recreational cannabis use. The measure came into effect on January 1, 2018 with California joining 28 other US states that have legislated for the medical and/or recreational use of cannabis.<sup>3</sup> Cannabis legalization in California is expected to generate \$3.7 billion in sales in 2018,<sup>4</sup> but requires policy initiatives to mitigate potential negative environmental impacts. California is in a unique position to create a sustainable cannabis industry.

### Analysis

#### 1. Water

The new cannabis industry has the potential to negatively impact California's already problematic water situation. California suffered drought from 2012-2016<sup>5</sup> but experienced the 'wettest rainy season on record in

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<sup>1</sup> This Situation Analysis was produced as part of a GDPO collaboration with Central European University's School of Public Policy (see <http://gdpo.swan.ac.uk/?p=494> for more information)

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<sup>3</sup> "State Marijuana Laws in 2018 Map," March 30, 2018, <http://www.governing.com/gov-data/state-marijuana-laws-map-medical-recreational.html>.

<sup>4</sup> Jeremy Berke, "California's Cannabis Market Is Expected to Soar to \$5.1 Billion — and It's Going to Be Bigger than Beer," Business Insider, February 28, 2018, <http://www.businessinsider.com/california-legalizing-weed-on-january-1-market-size-revenue-2017-12>.

<sup>5</sup> "Drought Background," *California Drought* (blog), accessed February 28, 2018, <http://www.californiadrought.org/drought/background/>.

2017.<sup>6</sup> However, in 2017 California had its worst wildfire season.<sup>7</sup> Scientists have determined that a rainy season after years of drought is one factor contributing to California's wildfires since vegetation grows rapidly before drying out during the fall.<sup>8</sup> The concern is that after years of drought, one year of rain may be insufficient to replenish California's water supply, and that the state remains vulnerable to future droughts.

California's water supply problem is of high salience for the cannabis industry; cannabis plants require significant volumes, estimated at 22.7 l d<sup>-1</sup> per plant, around twice of wine grapes.<sup>9</sup> In October 2017, California passed a Cultivation Policy to 'ensure that the diversion of water and discharge of waste associated with cannabis cultivation does not have a negative impact on water quality, aquatic habitat, riparian habitat, wetland and spring.'<sup>10</sup> Although water supply will be regulated with meters and permits, it is questionable whether California has the water volumes required to enable a viable and sustainable 'industry' to develop.

California also has to consider the impact of the *illicit* cannabis industry on water supply. Traditionally, cannabis cultivators in the Emerald Triangle (consisting of the Humboldt, Mendocino, and Trinity County) have relied on 'unauthorized surface water diversions for irrigation.'<sup>11</sup> Although it is hoped that Proposition 64 will enable illegal growers to transition into the legal market, there are obstacles, including the cost of fulfilling the new regulations, compliance costs, and taxes.<sup>12</sup> It is also unclear how Californian authorities will enforce regulations beyond the first inspection,<sup>13</sup> opening up the possibility that growers might modify their water consumption for permit purposes, but subsequently return to less efficient water methods later.

## Energy

Cannabis cultivation may additionally have an adverse effect on carbon emissions although currently there is a lack of data to estimate cannabis energy demands. It is estimated that cannabis production currently accounts for 1% of US energy usage.<sup>14</sup> This, in turn, is estimated to cost \$6 billion while also generating 15 million tons of greenhouse gas emissions.<sup>15</sup> Data has shown that cultivators that grow indoors and use generators create 'three times more CO<sub>2</sub> of facilities powered by the grid.'<sup>16</sup> By contrast, growing outside uses less electric energy, but

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<sup>6</sup> Dana Nuccitelli, "California's Hellish Fires: A Visit from the Ghost of Christmas Future," *The Guardian*, December 11, 2017, <https://www.theguardian.com/environment/climate-consensus-97-per-cent/2017/dec/11/californias-hellish-fires-a-visit-from-the-ghost-of-christmas-future>.

<sup>7</sup> Lauren Tierney, "The Grim Scope of 2017's California Wildfire Season Is Now Clear. The Danger's Not Over .," *The Washington Post*, January 4, 2018, [https://www.washingtonpost.com/graphics/2017/national/california-wildfires-comparison/?utm\\_term=.9145f2a80158](https://www.washingtonpost.com/graphics/2017/national/california-wildfires-comparison/?utm_term=.9145f2a80158).

<sup>8</sup> Eleanor Cummins, "How the End of the Drought Likely Exacerbated the Deadly California Wildfires," *Slate*, October 10, 2017, [http://www.slate.com/articles/health\\_and\\_science/science/2017/10/how\\_the\\_drought\\_fueled\\_california\\_s\\_wildfires.html](http://www.slate.com/articles/health_and_science/science/2017/10/how_the_drought_fueled_california_s_wildfires.html).

<sup>9</sup> K. Ashworth and W. Vizuete, "High Time to Assess the Environmental Impacts of Cannabis Cultivation," *Environmental Science & Technology* 51, no. 5 (February 17, 2017): 2531–33, <https://doi.org/10.1021/acs.est.6b06343>.

<sup>10</sup> State Water Resources Control Board, "Cannabis Cultivation Policy Principles and Guidelines for Cannabis Cultivation," October 17, 2017, 5, [https://www.waterboards.ca.gov/board\\_decisions/adopted\\_orders/resolutions/2017/final\\_cannabis\\_policy\\_with\\_att\\_a.pdf](https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2017/final_cannabis_policy_with_att_a.pdf).

<sup>11</sup> Courtney Davis and Allen Matkins Leck Gamble Mallory & Natis &, "The (Green) Land Rush Is On! But Is There Enough Water?," *The Registry* (blog), January 5, 2018, <http://news.theregistrysf.com/green-land-rush-enough-water/>.

<sup>12</sup> Henry McCann, "New Water Rules for Marijuana Growers," *Public Policy Institute of California* (blog), December 5, 2017, <http://www.ppic.org/blog/new-water-rules-marijuana-growers/>.

<sup>13</sup> Alastair Bland, "How Changing Marijuana Laws May Affect California's Water and Wildlife," *Water*, March 22, 2017, <https://www.newsdeeplly.com/water/articles/2017/03/22/how-changing-marijuana-laws-may-affect-californias-water-and-wildlife>.

<sup>14</sup> K. Ashworth and W. Vizuete, "High Time to Assess the Environmental Impacts of Cannabis Cultivation," *Environmental Science & Technology* 51, no. 5 (February 17, 2017): 2531–33, <https://doi.org/10.1021/acs.est.6b06343>.

<sup>15</sup> Melanie Sevcenko, "Pot Is Power Hungry: Why the Marijuana Industry's Energy Footprint Is Growing," *The Guardian*, February 27, 2016, <http://www.theguardian.com/us-news/2016/feb/27/marijuana-industry-huge-energy-footprint>.

<sup>16</sup> K. Ashworth and W. Vizuete, "High Time to Assess the Environmental Impacts of Cannabis Cultivation," *Environmental Science & Technology* 51, no. 5 (February 17, 2017): 2531–33, <https://doi.org/10.1021/acs.est.6b06343>.

consumes more water.<sup>17</sup> By 2022, a cannabis license will be needed for production. Growers will be required to provide details of energy use and sources, with license holders prescribed to ‘meet the average electricity greenhouse-gas-emission intensity required of their local utility provider.’<sup>18</sup> To minimize the negative impacts of legalizations, it is vital that cannabis growers have access to energy efficient equipment, more particularly given a 2016 survey that revealed 45% of respondents prefer to cultivate indoors.<sup>19</sup>

## 2. Waste

California’s cannabis industry has the potential to produce significant waste. There are estimates that each cultivation site could produce around 100,000 pounds of waste, and California expects about 10,000 cultivator sites.<sup>20</sup> Examples of the waste that cannabis generates are leaves, trimmed stems, post-extracted plant material, and chemical waste.<sup>21</sup> State level regulations will bring cannabis into line with California’s waste-management laws,<sup>22</sup> and cannabis license holders must inform authorities how they are disposing of their cannabis waste.<sup>23</sup> However, there are issues around compliance and monitoring that need to be addressed to ensure whether they are effective. California can learn from Washington State’s current cannabis waste problem. Since 2014, Washington’s cannabis industry has generated 1.7 million pounds of waste and the majority is being disposed of in landfills.<sup>24</sup> Washington’s waste problem is due to the lack of information around where the compostable waste is going.<sup>25</sup> Neither Washington State Liquor and Cannabis Board - nor the Department of Ecology - have collected data on how cannabis waste is discarded.<sup>26</sup>

## Monitoring of Environmental Policies

The Bureau of Cannabis Control is the agency that grants the licensing of retailers, distributors, testing labs and microbusinesses as well as develops regulations.<sup>27</sup> California’s State Water Board has the responsibility of overseeing the cannabis policy and the General Waste Discharge Requirements and Waiver of Waste Discharge of Waste Associated with Cannabis Cultivation Activities.<sup>28</sup> Regional Water Boards can make site-specific waste

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<sup>17</sup> April Mulqueen, Rebecca Lee, and Marzia Zafer, “Energy Impacts of Cannabis Cultivation Workshop Report and Staff Recommendations,” April 20, 2017, 4, [http://www.cpuc.ca.gov/uploadedFiles/CPUC\\_Public\\_Website/Content/About\\_Us/Organization/Divisions/Policy\\_and\\_Planning/PPD\\_Work/PPD\\_Work\\_Products\\_\(2014\\_forward\)/PPD%20-%20Prop%2064%20Workshop%20Report%20FINAL.pdf](http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/About_Us/Organization/Divisions/Policy_and_Planning/PPD_Work/PPD_Work_Products_(2014_forward)/PPD%20-%20Prop%2064%20Workshop%20Report%20FINAL.pdf).

<sup>18</sup> Jim Shields, “CA’s Stringent New Pot Regs,” *Anderson Valley Advertiser* (blog), November 29, 2017, <http://theava.com/archives/76268>.

<sup>19</sup> April Mulqueen, Rebecca Lee, and Marzia Zafer, “Energy Impacts of Cannabis Cultivation Workshop Report and Staff Recommendations,” April 20, 2017, 17, [http://www.cpuc.ca.gov/uploadedFiles/CPUC\\_Public\\_Website/Content/About\\_Us/Organization/Divisions/Policy\\_and\\_Planning/PPD\\_Work/PPD\\_Work\\_Products\\_\(2014\\_forward\)/PPD%20-%20Prop%2064%20Workshop%20Report%20FINAL.pdf](http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/About_Us/Organization/Divisions/Policy_and_Planning/PPD_Work/PPD_Work_Products_(2014_forward)/PPD%20-%20Prop%2064%20Workshop%20Report%20FINAL.pdf).

<sup>20</sup> Drew Bollea, “Where Will California’s Marijuana Waste Go?,” *CBS Sacramento*, November 17, 2017, <http://sacramento.cbslocal.com/2017/11/17/where-will-californias-marijuana-waste-go/>.

<sup>21</sup> Cheryl McMullen, “California Waste Disposal Company Makes Its Mark Servicing the Cannabis Industry,” *Waste360*, October 20, 2017, <http://www.waste360.com/special-waste/california-waste-disposal-company-makes-its-mark-servicing-cannabis-industry>.

<sup>22</sup> Duane Morris, “The Impact on Growers - California’s Emergency Cannabis Regulations,” *Lexology*, November 20, 2017, <https://www.lexology.com/library/detail.aspx?g=73ac7c6c-3a82-47f7-8877-39ddd413910f>.

<sup>23</sup> “California Code of Regulations Title 16 Division 42. Bureau of Cannabis Control” (Bureau of Cannabis Control), 36, accessed March 10, 2018, [http://www.bcc.ca.gov/law\\_regs/bcc\\_notice\\_emerg.pdf](http://www.bcc.ca.gov/law_regs/bcc_notice_emerg.pdf).

<sup>24</sup> Lester Black, “Washington’s Weed Industry Has a Million-Pound Waste Problem,” *The Stranger*, July 26, 2017, <https://www.thestranger.com/weed/2017/07/26/25307388/washingtons-weed-industry-has-a-million-pound-waste-problem>.

<sup>25</sup> *Op Cit.* Black, 2017.

<sup>26</sup> *Ibid.*

<sup>27</sup> “About Us - Bureau of Cannabis Control California,” accessed March 30, 2018, [http://www.bcc.ca.gov/about\\_us/](http://www.bcc.ca.gov/about_us/).

<sup>28</sup> California State Water Resources Control Board, “Water Board Cannabis Cultivation Programs,” February 14, 2018, [https://www.waterboards.ca.gov/water\\_issues/programs/cannabis/](https://www.waterboards.ca.gov/water_issues/programs/cannabis/).

discharge requirements (WDRs).<sup>29</sup> Water Boards have implemented informal and formal enforcement policies between Water Board staff such as verbal or written communication of potential violations, a notice of a violation, a notice to comply, and order technical or monitoring reports.<sup>30</sup> It is unclear how effective these agencies and policies will be at monitoring waste, energy and water consumption.

## Conclusion

Understanding the environmental impacts of cannabis is critical as legalization initiatives move ahead and the sector assumes 'industrial' scale operational status. California has – on paper - taken a comprehensive approach to minimizing the environmental impact. However, this will only be successful if effectively 'policed' and monitored, and cannabis cultivation fully transitions into the legal economy.

Therefore, to ensure the cannabis industry becomes a sustainable industry, data must be collected on water and energy consumption as well as of waste disposal methods. The cannabis industry is in a unique position to innovate and create an efficient industry, but only if it is monitored and researched, and able to create environmental sustainable industry standards.

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<sup>29</sup> "State Water Resources Control Board Order WQ 2017-00XX-DWQ Draft General Waste Discharge Requirements for Discharges of Waste Associated with Cannabis Cultivation Activities" (California Water Boards, July 7, 2017), 2, [https://www.waterboards.ca.gov/water\\_issues/programs/cannabis/docs/cannabis\\_go.pdf](https://www.waterboards.ca.gov/water_issues/programs/cannabis/docs/cannabis_go.pdf).

<sup>30</sup>State Water Resources Control Board, "Cannabis Cultivation Policy Principles and Guidelines for Cannabis Cultivation," October 17, 2017, 23, [https://www.waterboards.ca.gov/board\\_decisions/adopted\\_orders/resolutions/2017/final\\_cannabis\\_policy\\_with\\_att\\_a.pdf](https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2017/final_cannabis_policy_with_att_a.pdf).

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