

Regulating Pot to Save the Polar Bear: Energy and Climate Impacts of the Marijuana Industry

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I. INTRODUCTION

It goes by many names: cannabis, marijuana, pot, chronic, grass, reefer, shwag, Mary Jane.¹ Whatever the name, the trend is clear: the weed is legal but the herb ain't green. Nearly half of all U.S. states have enacted—or have pending—legislation to legalize, decriminalize, or in some way permit the use and cultivation of marijuana. As a result, marijuana has become a significant topic of conversation in the U.S.—especially in the areas of social policy and criminal law. One conversation yet to reach fruition, however, is the industry's projected impacts on energy demand and the climate. As the industry grows, so will its negative externalities. Indoor cannabis cultivation is one of the most energy-intensive industries in the U.S., requiring electricity to power lamps, to maintain consistent temperature and humidity levels, and to power fans for ventilation, among other things. This energy consumption, unless otherwise mitigated, results in significant greenhouse gas emissions. This article explores the opportunities that legalization brings in addressing the negative impacts on energy usage and the climate. It concludes that simply incorporating the marijuana industry into the existing energy regulatory framework will do little to address its negative impacts. It recommends that state and local policymakers take advantage of the opportunity to consider climate risks and energy usage before issuing business licenses for indoor marijuana cultivators.

1. “*Marijuana*” *Synonyms*, THE ONLINE SLANG DICTIONARY, <http://onlineslangdictionary.com/thesaurus/words+meaning+marijuana.html> [http://perma.cc/WDC9-KNNM] (last visited Mar. 25, 2015). According to the Online Slang Dictionary, there are 115 words for marijuana: 420, bammer, BC bud, blunt, bomb, bone, boo, boo-yah, bubonic chronic, bud, buddha, burger, candle, cheeba, chiba, chief, chiefs, chino, choke, chronic, cigga-weed, cigweed, clickem, colitis, combustible herbage, cripsey, cronick, dank, dirt weed, ditch weed, doja, dolja, doob, doobie, dope, drat, draw, dro, dub, dube, Dutchie, endo, erve, fatty, fatty boom blatty, gange, ganja, ganje, giggle stick, gonj, grass, green, green bud, heim, herb, herbal refreshment, hippie lettuce, hog leg, hooter, hydro, indica, indo, j, jay, jib, joint, keef, kief, kill, kind bud, la la, left-handed cigarette, limbo, loud, Mary Jane, Mexican dirt weed, mighty mez, MJ, mota, Mr. J, nib, nugget, onion, paca lolo, pakaloco, pakalolo, pato, pot, purp, reefer, reggie, reggs, roach, schwag, shake, shwag, skater, skunk weed, smoke, spliff, spliffy, sticky icky icky, sweet, tea, Thai stick, tical, toke, treats, trees, tweed, wacky tobaccy, weed, whifty, woolies, zombie. *Id.*

Section II analyzes the trend of legalization, or at least decriminalization, of marijuana possession, distribution, sale, and use. Portugal and Uruguay have legalized (or decriminalized) marijuana. Nearly half of the states in the United States have done the same, particularly for medical use. Four states—Alaska, Colorado, Oregon, and Washington—plus the District of Columbia have legalized it for recreational use. This Section will take a close look at some of the new cultivation and use laws and discuss how the United States federal government is responding to the trend.

Section III summarizes marijuana cultivation methods and their negative impacts on the environment, energy usage, and the climate. Whether cultivated indoors or outdoors, growing marijuana creates significant negative externalities. Indoor cultivation is highly energy-intensive and results in significant greenhouse gas emissions. However, it allows for—according to some—a better, more controlled yield and product. It is also less likely to result in environmental damage and requires less on-site security personnel. Outdoor cultivation, on the other hand, does not have the energy requirement. However, without regulation it can result in significant impacts to the environment due to deforestation, overuse of pesticides and rodenticides, and extensive irrigation.

Next, Section IV of this article will explore the opportunities that legalization brings in addressing the negative impacts of indoor cultivation on energy usage and the climate, such as curbing electricity theft, utilizing utility energy efficiency programs, and connecting to the electricity grid. Clandestine marijuana producers use inefficient and carbon dioxide-spewing on-site diesel and gasoline generators to meet their electricity needs. Legalizing the marijuana cultivation can allow these producers to connect to the grid, which would decrease waste and emissions. As will be discussed in Section V, however, shifting indoor growers onto the grid will not fully address the issue. The vast majority of the electricity supplied by the United States' grid is from fossil fuel sources. The marijuana industry is already one of the most energy-intensive industries in the United States, and with legalization its energy consumption is only expected to grow. This is at a time when the International Panel on Climate Change ("IPCC") is reporting that the energy supply sector is itself the largest

consumer of energy and responsible for nearly thirty-five percent of global anthropogenic greenhouse gas emissions.² With continued industrialization across the globe, energy demand is expected to increase exponentially.³ While it may not be feasible, or even reasonable, to consider the complete removal of fossil fuels as sources of electricity, it is possible to take steps to prevent new industries—especially highly energy-intensive ones—from contributing to the mix.

State and local policymakers at the cutting edge of regulating new industries such as the massive, legalized marijuana industry have a unique opportunity to incorporate carbon-free energy requirements into their licensing schemes. Working from a clean slate, policymakers can embed climate protective provisions within their regulations. Thus far, Colorado and Washington, and various local governments within those states, have established licensing requirements for most aspects of the marijuana industry.⁴ Colorado, and in particular Boulder City and County, have taken steps to implement a 100% renewable energy requirement for indoor marijuana cultivators, and Washington is in a good position to do so as well. Implementing such a requirement will ensure that the burden will be borne by the industry instead of by the general public. Marijuana can continue to tout itself as the “green” industry that it is perceived as being, and public policymakers can help to save the polar bear.⁵

II. THE TREND TOWARDS MARIJUANA LEGALIZATION

Marijuana has long been a forbidden fruit across the world, the possession of which has been punishable by fines,

2. T. Bruckner et al., *Energy Systems*, in CLIMATE CHANGE 2014: MITIGATION OF CLIMATE CHANGE, CONTRIBUTION OF WORKING GROUP III TO THE FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 518 (O. Edenhofer et al. eds., 2014) [hereinafter “WORKING GROUP III”], available at <http://mitigation2014.org/report/publication/> [<http://perma.cc/5CTY-XDL7>] (last visited Mar. 25, 2015).

3. *Id.* at 21.

4. As will be discussed *infra*, Oregon, Alaska, and Washington D.C. have not yet established licensing requirements, as the marijuana recreational laws just passed at the November 2014 elections.

5. Ezra Rosser notes that the majority of the population will never have an occasion to see a polar bear, but polar bears are the representative for the anti-global warming movement. Ezra Rosser, *Offsetting and the Consumption of Social Responsibility*, 89 WASH. U. L. REV. 27, 70–71 (2011).

imprisonment, or even death.⁶ Yet, in recent years, several countries and a majority of U.S. states have made a move to either decriminalize⁷ the consumption and/or possession of marijuana or to legalize it for medical purposes. To understand the significance and the pervasiveness of the industry, it is important to review the emerging laws legalizing or decriminalizing use and cultivation of marijuana. This Section will discuss the global and national trends that appear to suggest that the legal marijuana industry is here to stay.⁸

A. Global Trends in Legalization

In 2001, Portugal became the first country to decriminalize all drugs, including marijuana.⁹ Individuals caught with a personal supply of marijuana (ten-day usage supply) are not criminally prosecuted.¹⁰ According to Portuguese law: “The consumption, acquisition and possession for one’s own consumption of plants, substances or preparations . . . constitute an administrative offence.”¹¹ It is important to note, however, that the *cultivation* of marijuana in Portugal, even for personal use, is still illegal and can be prosecuted. In fact,

6. *Cannabis Situation Around the World*, CANNABIS CAMPAIGNERS’ GUIDE, <http://www.ccguides.org/abroad.php> [<http://perma.cc/G948-4PK9>] (last updated Feb. 20, 2015).

7. See Alex Kreit, *The Decriminalization Option: Should States Consider Moving from a Criminal to a Civil Drug Court Model?*, 2010 U. CHI. LEGAL F. 299, 325 (2010) (defining “decriminalization” to mean that the personal act of using or possessing the drug will not elicit criminal punishment or penalty from the authorities).

8. Gary Graham Hughes, *EPIC to Participate in HSU Earthday Symposium to Examine Marijuana’s Environmental Impact*, EPIC (Apr. 15, 2013, 1:46 PM), <http://www.wildcalifornia.org/blog/epictoparticipate/> [<http://perma.cc/J822-MQ6L>] (“[A]s with the flower bulb industry, wine and grape industry, the timber industry, the dairy industry, the tourism industry, and many other iconic North Coast economic motors, [marijuana] is here to stay; to plan otherwise is to ignore four decades of adaptation by an industry whose benefits, and costs, have had an undeniable impact on rural Northwest California.”).

9. See GLENN GREENWALD, *DRUG DECRIMINALIZATION IN PORTUGAL: LESSONS FOR CREATING FAIR AND SUCCESSFUL DRUG POLICIES 1* (2009), available at http://www.cato.org/sites/cato.org/files/pubs/pdf/greenwald_whitepaper.pdf [<http://perma.cc/CDT7-M55B>] (discussing Portugal’s marijuana laws in detail).

10. *Id.* at 3–4. Instead of a criminal citation, the drug is confiscated, and the individual is required to appear before a civil drug panel. The purpose of the panel is to evaluate the individual to determine whether he/she is suffering from a drug-related addiction. If not, the individual will not receive any sanction whatsoever. If yes, however, the panel has wide discretion as to how it can help educate and rehabilitate the individual. Kreit, *supra* note 7, at 327.

11. GREENWALD, *supra* note 9, at 3.

other than in Uruguay and some U.S. states, cultivation of marijuana is illegal in the majority of the world.¹²

In 2013, Uruguay became the first country to fully legalize the use, sale, and cultivation of marijuana for its citizens.¹³ The law was sponsored by the government and approved by Uruguay's Senate by a 16–13 vote.¹⁴ It allows citizens to grow their own marijuana plants or to purchase marijuana from government-run farms. As evidenced by the 16–13 vote in the Senate, the new law has been met with significant political opposition. Recent polls suggest that over sixty percent of Uruguay's population is against legalization.¹⁵ Nevertheless, in August 2014, Uruguay's Institute for the Regulation and Control of Cannabis—created to regulate the new industry—sought proposals from marijuana farmers to cultivate in a government field. The outdoor government-run marijuana field is alleged to be located in the southwest of Uruguay, with the perimeter guarded twenty-four hours per day.¹⁶ The agency plans to select up to five winning proposals to receive five-year licenses to grow, produce, and distribute the product on the designated government-run field starting in 2015.¹⁷ For citizens over the age of eighteen who choose to grow their own plants, the country has set up a registry system and limits the

12. It appears that cultivation is legal at some level in Iran and North Korea; however, little information is publicly available. There is likely no law against cultivating marijuana in North Korea. See Hunter Stuart, *When It Comes To Marijuana, North Korea Appears To Have Liberal Policy Of Tolerance*, WORLD POST (Oct. 10, 2013, 5:58 PM), http://www.huffingtonpost.com/2013/10/08/marijuana-in-north-korea_n_4067341.html [<http://perma.cc/PJ9F-YRCX>].

13. See *El Poder Ejecutivo Promulgó Ley Que Regula Producción, Distribución y Venta de Cannabis* [*The Executive Power Promulgated a Law That Regulates Production, Distribution and Sale of Cannabis*], PRESIDENCIA REPÚBLICA ORIENTAL DE URUGUAY (Dec. 30, 2014), <http://www.presidencia.gub.uy/comunicacion/comunicacion-noticias/promulgacion-regulacion-cannabis> [<http://perma.cc/5HAD-M8DC>].

14. Malena Castaldi & Felipe Llambias, *Uruguay Becomes First Country to Legalize Marijuana Trade*, REUTERS (Dec. 10, 2013, 7:49 PM), <http://www.reuters.com/article/2013/12/11/us-uruguay-marijuana-vote-idUSBRE9BA01520131211> [<http://perma.cc/K6MM-2N62>].

15. *Uruguayans and Marijuana*, CIFRA, <http://www.cifra.com.uy/novedades.php?idNoticia=233> [<http://perma.cc/S6VK-EM93>] (last visited Mar. 15, 2015).

16. *Uruguay Calls Out to Cannabis Growers to Join Govt's Pot Project*, RT NEWS (Aug. 2, 2014, 7:27 PM), <http://rt.com/news/177532-uruguay-cannabis-grow-license/> [<http://perma.cc/Z9HB-4MXE>].

17. *Uruguay Opens Bidding for Marijuana Plots*, JAM. OBSERVER (Aug. 2, 2014, 5:54 AM), <http://www.jamaicaobserver.com/latestnews/Uruguay-opens-bidding-for-marijuana-plots> [<http://perma.cc/4LPD-LQK6>].

number of female plants¹⁸ to six and limits the annual harvest to 480 grams.¹⁹ Uruguay is the first nation in the world to attempt to regulate the cultivation and sale of marijuana on a nationwide scale.²⁰

B. United States Trends in Legalization

In the United States, the federal government considers the cultivation, distribution, use, or possession of marijuana illegal and criminally punishable.²¹ Pursuant to the Controlled Substances Act of 1970, marijuana (or Tetrahydrocannabinol) is a Schedule I drug, which is defined as a drug (1) with a high potential for abuse; (2) with no currently accepted medical use; and (3) that is not safe to use under medical supervision.²² Twenty-three states plus Washington, D.C. seemingly disagree with the federal government's definition of marijuana as a drug without medicinal benefits and have legalized or decriminalized the medical use and cultivation of marijuana within their borders.²³

18. Not all plants are capable of producing smokable marijuana. Only female plants produce the "smokable buds." Male plants are used for breeding. *Male or Female*, GROW MARIJUANA, <http://grow-marijuana.com/male-female> [<http://perma.cc/2ZZL-PVS6>] (last visited Mar. 25, 2015).

19. Leonardo Haberkorn, *Uruguayans Can Now Sign Up to Grow Pot at Home*, DENVER POST (Aug. 27, 2014, 10:33 PM), http://www.denverpost.com/marijuana/ci_26418079/uruguayans-can-now-sign-up-grow-pot-at [<http://perma.cc/XUH5-9JZC>].

20. *Id.*

21. Controlled Substances Act, 21 U.S.C. § 812(c)(17) (2012); *Marijuana*, OFFICE OF NAT'L DRUG CONTROL POLICY, WHITE HOUSE, <http://www.whitehouse.gov/ondcp/marijuana> [<http://perma.cc/XRP6-Y6KU>] (last visited Mar. 25, 2015).

22. 21 U.S.C. § 812(b)(1); *see also* *Gonzales v. Raich*, 545 U.S. 1, 14 (2004) ("By classifying marijuana as a Schedule I drug, as opposed to listing it on a lesser schedule, the manufacture, distribution, or possession of marijuana became a criminal offense, with the sole exception being use of the drug as part of a Food and Drug Administration pre-approved research study.")

23. *State Medical Marijuana Laws*, NAT'L CONF. ST. LEGISLATURES (Mar. 16, 2014), <http://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx> [<http://perma.cc/GEF8-CGTJ>]; *see also* *Oregon Legislature Ends 24 Years of Marijuana Decriminalization*, NORML (July 3, 1997), <http://norml.org/news/1997/07/03/oregon-legislature-ends-24-years-of-marijuana-decriminalization> [<http://perma.cc/AMD9-4J6R>] (explaining that Oregon was the first state to decriminalize the possession of small quantities of marijuana).

i. State Trends to Legalize

California became the first state in 1996 to allow patients to use marijuana for medical purposes.²⁴ California's Compassionate Use Act of 1996 did not legalize the drug, but did decriminalize the cultivation and use of marijuana for qualifying patients who were seriously ill.²⁵ Several years later, California set up a voluntary patient registration program,²⁶ whereby patients were given identification cards to enable law enforcement to easily identify those patients who may cultivate, possess, transport, and consume marijuana without prosecution.²⁷ Patients, or their primary caregivers, may typically cultivate up to six mature or twelve immature plants for their personal use,²⁸ but may grow more if a doctor says that they need more to adequately treat their illness.²⁹ In addition, cooperative or collective marijuana cultivation is

24. California Compassionate Use Act of 1996, CAL. HEALTH & SAFETY CODE § 11362.5 (West 2014); *see also* EDMUND G. BROWN JR., ATT'Y GEN., STATE OF CAL., GUIDELINES FOR THE SECURITY AND NON-DIVERSION OF MARIJUANA GROWN FOR MEDICAL USE 1 (2008), *available at* http://ag.ca.gov/cms_attachments/press/pdfs/n1601_medicalmarijuanaguidelines.pdf [<http://perma.cc/KJ9Q-JG63>]. Furthermore, states with comprehensive medical marijuana programs include: Alaska, Arizona, California, Colorado, Connecticut, Delaware, District of Columbia, Hawaii, Illinois, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, Oregon, Rhode Island, Vermont, and Washington. Eleven other states allow limited access to marijuana for medical purposes, but do not have comprehensive legislation (Alabama, Florida, Iowa, Kentucky, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Utah, and Wisconsin). Most of these eleven states either allow limited marijuana use for specific types of conditions, such as cancer, or for research purposes. However, marijuana is not legal to the general public for general medicinal purposes. *State Medical Marijuana Laws*, *supra* note 23; *see also Marijuana Resource Center: State Laws Related to Marijuana*, OFFICE OF NAT'L DRUG CONTROL POLICY, WHITE HOUSE, <http://www.whitehouse.gov/ondcp/state-laws-related-to-marijuana> [<http://perma.cc/D48U-3F9D>] (last visited Mar. 25, 2015).

25. HEALTH & SAFETY § 11362.5 (listing qualifying illnesses as Arthritis, Cachexia, Cancer, Chronic Pain, HIV or AIDS, Epilepsy, Migraine, Multiple Sclerosis, and other illnesses for which medical use is "deemed appropriate and has been recommended by a physician"); BROWN, *supra* note 24.

26. CAL. HEALTH & SAFETY CODE §§ 11362.7–11362.83 (West 2014) (requiring California's Department of Public Health to develop the medical marijuana registry program).

27. *Id.* §§ 11362.71(e), 11362.78.

28. *Id.* § 11362.7; *id.* § 11362.77(a) ("A qualified patient or primary caregiver may possess no more than eight ounces of dried marijuana per qualified patient. In addition, a qualified patient or primary caregiver may also maintain no more than six mature or 12 immature marijuana plants per qualified patient.").

29. *Id.* § 11362.77(b).

allowed in California.³⁰ The existence of collective dispensaries, however, is not a right; local governments can restrict, or even ban them.³¹

Medical use. Much like California's medical marijuana laws, most states require patients to first be diagnosed with some sort of a debilitating disease and to obtain a doctor's prescription for medical marijuana. The patient is then required to register and receive a license to cultivate, possess, and consume the product. Most states limit the amount of marijuana or the number of plants that a patient is allowed to possess at one time.³² Other states such as Minnesota are a bit more restrictive.³³ Minnesota law allows patients to consume marijuana in liquid, pill or vapor form using an e-cigarette;³⁴ however, the smoking or vaporizing of marijuana in plant form is prohibited.³⁵ Patients are not allowed to cultivate their own

30. *Id.* §§ 11362.765(a)–11362.768(b) (stating that cooperatives and collectives cannot make a profit and cannot be located within 600 feet of a school).

31. *Id.* § 11362.768(f); *Conejo Wellness Ctr., Inc. v. City of Agoura Hills*, 154 Cal. Rptr. 3d 850, 864–66 (Cal. Ct. App. 2013).

32. *See State Laws*, NORML, www.norml.org/laws [<http://perma.cc/8NN6-5JES>] (last visited Mar. 23, 2015). For example, Alaska law provides that if a physician believes that the medicinal use of marijuana might be beneficial to a patient with a debilitating condition, he has authority to certify such use. The patient must register with the Department of Health and Social Services, who will then issue an identification card to the patient. *See* ALASKA STAT. ANN. §§ 17.37.10–17.37.070 (West 2014) (setting the possession limit at one ounce usable, three mature plants, and three immature plants); *Rollins v. Ulmer*, 15 P.3d 749, 752 (Alaska 2001) (explaining that under Alaskan law, the patient must have a debilitating condition, including, but not limited to cancer, glaucoma, HIV, or epilepsy). *See also Medical Marijuana Pros and Cons: 23 Legal Medical Marijuana States and DC*, PRO CON, <http://medicalmarijuana.procon.org/view.resource.php?resourceID=000881> [<http://perma.cc/XQ3R-NCKN>] (last visited Mar. 23, 2015) (explaining that Connecticut law provides that a patient with a debilitating condition may possess the amount of marijuana that his physician prescribes for such condition); *accord* CONN. GEN. STAT. ANN. § 21a-253 (West 2015) (stating that a patient may possess a quantity of marijuana less than or equal to a prescription made by a physician licensed to prescribe marijuana); *id.* § 21a-408 (defining debilitating medical condition as “cancer, glaucoma, positive status for human immunodeficiency virus or acquired immune deficiency syndrome, Parkinson’s disease, multiple sclerosis, damage to the nervous tissue of the spinal cord with objective neurological indication of intractable spasticity, epilepsy, cachexia, wasting syndrome, Crohn’s disease, posttraumatic stress disorder,” or any other illness that the Department of Consumer Protection approves).

33. Kevin Riach, *High Hopes: The Future of Medical Marijuana in Minnesota*, 71 BENCH & B. MINN. 20, 21 (2014).

³⁴ MINN. STAT. ANN. § 152.22 (West 2015); Riach *supra* note 33, at 21.

35. MINN. STAT. ANN. § 152.22. *See also* Riach, *supra* note 33, at 21 (explaining that Minnesota patients must have a qualifying condition, including “cancer, glaucoma, AIDS, Tourette’s syndrome, amyotrophic lateral sclerosis (Lou Gehrig’s Disease),

marijuana, but must obtain it from a “licensed manufacturer” registered by the state’s Commissioner of Health.³⁶

Recreational use. The use of marijuana for recreational purposes generally refers to the voluntary ingestion for personal pleasure or satisfaction, unrelated to any medical condition.³⁷ Recreational use of marijuana is now legal in four states—Colorado,³⁸ Washington,³⁹ Oregon,⁴⁰ and Alaska⁴¹—and the District of Columbia.⁴²

Colorado. Twelve years after Colorado approved the use of medical marijuana⁴³ Colorado citizens voted to amend their constitution to legalize marijuana for adult recreational use.⁴⁴ It was the first state in the nation to do so.⁴⁵ Colorado law established that marijuana should be regulated in a manner

epilepsy, severe and persistent muscle spasms, [or] Crohn’s disease”); *Medical Marijuana Pros and Cons: 23 Legal Medical Marijuana States and DC*, *supra* note 32 (explaining that the possession limit for Minnesota patients is a 30-day supply of non-smokable marijuana).

36. Riach, *supra* note 33, at 21; *see also* MINN. STAT. ANN. § 152.25 (requiring the Commissioner of Health to register two in-state manufacturers for the production of all medical cannabis within the state); MINN. STAT. ANN. § 152.29 (requiring manufacturers to ensure that the medical cannabis distributed contains a maximum of a 30-day supply of the dosage determined for that patient).

37. A recreational drug is “any substance with pharmacologic effects that is taken voluntarily for personal pleasure or satisfaction rather than for medicinal purposes. The term is generally applied to alcohol, barbiturates, amphetamines, THC, PCP, cocaine, and heroin but also includes caffeine in coffee and cola beverages.” MOSBY’S MEDICAL DICTIONARY 1589 (Tamara Myers ed., 8th ed. 2009).

38. COLO. CONST. art. XVIII, § 16, amended by COLO. CONST. amend. 64, *available at* <http://www.sos.state.co.us/pubs/elections/Initiatives/titleBoard/filings/2011-2012/30Final.pdf> [<http://perma.cc/H2P2-QZU2>] (amending the Colorado constitution to “declare that the use of marijuana should be legal for persons twenty-one years of age or older and taxed in a manner similar to alcohol”); CHARLES BROWN & PHYLLIS RESNICK, COLO. FUTURES CTR., *THE FISCAL IMPACT OF AMENDMENT 64 ON STATE REVENUES 1* (updated 2014), *available at* <https://webcom.colostate.edu/coloradofutures/files/2013/04/Marijuana-Economic-Study-Update.pdf> [<https://perma.cc/946V-JCL9>] (explaining that as a result of amendment 64, it is currently legal for adults in Colorado to produce, sell, and use recreational marijuana).

39. 2013 Wash. Legis. Serv. Ch. 3 (I.M. 502) (West), *available at* <http://sos.wa.gov/assets/elections/initiatives/i502.pdf> [<http://perma.cc/89YA-QVGP>].

40. 2015 Or. Legis. Serv. Ch. 1 (B.M. 91) (West).

41. ALASKA STAT. ANN. § 17.38.010 (West 2015).

42. D.C. CODE § 48-904.01 (2015).

43. *See* COLO. CONST. art. XVIII, § 14 (the “Medical Marijuana Amendment”).

44. *See* COLO. CONST. art. XVIII, § 16.

45. Michael Martinez, *10 Things to Know About Nation’s First Recreational Marijuana Shops in Colorado*, CNN (Jan. 1, 2014, 7:40 PM), <http://www.cnn.com/2013/12/28/us/10-things-colorado-recreational-marijuana/> [<http://perma.cc/D86J-6HED>].

similar to alcohol.⁴⁶ Individuals over twenty-one years of age are authorized, without the fear of criminal prosecution, to possess and consume one ounce or less of marijuana.⁴⁷ Consumption cannot take place in public or in a manner that endangers others.⁴⁸ Individuals possessing more than an ounce of marijuana are required to show proof of a debilitating medical condition or physician's prescription.⁴⁹ Cultivation for personal use is limited to six marijuana plants (with three or fewer being mature), and the plants must be grown indoors.⁵⁰ Cultivation and harvesting of marijuana for commercial use is legal⁵¹ with proper licensing through the state's Department of Revenue.⁵² The state licensing scheme will be discussed in detail in Section V.

46. COLO. CONST. art. XVIII, § 16.

47. Steven Collis, *Rocky Mountain High? Take It Easy, Man*, 21 No. 12 COLO. EMP. L. LETTER 1, 1 (2012).

48. *Id.*

49. *Id.* See COLO. CONST. art. XVIII, § 14.

50. COLO. CONST. art. XVIII, § 16, cl. 3(b). Such activity is lawful for adults in Colorado:

Possessing, growing, processing, or transporting no more than six marijuana plants, with three or fewer being mature, flowering plants, and possession of the marijuana produced by the plants on the premises where the plants were grown, provided that the growing takes place in an enclosed, locked space, is not conducted openly or publicly, and is not made available for sale.

Id.

51. COLO. CONST. art. XVIII, § 16, cl. 4(c). Such activity is lawful for marijuana-related facilities in Colorado:

Cultivating, harvesting, processing, packaging, transporting, displaying, or possessing marijuana; delivery or transfer of marijuana to a marijuana testing facility; selling marijuana to a marijuana cultivation facility, a marijuana product manufacturing facility, or a retail marijuana stores; or the purchase of marijuana from a marijuana cultivation facility, if the person conducting the activities described in this paragraph has obtained a current, valid license to operate a marijuana cultivation facility or is acting in his or her capacity as an owner, employee, or agent of a licensed marijuana cultivation facility.

Id. A "marijuana cultivation facility" is defined under the Amendment as "an entity licensed to cultivate, prepare, and package marijuana and sell marijuana to retail marijuana stores, to marijuana product manufacturing facilities, and to other marijuana cultivation facilities, but not to consumers." COLO. CONST. Art. XVIII, § 16, cl. 2(h).

52. See *Business License Applicant Criteria—Retail Marijuana*, COLO. DEPT OF REVENUE, <https://www.colorado.gov/pacific/enforcement/business-license-applicants-retail-marijuana-2> [<https://perma.cc/5ACC-GAXD>] (last visited Mar. 24, 2015)

Washington. Similarly, in 2012 Washington state passed Initiative 502, which allows individuals who are twenty-one years of age and older to privately cultivate, possess, and consume a set amount of marijuana.⁵³ The stated intent of legalization is (1) to free up law enforcement resources to focus on violent and property crimes instead of marijuana-related crimes; (2) to generate state and local marijuana tax revenue that can be used for “education, health care, research, and substance abuse prevention”; and (3) to place marijuana into a highly regulated and state-licensed system and take it out of the hands of illegal drug organizations.⁵⁴ The Initiative was incorporated into Washington’s Uniform Controlled Substances Act.⁵⁵ As will be discussed in detail in Section V., the Act sets forth a scheme for the regulation and licensing of commercial marijuana producers, processors, and retailers.⁵⁶ As of the writing of this article, Washington had received approximately 2,800 applications for a producers’ license.⁵⁷

Oregon, Alaska, and Washington D.C. The November 2014 elections resulted in the approval of three additional measures to legalize recreational marijuana in Oregon, Alaska, and Washington D.C. Oregon’s Measure 91 legalizes the

(describing the requirements for retail marijuana business licenses, including a retail marijuana cultivation license). The state also imposes “a 15% excise tax on the average market price of retail marijuana. The excise tax is imposed on the first sale or transfer from a retail marijuana cultivation facility to a retail marijuana store, retail marijuana product manufacturing facility or to another retail marijuana cultivation facility.” COLO. DEP’T OF REVENUE, EXCISE 23: EXCISE TAX ON RETAIL MARIJUANA 1 (Apr. 2014), *available at* <http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheader=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1251973010629&ssbinary=true> [<http://perma.cc/J2GU-CFRB>].

53. Individuals may possess “up to one-ounce of cannabis (and/or up to 16 ounces of marijuana-infused product in solid form, and 72 ounces of marijuana-infused product in liquid form) for their own personal use in private.” *Washington Legalization*, NORML, <http://norml.org/legal/item/washington-legalization> [<http://perma.cc/LJF2-BNYK>] (last visited Mar. 24, 2015).

54. 2013 Wash. Legis. Serv. Ch. 3 (I.M. 502) (West), *available at* <http://sos.wa.gov/assets/elections/initiatives/i502.pdf> [<http://perma.cc/89YA-QVGP>].

55. See Uniform Controlled Substances Act, WASH. REV. CODE ANN. §§ 69.50.101–609 (West 2015).

56. *Id.* § 69.50.325 (authorizing the state liquor control board to regulate the marijuana producer’s license); *id.* § 69.50.328; *id.* § 69.50.331; *id.* § 69.50.345 (requiring the state liquor control board to adopt rules by December 1, 2013 for the licensing of marijuana producers, processors, and retailers).

57. Jason Toon, *Legal Weed in Washington State Has Been Completely Screwed Up*, VICE NEWS (Mar. 10, 2014, 12:15 PM), <https://news.vice.com/article/legal-weed-in-washington-state-has-been-completely-screwed-up> [<https://perma.cc/W55K-EUCT>].

possession, use, and cultivation of marijuana for adults twenty-one and over.⁵⁸ Adults are allowed to possess up to one ounce in public and eight ounces in private.⁵⁹ They may grow four plants for household use.⁶⁰ The Oregon Liquor Control Commission is the agency charged with regulating Oregon's marijuana business.⁶¹ Qualifying producers will be required to go through a state licensing process and pay licensing fees to cultivate marijuana commercially.⁶² Oregon has not yet established the licensing parameters. Alaskan citizens also voted to approve Ballot Measure 2, which legalized marijuana for adult recreational use.⁶³ Under the new law, adults may personally possess one ounce of marijuana and up to six plants.⁶⁴ Those seeking to cultivate marijuana for commercial purposes will be required to register with the Alcoholic Beverage Control Board and pay the appropriate registration and licensing fees.⁶⁵ Finally, District of Columbia voters

58. 2015 Or. Legis. Serv. Ch. 1 (B.M. 91) (West).

59. *Id.* § 79.

60. *Id.* § 6.

61. *Id.* § 7.

62. According to § 28(4) and (5) of the Act:

(4) The commission shall assess a nonrefundable fee for processing a new or renewal application for any license authorized by sections 3 to 70 of this Act. The application processing fee shall be \$250.

(5) The annual license fee for any license granted under sections 3 to 70 of this Act shall be \$1,000. The license fee is nonrefundable and shall be paid by each applicant upon the granting or committing of a license.

Id. § 28.

63. See ALASKA STAT. ANN. § 17.38.010 (West 2015) ("In the interest of allowing law enforcement to focus on violent and property crimes, and to enhance individual freedom, the people of the state of Alaska find and declare that the use of marijuana should be legal for persons 21 years of age or older.").

64. *Id.* § 17.38.020.

65. See *id.* § 17.38.090. The Board has nine months from the effective date of the act to adopt regulations to implement the act and to establish parameters and fee schedules:

(a) Not later than nine months after [the effective date of this act], the board shall adopt regulations necessary for implementation of this chapter. Such regulations shall not prohibit the operation of marijuana establishments, either expressly or through regulations that make their operation unreasonably impracticable. Such regulations shall include:

...

(2) A schedule of application, registration and renewal fees, provided, application fees shall not exceed \$5,000, with this upper limit adjusted annually for inflation,

passed Initiative 71—the Legalization of Possession of Minimal Amounts of Marijuana for Personal Use Act of 2014—by a whopping seventy percent vote.⁶⁶ Adults may possess up to two ounces of marijuana for personal use and six cannabis plants, with only three or fewer being mature.⁶⁷ Of note, the Act requires that the plants be harvested indoors and within a “person’s principal residence.”⁶⁸ The Act does not provide for commercial harvesting; nor does it discuss any type of licensing scheme for possession or cultivation.

ii. The Federal Response to State Trends to Legalize

With nearly half of the U.S. states implementing laws that decriminalize or legalize certain marijuana-related conduct, the federal government has been challenged with how (or whether) to enforce the Controlled Substances Act. Recent events seem to indicate, however, that the federal government is becoming less interested in intrastate marijuana issues. First, the federal government does not prioritize enforcement where the state has an established set of regulations; second, Congress has removed funding for enforcement against those abiding by state medical marijuana laws.

Setting Priorities. On August 29, 2013, James Cole, the Deputy Attorney General of the United States, issued a memorandum to federal prosecutors with guidance on

unless the board determines a greater fee is necessary to carry out its responsibilities under this chapter[.]

Id.

66. *Ballot Initiative 71 Became Law at 12:01am, Thursday, February 26, 2015*, DCMJ, <http://dcmj.org/ballot-initiative/> [<http://perma.cc/AKX2-AWG9>] (last visited Mar. 12, 2015).

67. *Id.*

68. *Id.* Section 2 amends Section 401(a)(1)(C) of the District of Columbia Uniform Controlled Substances Act to state that adults may legally:

Possess, grow, harvest or process, within the interior of a house or rental unit that constitutes such person’s principal residence, no more than six cannabis plants, with three or fewer being mature, flowering plants, provided that all persons residing within a single house or single rental unit may not possess, grow, harvest or process, in the aggregate, more than twelve cannabis plants, with six or fewer being mature, flowering plants[.]

Id.

enforcement of federal marijuana laws.⁶⁹ While the U.S. Department of Justice (“DOJ”) maintains that “marijuana is a dangerous drug and that the illegal distribution and sale of marijuana is a serious crime,” the DOJ has acknowledged its limited resources to investigate and prosecute all marijuana crimes.⁷⁰ Given its limited resources, the DOJ has prioritized enforcement into eight categories:

- Preventing the distribution of marijuana to minors;
- Preventing revenue from the sale of marijuana from going to criminal enterprises, gangs, and cartels;
- Preventing the diversion of marijuana from states where it is legal under state law in some form to other states;
- Preventing state-authorized marijuana activity from being used as a cover or pretext for the trafficking of other illegal drugs or other illegal activity;
- Preventing violence and the use of firearms in the cultivation and distribution of marijuana;
- Preventing drugged driving and the exacerbation of other adverse public health consequences associated with marijuana use;
- Preventing the growing of marijuana on public lands and the attendant public safety and environmental dangers posed by marijuana production on public lands; and
- Preventing marijuana possession or use on federal property.⁷¹

If the state marijuana-related conduct falls outside of these priorities, the DOJ has stated that it will rely upon state and local law enforcement to impose their own laws.⁷²

69. Memorandum from James M. Cole, Deputy Att’y Gen., to all U.S. Attorneys (Aug. 29, 2013), *available at* <http://www.justice.gov/iso/opa/resources/3052013829132756857467.pdf> [<http://perma.cc/7AAZ-4WWT>] (providing guidance for marijuana enforcement).

70. *Id.* at 1.

71. *Id.* at 1–2.

72. *Id.* at 2–3 (“In jurisdictions that have enacted laws legalizing marijuana in some form and that have also implemented strong and effective regulatory and enforcement systems to control the cultivation, distribution, sale, and possession of marijuana, conduct in compliance with those laws and regulations is less likely to threaten the federal priorities set forth above.”).

Furthermore, the DOJ has indicated that the more highly regulated the industry becomes, the less likely it will be threatened by federal law enforcement.⁷³

Interestingly, two of the eight federal priorities address cultivation. First, the federal government is concerned about violent activities and the use of firearms during cultivation.⁷⁴ Second, the federal government seeks to prevent the environmental damage caused by marijuana production on public lands.⁷⁵ These priorities could have the effect of encouraging states and local governments to require cannabis to be grown indoors instead of outdoors. As will be discussed in more detail, indoor cultivation provides more security and less of a need for armed guards and is less environmentally damaging—though without restrictions it is certainly not less damaging for the climate than outdoor cultivation.

Withdrawal of Funding. On December 11, 2014, Congress passed its omnibus \$1 trillion spending bill.⁷⁶ The bill prohibited the DOJ from using any of the funds to prevent states that had passed medical marijuana laws from “implementing their own State laws that authorize the use, distribution, possession, or cultivation of medical marijuana.”⁷⁷ Many are touting this step as a big win for medical marijuana growers,⁷⁸ and while it does appear to effectively prevent the

73. *Id.* at 3.

74. *Id.*

75. *Id.*

76. Ashley Parker & Robert Pear, *House Narrowly Passes Bill to Avoid Shutdown; \$1.1 Trillion in Spending*, N.Y. TIMES, Dec. 12, 2014, at A1.

77. Consolidated and Further Continuing Appropriations Act, 2015, Public Law No. 113-235 § 538, 128 Stat. 2130, 2217 (2014). Section 538 of the bill states as follows:

None of the funds made available in this Act to the Department of Justice may be used, with respect to the States of Alabama, Alaska, Arizona, California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Hawaii, Illinois, Iowa, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nevada, New Hampshire, New Jersey, New Mexico, Oregon, Rhode Island, South Carolina, Tennessee, Utah, Vermont, Washington, and Wisconsin, to prevent such States from implementing their own State laws that authorize the use, distribution, possession, or cultivation of medical marijuana.

Id.

78. Matt Ferner, *Congress Blocks Feds from Targeting Medical Marijuana, Hemp Cultivation*, HUFFINGTON POST (Dec. 10, 2014, 2:36 PM), http://www.huffingtonpost.com/2014/12/10/congress-blocks-feds-from_n_6302530.html [<http://perma.cc/7YMP-KVCM>]; Evan Halper, *Congress Quietly Ends Federal*

DOJ from acting against legal medical marijuana growers, users, and sellers within the listed states, it does not contain the same type of protection for recreational marijuana. Furthermore, it may be detrimental to Washington D.C.'s marijuana laws, because no funds may be used to "enact or carry out any law, rule, or regulation to legalize or otherwise reduce penalties" for a Schedule I substance such as marijuana.⁷⁹ The language is broadly written and precludes funds from being used to enact medical marijuana laws as well as recreational marijuana laws. As a result, the spending bill appears to protect states that have established medical marijuana laws, but may block Washington D.C. from implementing its own.

III. THE CULTIVATION OF MARIJUANA AND ITS NEGATIVE IMPACTS ON ENERGY USAGE, THE ENVIRONMENT, AND THE CLIMATE

Whether cultivated indoors or outdoors, it seems undeniable that the marijuana industry has quantifiable negative impacts on the environment and the climate.⁸⁰ While the focus of this article is on the energy-intensive and climate-damaging nature of indoor marijuana cultivation, one cannot escape the potential major environmental impacts of outdoor growth. Indoor cultivation allows for more security and control over the process—and some claim also creates a better product—but it requires a significant amount of energy. And, depending on the

Government's Ban on Medical Marijuana, L.A. TIMES (Dec. 16, 2014, 4:00 AM), <http://www.latimes.com/nation/la-na-medical-pot-20141216-story.html> [<http://perma.cc/6ZW6-A7QJ>].

79. Public Law No. 113-235 § 809, 128 Stat. at 2394. Section 809 of the spending bill states that

(a) None of the Federal funds contained in this Act may be used to enact or carry out any law, rule, or regulation to legalize or otherwise reduce penalties associated with the possession, use, or distribution of any schedule I substance under the Controlled Substances Act ["CSA"] or any tetrahydrocannabinols derivative.

(b) None of the funds contained in this Act may be used to enact any law, rule, or regulation to legalize or otherwise reduce penalties associated with the possession, use, or distribution of any schedule I substance under the [CSA] or any tetrahydrocannabinols derivative for recreational purposes.

Id.

80. Hughes, *supra* note 8.

power source, it can generate large amounts of carbon dioxide (CO₂) emissions, which negatively impact the climate. Outdoor cultivation of cannabis does not require the amount of energy as indoor cultivation; however, it can significantly impact the environment by requiring the clearing of large plots of land, pesticide and rodenticide use, and irrigation, among other things. This section will attempt to explain these cultivation methods, looking at some of the most significant externalities of each.⁸¹

A. Indoor Marijuana Cultivation and Its Externalities

The most popular location for the cultivation of marijuana in the United States has historically been indoors. This is due to many factors, not the least of which being that up until recently, growing cannabis was illegal across the United States and indoor cultivation allowed for more clandestine operations.⁸² Besides that factor, however, indoor cultivation has other advantages over outdoor cultivation. It allows for better security of the premises, more control of the product, and higher yields.⁸³ Unlike outdoor cultivation, which generally only allows for one harvest per year, indoor cultivation can provide multiple harvests per year.⁸⁴ In fact, certain medicinal varieties of cannabis have been bred specifically for indoor

81. While this article mainly discusses cultivation of marijuana indoors and outdoors, marijuana can also be cultivated in greenhouses like other flowering crops. It requires less energy than cultivating indoors, as natural sunlight can be utilized for some lighting and plant photosynthesis; however, depending on the climate, electricity is still required for some lighting and for ventilation fans and to maintain appropriate temperature and humidity levels during winter months. See MICHAEL O'HARE, DANIEL L. SANCHEZ & PETER ALSTONE, ENVIRONMENTAL RISKS AND OPPORTUNITIES IN CANNABIS CULTIVATION 7 (2013), available at http://lcb.wa.gov/publications/Marijuana/SEPA/BOTEC_Whitepaper_Final.pdf [<http://perma.cc/WB3J-MFZ5>]; see also Seth Zuckerman, *Is Pot-Growing Bad for the Environment?*, NATION (Oct. 31, 2013), <http://www.thenation.com/article/176955/pot-growing-bad-environment?page=full> [<http://perma.cc/W6QP-3FWL>].

82. *Cannabis Eradication*, DEA, <http://www.justice.gov/dea/ops/cannabis.shtml> [<http://perma.cc/RBV7-AVVQ>] (last visited Mar. 12, 2015) (“[C]ultivators have turned to sophisticated technology to cultivate cannabis plants indoors. The use of hydroponics (growing plants in a nutrient laden solution rather than conventional soil) and other technological advances have enabled cultivators to increase the potency of Tetrahydrocannabinol (THC), the psychoactive ingredient in cannabis plants.”).

83. Evan Mills, *The Carbon Footprint of Indoor Cannabis Production*, 46 ENERGY POLY 58, 58–67 (2012), available at <http://evanmills.lbl.gov/pubs/pdf/cannabis-carbon-footprint.pdf> [<http://perma.cc/9TNC-VMBQ>].

84. O'HARE ET AL., *supra* note 81, at 6.

production.⁸⁵ The plants are small, have short growth cycles, and large flowers that contain high levels of Tetrahydrocannabinol—the main psychoactive chemical in marijuana.⁸⁶ Indoor cultivation “divorces the process from the constraints of seasonal growing and typical harvest cycles.”⁸⁷ These private benefits, however, are easily overshadowed by the negative public global impacts to the climate from fossil fuel-generated electricity.⁸⁸

Energy. Indoor marijuana cultivation is highly energy-intensive. Overall, energy costs account for about one-third of the cost of production.⁸⁹ With \$6 billion in energy costs annually,⁹⁰ marijuana cultivation is one of the most energy-intensive of the major industries in the United States.⁹¹ It consumes six-times as much energy as the pharmaceuticals industry and requires eight-times as much energy per square foot as the average U.S. commercial building.⁹² It is estimated that marijuana currently consumes at least one percent of all of the nation’s electricity.⁹³ And in California, which reportedly has the largest marijuana growing industry in the United States, consumption totals three percent of California’s total electricity consumption.⁹⁴ The energy consumption is expected to grow exponentially as marijuana becomes legalized throughout the country.⁹⁵

85. Jessica M. Arnold, Energy Consumption and Environmental Impacts Associated with *Cannabis* Cultivation 14 (May 2013) (unpublished Master of Science in Environmental Systems thesis, Humboldt State University), available at http://www.academia.edu/8966563/Energy_Consumption_and_Environmental_Impacts_Associated_with_Cannabis_Cultivation.

86. *Id.*

87. O’HARE ET AL., *supra* note 81, at 6.

88. According to Michael O’Hare, “the predominant environmental concern in marijuana production is energy use for indoor production . . . and in particular the climate effects of this energy use.” O’HARE ET AL., *supra* note 81, at 3–4. BOTEC’s main recommendation to alleviate these energy and climate impacts is to move cultivation to greenhouses and outdoors. *Id.* at 4.

89. *Id.* at 3, 7.

90. Mills, *supra* note 83, at 59.

91. *Id.*

92. *Id.* at 62.

93. *Id.*

94. *Id.*

95. For example, it is estimated that Washington State’s total energy consumption could increase by approximately 0.8% due to indoor cultivation. See O’HARE ET AL., *supra* note 81, at 6. When California legalized marijuana for medical purposes,

High-intensity lighting is the main devourer of electricity for indoor production facilities. According to one report, indoor marijuana lamps have an intensity equivalent to hospital operating room lamps, which are approximately 500 times greater than a standard reading light.⁹⁶ Indoor cultivation also requires electricity for frequent air exchanges and ventilation, and for maintaining average temperatures and humidity levels day and night.⁹⁷ In addition, electricity requirements increase if growers utilize hydroponic systems (the use of mineral nutrient solutions in water instead of soil) for cultivation.⁹⁸ “A dining table-sized hydroponic unit yielding five one-pound crops per year would consume as much electricity as the average U.S. home.”⁹⁹ By some estimates, the total electricity intensity for an indoor marijuana facility is approximately 200 watts per square foot.¹⁰⁰ This is comparable to the electricity intensity of modern datacenters.¹⁰¹

Humboldt County in Northern California saw a fifty percent per capita spike in consumption. *Id.*

96. O'HARE ET AL., *supra* note 81, at 6; Mills, *supra* note 83, at 59 (“Specific energy uses include high-intensity lighting, dehumidification to remove water vapor, space heating during non-illuminated periods and drying, irrigation water pre-heating, generation of CO₂ by burning fossil fuel, and ventilation and air-conditioning to remove waste heat. Substantial energy inefficiencies arise from air cleaning, noise and odor suppression, and inefficient electric generators used to avoid conspicuous utility bills.”).

97. Average temperature requirements are 82 degrees Fahrenheit during the day and 68–70 degrees Fahrenheit at night. Evan Mills, *The Carbon Footprint of Indoor Cannabis Production* [hereinafter “Mills Presentation”], http://evan-mills.com/energy-associates/Indoor_files/Carbon-footprint.pdf [<http://perma.cc/94UD-253P>] (last visited Apr. 30, 2015); see also O'HARE ET AL., *supra* note 81, at 5.

98. Zuckerman, *supra* note 81.

99. *Id.* In addition to the electricity use, indoor growing operations also require a huge amount of water when utilizing hydroponic techniques. O'HARE ET AL., *supra* note 81, at 14. “One recent estimate suggests that a one-room hydroponic operation may require as much as 151 liters of water per day, equivalent to application of nearly 100 inches of water per year.” Eric L. Christensen, *Pot, Power, & Pollution: The Overlooked Impacts of Marijuana Legalization on Utilities and the Environment*, GTH ENERGY & NAT. RESOURCES L. BLOG (Apr. 17, 2014), (on file with the author); see also O'HARE ET AL., *supra* note 81, at 14 (“Hydroponic pollution is also a concern for indoor cultivation . . . [because] hydroponic systems produce more nutrient pollution than other growing methods.”).

100. Mills, *supra* note 83, at 59 (“Specific energy uses include high-intensity lighting, dehumidification to remove water vapor, space heating during non-illuminated periods and drying, irrigation water pre-heating, generation of CO₂ by burning fossil fuel, and ventilation and air-conditioning to remove waste heat. Substantial energy inefficiencies arise from air cleaning, noise and odor suppression,

Climate. By some estimates, indoor marijuana cultivation produces fifteen million metric tons of carbon emissions annually, which is equivalent to the amount produced by three million American cars.¹⁰² Put another way, one single kilogram of processed marijuana produces emissions equivalent to those produced from driving across the country five times in a forty-four mpg car.¹⁰³ One reason for the high emissions level is that many illegal indoor production facilities historically used diesel and gasoline generators—or stole their electricity¹⁰⁴—in order to stay under the radar of law enforcement.¹⁰⁵ As production becomes legal in more states, growers will connect to the grid and avoid most use of off-grid gasoline and diesel generators.¹⁰⁶ However, even if indoor growers take electricity from the grid, the indoor cultivation industry’s contribution to GHG emissions will be significant, because approximately sixty-seven percent of the electricity distributed by the grid is generated by burning a fossil fuel.¹⁰⁷ Depending on the source of electricity, marijuana’s energy consumption can leave quite a carbon footprint.

It has been argued that the best way to address these energy and climate issues is to move cultivation outdoors.¹⁰⁸ While this would alleviate the need for many of the energy-intensive

and inefficient electric generators used to avoid conspicuous utility bills.”); *see also* O’HARE ET AL., *supra* note 81, at 14–15.

101. Mills, *supra* note 83, at 59.

102. *Id.* In addition, indoor marijuana growers generally use “CO₂ generators, fueled by natural gas or propane,” to increase concentrations of CO₂ to four times its natural level so as to enhance growth and yield. O’HARE ET AL., *supra* note 81, at 6 (“However, given the beneficial effect of heightened CO₂ concentration on plant yield, this practice may decrease overall environmental impact per unit of product.”). This accounts for approximately two percent of the footprint of indoor cultivation. Mills, *supra* note 83, at 61.

103. Mills, *supra* note 83, at 60 (stating that one smoked joint produces two pounds of CO₂).

104. Mills Presentation, *supra* note 97.

105. O’HARE ET AL., *supra* note 81, at 7 (“Per unit greenhouse gas (GHG) emissions from these generators are often 3–4 times greater than the relatively low-carbon electricity available in the Pacific Northwest or California.”).

106. *Id.* (“We expect that legal production will avoid nearly all use of off-grid generation.”).

107. *What is U.S. Electricity Generation by Energy Source?*, U.S. ENERGY INFO. ADMIN., <http://www.eia.gov/tools/faqs/faq.cfm?id=427&t=3> [<http://perma.cc/A2NX-TC4S>] (last updated Mar. 31, 2015). However, some states such as Washington and California have more climate-friendly grids relying on generation from hydropower, other renewables, and nuclear power. *See* O’HARE ET AL., *supra* note 81, at 9.

108. O’HARE ET AL., *supra* note 81, at 3.

lamps—and therefore reduce reliance on peak electricity generated by fossil fuels and reduce greenhouse gas emissions—outdoor cultivation has many of its own negative externalities, especially environmental ones.

B. Outdoor Marijuana Cultivation and Its Externalities

Cannabis is an annual plant, meaning that its cycle of life occurs within a one-year period.¹⁰⁹ While different cannabis seeds thrive in different environments, growers generally look for outdoor locations that receive at least twelve hours or more of sunlight a day.¹¹⁰ In the United States, optimal areas for cultivation are in California and the Pacific Northwest.¹¹¹ Seeds are generally planted in the spring months and harvested in the fall, so the plants receive the increased amount of sunlight available during the summer.¹¹²

Some of the most significant environmental externalities of outdoor marijuana cultivation are the destruction of lands and wildlife habitat, the unregulated use of pesticides and rodenticides, and the illegal diversion of water.

Deforestation. Topping the list of environmental concerns is the deforestation and use of public lands¹¹³ for what are

109. *Id.* at 10.

110. It appears that the key is to have fewer than six hours of darkness during the vegetative growth. Once the plant flowers, twelve hours of sunlight followed by twelve hours of darkness is sufficient. Rambo, *Light Cycles and Flowering Cannabis*, MARIJUANA GROWERS HEADQUARTERS (Jan. 7, 2012), <http://www.marijuanagrowershq.com/light-cycles-and-flowering-cannabis/> [<http://perma.cc/8TUF-8VQ8>].

111. NAT'L DRUG INTELLIGENCE CTR., DOJ, DOMESTIC CANNABIS CULTIVATION ASSESSMENT 2007 15 (2007), available at <http://www.justice.gov/archive/ndic/pubs22/22486/22486p.pdf> [<http://perma.cc/EN5F-UBNK>]; see also *Production and Distribution*, CANNABIS, COCA, & POPPY: NATURE'S ADDICTIVE PLANTS, <http://www.dea.museum.org/ccp/cannabis/production-distribution.html> [<http://perma.cc/UQ7M-KT2U>] (last visited Apr. 30, 2015).

112. DJ Short, *Harvesting Marijuana—When To Harvest Your Marijuana Crop?*, MARIJUANA SEEDS SEARCH GARDEN, <http://www.greenmanspage.com/guides/harvest.html> [<http://perma.cc/SG4R-Q7JT>] (last visited Apr. 30, 2015); see also NAT'L DRUG INTELLIGENCE CTR., *supra* note 111, at 15 (“The primary cannabis planting, growing, and harvesting seasons for southern, central and northern California are similar and typically occur from April through October. Cannabis seeds or seedlings are planted in spring, usually in April or May, and tended through the summer; they reach plant maturity in September or October.”).

113. Warren Eth, Comment, *Up In Smoke: Wholesale Marijuana Cultivation Within the National Parks and Forests, and the Accompanying Extensive Environmental Damage*, 16 PENN ST. ENVTL. L. REV. 451, 470–477 (2008) (discussing

called “trespass operations.”¹¹⁴ Trespass operations result in the illegal clearing of land, which destroys wildlife and wildlife habitat on public lands or National Forest lands.¹¹⁵ Trespass operations have been particularly prevalent in California where many public resources such as parks, streams, and lakes have been critically damaged.¹¹⁶

Pesticides and Rodenticides. If the clearing of land is not enough to destroy the area’s wildlife, the unregulated use of pesticides and rodenticides will surely do so.¹¹⁷ Northern California has reported wildlife poisoning and rivers being polluted by overuse of pesticides.¹¹⁸ One particularly well-documented case is that of the Pacific fisher. The Pacific fisher, a West Coast endangered species candidate, is a tree-dwelling mammal similar to a weasel.¹¹⁹ Studies indicate that it is being poisoned by “rodenticides used to deter forest creatures and bugs from visiting the growing sites and grazing on the marijuana plants.”¹²⁰ In fact, between 2007 and 2011, some eighty percent of the fishers studied had been exposed to rodenticide.¹²¹

Water Diversions. Another major externality of outdoor marijuana cultivation is its water-thirsty nature. Each marijuana plant requires several gallons of water each day during the summer growing season.¹²² While this may not seem like a lot of water for individuals cultivating six plants for their own personal use, it adds up to a large amount when cultivating thousands of plants for commercial resale.¹²³ Unfortunately, many outdoor growers have historically utilized illegal river and lake diversions to irrigate their crops. These illegal diversions reduce water flows and have resulted in the

the major environmental impacts of the outdoor marijuana cultivation industry on the nation’s public lands and wildlife).

114. Christensen, *supra* note 99.

115. *Id.*

116. *Id.*

117. *Id.*

118. Felicity Barringer, *Marijuana Crops in California Threaten Forests and Wildlife*, N.Y. TIMES, June 21, 2013, at A1.

119. Erin McHenry, *Illegal Marijuana Growers Poison Pacific Fishers*, THINK, <http://www.think-mag.com/your-world/illegal-marijuana-growers-poison-pacific-fishers/> [<http://perma.cc/KS9P-LSHS>] (last visited Apr. 30, 2015).

120. *Id.*

121. *Id.*

122. Zuckerman, *supra* note 81.

123. *Id.*

“dewatering” of streams and rivers in Northern California.¹²⁴ “Such practices have serious implications for legitimate water users downstream, as well as fisheries and other water-dependent resources.”¹²⁵

In addition to the environmental externalities of outdoor cultivation, growing marijuana outside also creates negative societal externalities by requiring increased security, and potentially armed security, to guard the land.¹²⁶ Together, these factors (armed guards and environmental damage) could trigger heightened concern of federal enforcement and prosecution. Recall that two of the eight federal priorities for federal prosecutors address outdoor marijuana cultivation. First, the federal government is concerned about violent activities and the use of firearms during cultivation.¹²⁷ Second, the federal government seeks to prevent environmental

124. Christensen, *supra* note 99.

125. *Id.* There are many reports of water shortages caused by illegal marijuana cultivation. “Water has become a point of contention” in Northern California in particular during the late summer months when the marijuana plants require the most water. One resident, “Sharon,” reports that her water supply “has run dry repeatedly as a nearby family has scaled up its cannabis growing. When that happens, the handful of households who depend on that system have to wait until the creek gradually replenishes their tanks before they enjoy the convenience of running water again.” Zuckerman, *supra* note 81.

126. For example, in Colorado, marijuana plants need not be grown indoors; however, if the cultivation facility is located outdoors it must include additional security measures. See 1 COLO. CODE REGS. § 212-2.305(a)(5) (LexisNexis 2015). The following security standards apply to facilities in Colorado:

Any outdoor Retail Marijuana Cultivation Facility, or greenhouse cultivation, is a Limited Access Area and must meet all of the requirements for Security Alarm Systems described in this rule. An outdoor or greenhouse Retail Marijuana Cultivation Facility must provide sufficient security measures to demonstrate that outdoor areas are not readily accessible by unauthorized individuals. This shall include, at a minimum, perimeter fencing designed to prevent the general public from entering the Limited Access Areas. It shall be the responsibility of the Licensee to maintain physical security in a manner similar to a Retail Marijuana Cultivation Facility located in an indoor Licensed Premises so it can be fully secured and alarmed.

Id.

127. Memorandum from James M. Cole, Deputy Att’y Gen., to all U.S. Attorneys, *supra* note 69, at 2–3 (“In jurisdictions that have enacted laws legalizing marijuana in some form and that have also implemented strong and effective regulatory and enforcement systems to control the cultivation, distribution, sale, and possession of marijuana, conduct in compliance with those laws and regulations is less likely to threaten the federal priorities set forth above.”).

damage caused by growers on public lands.¹²⁸ These federal priorities appear to encourage indoor cultivation so that these externalities could be highly regulated and controlled.

IV. OPPORTUNITIES PRESENTED BY LEGALIZATION TO ADDRESS SOME NEGATIVE EXTERNALITIES

Marijuana has essentially been a black market industry in the United States since it was taxed into hideout in 1937.¹²⁹ Some seventy-five years later, the industry is the largest existing U.S. cash crop by value,¹³⁰ having flourished in the shadows without a regulatory framework.¹³¹ Indeed, some argue that the lack of effective regulation is the cause of the industry's "excessive and inefficient energy use, inappropriate application of chemical additives and fertilizers, [and] improper waste management."¹³² With state legalization, outdoor cultivators would be required to abide by existing land, pesticide and rodenticide, and water use regulations, thereby significantly reducing, if not eliminating, its negative environmental impacts.¹³³ Likewise, some of the negative energy and climate externalities of indoor cultivation will be addressed through continued state legalization. For example,

128. *Id.*

129. The Marihuana Tax Act of 1937, Pub. L. No. 75-238, 50 Stat. 551 (1937), repealed by Comprehensive Drug Abuse Prevention and Control Act of 1970, Pub. L. No. 91-513, 1101, 84 Stat. 1236, 1292. The Marihuana Tax Act of 1937 placed a heavy tax on the commercial sale of marijuana. *Id.* While the Act did not criminalize marijuana, it did include punishments of fines up to \$2,000 and imprisonment up to five years for violation of the Act. *Id.*; see also *Gonzales v. Raich*, 545 U.S. 1, 11 (2005) (discussing the history of anti-marijuana laws in the United States). Ironically, Colorado was the first state where two individuals were arrested, one for possession and the other for dealing, in violation of the Act. They received harsh sentences of eighteen months and four years, respectively. Matt Ferner, *Marijuana Prohibition Began with an Arrest in Denver, Ends Here with Long Lines and High Hopes*, HUFFINGTON POST (Jan. 23, 2014, 8:17 AM), http://www.huffingtonpost.com/2014/01/06/marijuana-prohibition-ends_n_4549403.html [<http://perma.cc/X4AN-R8R5>]. Certain provisions of the Act were later found to be unconstitutional. See *Leary v. United States*, 395 U.S. 6, 52 (1969).

130. Mills, *supra* note 83, at 58.

131. Zuckerman, *supra* note 81 ("The problem with the weed industry is that its impacts are severe, it's not effectively regulated, and it's growing so rapidly," says Greacen, executive director of Friends of the Eel River, which runs through the heart of the marijuana belt.').

132. Arnold, *supra* note 85, at 2 (discussing in depth the problems caused by a lack of regulation for the marijuana industry).

133. Christensen, *supra* note 99.

it will likely reduce energy theft, allow growers to plug into utility energy efficiency and conservation programs, and allow growers to take advantage of utility time-of-use rates.

Curbing Theft by Connecting to the Grid. Legalization could help to decrease utility electricity theft. From 2006 to 2010, British Columbia Hydro reported some 2,618 cases of electricity theft, “the majority of which are claimed to be associated with cannabis growing operations.”¹³⁴ According to the utility company, this theft has cost the utility \$100 million a year.¹³⁵ Presumably, legitimate companies with significant sources of revenue will be less likely to steal electricity than those that are operating illicitly. Likewise, by connecting to the grid, marijuana cultivators will lessen some of their carbon footprint, shifting from diesel and gasoline generators to the state’s energy mix. As will be discussed in detail, however, this shift will not fully address the climate issue because the U.S. grid still relies heavily on coal and other fossil fuels to generate electricity.

Utility Energy Efficiency Programs. Once indoor marijuana cultivators connect to the grid, utilities will be able to include the industry in their energy conservation programs. These energy efficiency programs were established in the 1970s to help customers “cope with soaring energy prices.”¹³⁶ They have evolved as an important conservation tool for utilities and customers alike.¹³⁷ Through utility energy efficiency programs, growers could receive education as to the utilization of more energy efficient technology in their business operations such as more efficient air filtration and climate control methods and LED lighting. For example, the high-intensity lighting operated by indoor marijuana growers could be replaced by

134. Mills Presentation, *supra* note 97.

135. Gerry Belett, *Hydro Theft by B.C. Pot Growers Costs \$100M a Year*, VANCOUVER SUN (Oct. 8, 2010), <http://www2.canada.com/vancouversun/news/story.html?id=2deb7b35-c988-44a5-a8f9-b565d6f10a5a> [<http://perma.cc/J3Z9-62PN>].

136. *Energy Efficiency Programs for Utility Customers*, AMERICAN COUNCIL FOR AN ENERGY EFFICIENT ECONOMY, <http://www.aceee.org/topics/energy-efficiency-programs> [<http://perma.cc/CB69-AXJG>] (last visited Apr. 30, 2015); Christensen, *supra* note 99 (“As indoor grow operations are legitimized, electric utilities will be presented with some low-hanging fruit for their energy conservation programs.”).

137. *Energy Efficiency Programs for Utility Customers*, *supra* note 136.

LED lighting that “can produce three times more light per watt of energy expended.”¹³⁸

Time-of-Use Rates. In addition to education and encouraging the use of low-energy lighting and air filtration methods, with time-of-use rates, utilities can encourage indoor growers to take the majority of their electricity during off-peak, night hours.¹³⁹ This is beneficial in two ways. First, electricity is less expensive to the grower because there is a lower demand.¹⁴⁰ Second, and more importantly, during peak, day hours the grid relies almost exclusively on electricity generated by natural gas and coal plants.¹⁴¹ As such, taking electricity during off-peak and night hours will result in more reliance on renewable energy generation and a smaller carbon footprint.¹⁴²

It is important to note, however, that even with state legalization, the federal criminalization of marijuana continues to create concerns for marijuana service providers including utilities and irrigation districts who receive federal funding.¹⁴³ Utilities that receive power from federal projects question whether they may legally supply electricity to marijuana

138. Christensen, *supra* note 99. Energy conservation technology will not stop at LED lighting. Investors, looking to capitalize on the new industry, have already started to emerge, and research and development is being expended to build better technology. For example, in June, NovoFuel, a subsidiary of AlumiFuel Power Corporation announced that it had “completed the design of a Renewable Energy System (RES) to meet the rapidly expanding energy requirements of legal marijuana growers in the U.S. and Canada.” *Novo Finalizes Design of Pilot Renewable Energy System to Support Cannabis Cultivation*, MARKET WIRED (June 5, 2014, 9:00 AM), <http://www.marketwired.com/press-release/novofuel-finalizes-design-pilot-renewable-energy-system-support-cannabis-cultivation-otcqb-afpw-1917747.htm> [http://perma.cc/FX4W-HUYG]. The company established a pilot program in Michigan—a state with legalized medical marijuana cultivation—to help alleviate the increased pressures to the local power grid. *Id.* Under the pilot program, fifty-two percent of the site’s energy consumption is provided by the off-grid RES. “These integrated RES components include mini-wind turbine systems, solar panel (photovoltaic) systems, large format lithium-ion batteries, and, where applicable, hydrogen fuel cells—all integrated by the world-class real-time microgrid energy management and control system.” *Id.* If this pilot program is successful, the company plans to take its RES to other sites around North America. *Id.*

139. Christensen, *supra* note 99.

140. Dave Diezger, *Saving Money by Understanding Demand Charges on Your Electric Bill*, USDA, <http://www.fs.fed.us/t-d/pubs/htmlpubs/htm00712373/> [http://perma.cc/AQ5W-HXVG] (last visited Apr. 30, 2015).

141. O’HARE ET AL., *supra* note 81, at 25.

142. *Id.* (“Smart meters and nighttime lighting in indoor growing facilities can encourage growers to move a significant amount of the electric usage to this environmentally favored period.”).

143. *Id.*

producers, because any regulatory agency that receives federal funding risks losing those funds by enacting regulations to facilitate marijuana cultivation.¹⁴⁴ This has led some municipalities and counties to refrain from enacting a regulatory framework, which in turn has resulted in continued misuse of natural resources and damage to the climate.¹⁴⁵ Many point to the federal prohibition and the concern for loss of funding, or worse, as the “biggest impediment to curbing the impacts of marijuana cultivation.”¹⁴⁶ According to Tony Silvaggio, a lecturer at Humboldt State University and a scholar at the Humboldt Institute for Interdisciplinary Marijuana Research, “We don’t have a set of best management practices for this industry, partly because of federal prohibition.”¹⁴⁷

V. A NEW LICENSING FRAMEWORK TO LIMIT ENERGY AND CLIMATE IMPACTS OF INDOOR CULTIVATION

While integrating indoor growers into the existing energy delivery framework is a pronounced start, more could and should be done to further limit the energy and climate impacts of indoor cultivation. To date policymakers have done little to assess energy usage or climate risks of indoor marijuana cultivation,¹⁴⁸ state and local agencies will need to start taking these issues into consideration. This Section will discuss climate change as one of the most devastating negative externalities of electricity generation, consider the need for comprehensive state licensing schemes that assess energy usage and climate risk prior to issuing business licenses, and ultimately recommend that regulators mandate that indoor marijuana cultivators utilize carbon-free electricity generation.¹⁴⁹

144. *Id.*; see also Mike Faulk, *Water Agency Deciding on Marijuana Policy*, SEATTLE TIMES (Apr. 10, 2014, 11:46 AM), <http://blogs.seattletimes.com/today/2014/04/no-federal-water-for-washington-pot-farms/> [<http://perma.cc/H642-6P64>].

145. Christensen, *supra* note 99.

146. Zuckerman, *supra* note 81.

147. Mills, *supra* note 83, at 63 (“There is little, if any, indication that public policymakers have incorporated energy and environmental considerations into their deliberations on *Cannabis* production and use.”).

148. *Id.*

149. What better industry to start with than the marijuana industry, which markets itself to environmentalists and naturalists?

A. The Externality That Ate the World¹⁵⁰

According to the IPCC, the earth's atmosphere contains "unprecedented" levels of carbon dioxide, methane, and nitrous oxide,¹⁵¹ which are due in large part to anthropogenic,¹⁵² or human caused activities, and in particular to activities involving fossil fuel extraction and use.¹⁵³ In its Fifth Assessment, the IPCC states:

The atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased to levels unprecedented in at least the last 800,000 years. Carbon dioxide concentrations have increased by forty percent since pre-industrial times, primarily from fossil fuel emissions and secondarily from net land use change emissions.¹⁵⁴

Atmospheric and oceanic temperatures are increasing,¹⁵⁵ storms are intensifying,¹⁵⁶ ice caps are melting,¹⁵⁷ oceans are acidifying,¹⁵⁸ and sea levels are rising.¹⁵⁹ If humans continue to emit greenhouse gases, the result will be "further warming and changes in all components of the climate system."¹⁶⁰ The good news does not stop there. Even if humans halt CO₂ emissions

150. Jedediah Purdy, *The Politics of Nature: Climate Change, Environmental Law, and Democracy*, 119 YALE L.J. 1122, 1132 (2010) ("Climate change threatens to be the externality that ate the world.").

151. Lisa V. Alexander et al., *IPCC, 2013: Summary for Policymakers*, in CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS, CONTRIBUTION OF WORKING GROUP I TO THE FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 11 (T.F. Stocker et al. eds., 2013), available at http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf [<http://perma.cc/A38X-LWPD>].

152. According to the Report:

Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes. This evidence for human influence has grown since AR4. It is *extremely likely* that human influence has been the dominant cause of the observed warming since the mid-20th century.

Id. at 17 (internal citation omitted).

153. *Id.* at 11–12, 17.

154. *Id.* at 11.

155. *Id.* at 8, 20.

156. *Id.* at 23.

157. *Id.* at 24.

158. *Id.* at 11, 26 ("The ocean has absorbed about 30% of the emitted anthropogenic carbon dioxide, causing ocean acidification.").

159. *Id.* at 25.

160. *Id.* at 19.

altogether, experts predict that a significant amount of existing atmospheric CO₂ will remain for more than 1,000 years,¹⁶¹ and that “[m]ost aspects of climate change will persist for many centuries.”¹⁶² As aptly put by Jedediah Purdy, “Climate change threatens to be the externality that ate the world.”¹⁶³

The IPCC identifies the “energy supply sector”¹⁶⁴ as the largest consumer of energy.¹⁶⁵ It is also the largest emitter of global greenhouse gases, responsible for nearly thirty-five percent of global anthropogenic greenhouse gas emissions,¹⁶⁶ and is continuing to trend upward. For example, from 1991–2000, the sector increased emissions 1.7% per year. From 2000–2010, the increase was 3.1% per year.¹⁶⁷ The vast majority of the increase (three-fourths) is due to increased generation of electricity and heat from fossil fuels.¹⁶⁸ Electricity production has been and will most likely continue to be the “largest single sector emitting fossil fuel CO₂.”¹⁶⁹ If humans are to mitigate climate impacts, net emissions must be zero.¹⁷⁰ The IPCC notes that there are multiple options to reduce the energy sector’s greenhouse gas emissions including energy efficiency and fugitive emission reductions, fossil fuel

161. *Id.* at 28 (“Depending on the scenario, about 15 to 40% of emitted CO₂ will remain in the atmosphere longer than 1,000 years.”).

162. *Id.* at 27. The IPCC notes that a “large fraction” of the human-induced climate change is “irreversible on a multi-century to millennial time scale.” *Id.* at 28.

163. Purdy, *supra* note 150, at 1132.

164. WORKING GROUP III, *supra* note 2, at 518 (“The energy supply sector . . . comprises all energy extraction, conversion, storage, transmission, and distribution processes with the exception of those that use final energy to provide energy services in the end-use sectors (industry, transport, and building, as well as agriculture and forestry).”).

165. *Id.* Despite the United Nations Framework Convention on Climate Change (“UNFCCC”) and the Kyoto Protocol, GHG emissions grew more rapidly between 2001 and 2010 than in the previous decade. Growth in sector GHG emissions accelerated from 1.7% per year from 1991–2000 to 3.1% per year from 2001–2010. The main contributors to this trend were a higher energy demand associated with rapid economic growth and an increase of the share of coal in the global fuel mix. *Id.*

166. *Id.* at 522 (“In 2010, the energy supply sector accounts for 49% of all energy-related GHG emissions . . . and 35% of anthropogenic GHG emissions, up 13% from 22% in 1970, making it the largest sectoral contributor to global emissions.”).

167. *Id.*

168. *Id.*

169. *Id.* at 559.

170. *Id.* at 527 (“Climate change can only be mitigated and global temperature be stabilized when the total amount of CO₂ emitted is limited and emissions eventually approach zero.”).

switching, carbon capture and storage, and increased reliance on renewable energy¹⁷¹ and nuclear power.¹⁷²

Even in the face of the devastating impacts of climate change, it is simply not feasible (or desirable) to immediately remove all fossil fuels as a source of energy. The world economy would certainly collapse and many people would suffer immediate physical and financial harm.¹⁷³ Nor, however, can we maintain a “business as usual” mentality.¹⁷⁴ With little to no federal action to address climate change,¹⁷⁵ states and local governments should take the first steps toward eliminating fossil fuels as energy sources by incorporating climate risk analysis into their decision-making process, and by mandating that new industries, such as the marijuana industry, ultimately use carbon-free energy sources as a condition of licensing.¹⁷⁶

171. Renewable energy includes “bioenergy, direct solar energy, geothermal energy, hydropower, ocean energy, and wind energy.” *Id.* at 525.

172. *Id.* at 530.

173. Jamison E. Colburn, *Subsidiarity and Environmental Law: Solidarity and Subsidiarity in a Changing Climate: Green Building as Legal and Moral Obligations*, 5 U. ST. THOMAS L.J. 232, 236 (2008) (noting that “[s]tarvation, death from exposure, and other ailments, would all certainly rise” if fossil fuels were removed from use).

174. This author is not naïve in arguing that limiting emissions in the United States through renewable energy offsets will somehow counteract the increasing emissions in other parts of the world such as China and India that will account for the majority of the increase in CO₂ over the coming decades due to their double-digit growth and reliance on fossil fuels.

175. See Alexandra Klass, *Convergence of Environmental and Energy Law*, 24 FORDHAM ENVTL. L. REV. 180, 189–195 (discussing the convergence between the two fields of environmental and energy law, primarily precipitated by state climate change initiatives in the face of a void in federal regulation).

176. Very recently, New York became the first state to take a step in this direction when Governor Cuomo signed into law the Community Risk and Resiliency Act (“CRAA”). See 2014 N.Y. Laws 355. The Act requires, among other things, that the Department of State, in consultation with the Department of Environmental Conservation, prepare model laws that take into account certain climate risks and to make such model laws available to the municipalities. *Id.* at § 14. This Act essentially gives the climate similar status as the environment has under the State Environmental Quality Review Act. See Michael B. Gerrard, *New Statute Requires State Agencies to Consider Climate Risks*, 252 N.Y. L.J. 93 (2014), available at <http://web.law.columbia.edu/sites/default/files/microsites/climate-change/nyljnewstatuterequiresstateagenciestoconsiderclimaterisksnovemeber2014.pdf> [<http://perma.cc/5ZMX-SZJJ>]. However, as noted by Professor Gerrard, the Act is limited in scope and application. *Id.* First, the Act only requires agencies to consider risks of flooding, sea level rise, and damage due to storm surges. *Id.* It does not require agencies to look at other climate risks such as heat waves, drought, and wildfires. *Id.* Second, as a procedural law, it only requires “consideration” of these climate risks. *Id.* It does not require any specific action or outcome. *Id.*

B. Incorporating Climate-Risk Analysis and Mandates into State Business Licensing Schemes

As discussed above, the indoor marijuana cultivation industry is one of, if not the, most highly energy-intensive industries in the United States,¹⁷⁷ with \$6 billion in energy costs annually.¹⁷⁸ It already consumes at least one percent of the entire nation's electricity,¹⁷⁹ and this figure is expected to increase as marijuana becomes legalized throughout the country.¹⁸⁰ Uncontrolled fossil fuel energy usage for indoor marijuana cultivation is not only globally damaging, but it can completely nullify any previous environmental advancements made under local comprehensive climate change policies.¹⁸¹ For example, the coastal city of Arcata, California had a goal of decreasing local greenhouse gas emissions by twenty percent over a twelve-year period.¹⁸² Six years in, "Arcata's household electrical use grew by twenty-five percent," while statewide electricity consumption was level or declining.¹⁸³ Arcata determined that this increase was due to 600 residences that were consuming triple the average household electricity use—consistent with indoor commercial marijuana cultivation.¹⁸⁴ Legalization will allow indoor cultivators to connect to the existing electricity grid, which will reduce reliance on inefficient and high-carbon emitting gasoline and diesel generators.¹⁸⁵ It will not, however, alleviate the climate risk,

177. O'HARE ET AL., *supra* note 81, at 3, 7.

178. Mills, *supra* note 83, at 59; *see also* Mills Presentation, *supra* note 97.

179. Mills, *supra* note 83, at 59.

180. For example, it is estimated that Washington State's total energy consumption could increase by approximately 0.8% due to indoor cultivation. *See* O'HARE ET AL., *supra* note 81, at 3. When California legalized marijuana for medical purposes, Humboldt County in Northern California saw a fifty percent per capita spike in consumption. *Id.*

181. *See* ICLEI USA, U.S. LOCAL SUSTAINABILITY PLANS AND CLIMATE ACTION PLANS, <http://www.icleiusa.org/action-center/planning/List%20of%20U.S.%20Sustainability%20and%20Climate%20Plans.pdf> [<http://perma.cc/776Y-6WXN>] (last updated Nov. 30, 2009) (listing various local climate change policies).

182. CITY OF ARCATA, COMMUNITY GREENHOUSE GAS REDUCTION PLAN ii (Aug. 2006), http://www.cityofarcata.org/sites/default/files/files/document_center/Environmental%20Services/Energy/Greenhouse%20Gas%20Reduction%20Plan.pdf [<http://perma.cc/8CZU-JEUP>] (discussing plan to reduce greenhouse gas emissions).

183. Zuckerman, *supra* note 81.

184. *Id.*

185. O'HARE ET AL., *supra* note 81, at 7 ("We expect that legal production will avoid nearly all use of off-grid generation.")

because the majority of the electricity generated in the United States is from fossil fuel sources.¹⁸⁶ The industry's impacts on the climate are severe.¹⁸⁷ This final section will discuss Colorado and Washington's budding licensing schemes and the need for public policymakers to establish new licensing frameworks that integrate climate risk analysis.¹⁸⁸

i. Colorado and Washington Licensing Schemes

States like Colorado and Washington that have fully legalized marijuana are beginning to establish licensing schemes for marijuana producers, distributors, and retailers. Likewise, cities and counties within those states are implementing their own licensing requirements. As policymakers draft their marijuana licensing schemes, they have a unique opportunity to embed¹⁸⁹ climate and energy protective provisions.¹⁹⁰ Drafting from a clean slate, policymakers can take a holistic approach to regulation instead of being bound by a previous framework.¹⁹¹

186. U.S. ENERGY INFO. ADMIN., *supra* note 107. However, some states such as Washington and California have more climate-friendly grids relying on generation from hydropower, other renewables, and nuclear power. See O'HARE ET AL., *supra* note 81, at 9.

187. Zuckerman, *supra* note 81 ("The problem with the weed industry is that its impacts are severe, it's not effectively regulated, and it's growing so rapidly," says Greacen, executive director of Friends of the Eel River, which runs through the heart of the marijuana belt.').

188. What better industry to start with than the marijuana industry, which markets itself to environmentalists and naturalists?

189. Environmental law has long relied upon major statutes such as the Clean Air Act to regulate and protect the environment. Climate law is not similarly situated. There is no federal climate change act and it is unlikely that Congress will pass any sort of major act in the near future. The absence of a federal act, however, provides opportunities to include climate protective measures within non-environmental laws such as marijuana regulatory laws. Utilizing what Todd Aagaard coins as "embedded environmental law" in non-environmental laws can be beneficial when developing energy regulations, because, among other things, it affords the opportunity for policymakers to begin with a clean slate. Todd S. Aagaard, *Environmental Law Outside the Canon*, 89 IND. L.J. 1239, 1271 (2014).

190. *Id.* at 1239 ("Energy law provides an interesting example of a related field that may once have fit within the category of noncanonical environmental law, or perhaps not environmental law at all, but has arguably ascended to at least the category of subcanonical environmental law by virtue of energy law's increasing focus on environmental concerns and the increased appreciation of its important relationship to environmental issues such as air pollution and climate change.').

191. *Id.* at 1271 ("The framework of existing statutes therefore constrains options for regulatory innovation within those programs.').

While neither state requires a climate risk assessment prior to issuing cultivation licenses, Boulder, Colorado places significant energy-usage restrictions on indoor growers, and Washington's regulatory scheme opens the door for localities to regulate methods of production and energy use.

Colorado. The Colorado Medical Marijuana Code establishes a dual licensing structure for the regulation of medical marijuana at state and local levels.¹⁹² State licensing is governed by the Colorado Department of Revenue.¹⁹³ To obtain a state license, cultivators must be able to pay certain application fees, excise taxes, and licensing fees,¹⁹⁴ and must meet significant requirements related to daily business operations such as reporting, packaging, labeling, and advertising of the product.¹⁹⁵

Given the dual licensing structure, many local governments in Colorado have also enacted codes to further regulate and enforce medical marijuana within their borders.¹⁹⁶ For instance, the City of Boulder has enacted two sets of regulatory codes—one for medical marijuana and another for recreational marijuana.¹⁹⁷ Both have the stated purpose to “regulate the use, acquisition, cultivation, production, and distribution” of marijuana consistent with Colorado's Medical and Recreational

192. Colorado Medical Marijuana Code, COLO. REV. STAT. ANN. §12-43.3-101 (West 2010).

193. COLO. DEPT. OF REVENUE, PERMANENT RULES RELATED TO THE COLORADO RETAIL MARIJUANA CODE (Sept. 9, 2013), *available at* https://www.colorado.gov/pacific/sites/default/files/Retail%20Marijuana%20Rules,%20Adopted%20090913,%20Effective%20101513%5B1%5D_0.pdf [<https://perma.cc/28ES-V2AM>].

194. The state imposes “a 15% excise tax on the average market price of retail marijuana. The excise tax is imposed on the first sale or transfer from a retail marijuana cultivation facility to a retail marijuana store, retail marijuana product manufacturing facility or to another retail marijuana cultivation facility.” COLO. DEPT. OF REVENUE, EXCISE 23: EXCISE TAX ON RETAIL MARIJUANA 1 (2014), *available at* <http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheader=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1251973010629&ssbinary=true> [<http://perma.cc/3SCP-C7NU>]. The application fee is \$5,000, while the initial licensing fee depends on the size of the cultivation facility. *See* PERMANENT RULES RELATED TO THE COLORADO RETAIL MARIJUANA CODE, *supra* note 193, at 18–19.

195. *See* PERMANENT RULES RELATED TO THE COLORADO RETAIL MARIJUANA CODE, *supra* note 193, at 82–117.

196. *See, e.g.*, BOULDER, COLO., REV. CODE § 6-14 (2015).

197. *Compare* BOULDER, COLO., REV. CODE § 6-14 *with* BOULDER, COLO., REV. CODE § 6-16 (2015).

Marijuana Amendments.¹⁹⁸ The City's codes require marijuana businesses to utilize renewable energy to offset 100% of their electricity consumption.¹⁹⁹ To ensure compliance, businesses must keep monthly records to verify their energy use and renewable energy credit purchases, which must be disclosed to City officials upon request.²⁰⁰ The basis for the City's renewable energy offset requirement is Boulder's Sustainability and Climate Action Plan,²⁰¹ which "is an

198. BOULDER, COLO., REV. CODE § 6-16-1; BOULDER, COLO., REV. CODE § 6-14-1; *see also* COLO. CONST. art. XVIII, § 16 (the "Recreational Marijuana Amendment"); COLO. CONST. art. XVIII, § 14 (the "Medical Marijuana Amendment").

199. Per the ordinances:

Renewable Energy Usage Required. A medical marijuana business shall directly offset one hundred percent of its electricity consumption through the purchase of renewable energy in the form of Windsource, a verified subscription in a Community Solar Garden, or renewable energy generated onsite, or an equivalent that is subject to approval by the city.

BOULDER, COLO., REV. CODE § 6-14-8(i); *see also* BOULDER, COLO., REV. CODE § 6-16-8(i).

200. Per the ordinances, "Records to Be Maintained" include:

Reporting of Energy Use and Renewable Energy Credit (REC) Purchases. The records to be maintained by each recreational marijuana business shall include, without limitation, records showing on a monthly basis the use and source of energy and the number of certified Renewable Energy Credits (RECs) purchased, or the subscription level for another renewable energy acquisition program approved by the city manager. A statement of the projected daily average peak electric load anticipated to be used by the business and certification from the building owner or landlord and utility provider that the premises are equipped to provide the required electric load, or necessary upgrades will be performed. Such records shall include all statements, reports, or receipts to verify the items included in the report of the business. By application for a recreational marijuana business license from the city, the recreational marijuana business grants permission to providers of the energy or point of origin of the RECs or other renewable energy acquisition program to disclose the records of the business to the city. For recreational marijuana businesses that cultivate medical marijuana, the report shall include the number of certified RECs purchased, or the subscription level for another renewal energy acquisition program approved by the city manager.

BOULDER, COLO., REV. CODE § 6-16-9(g); *see also* BOULDER, COLO., REV. CODE § 6-14-9(g).

201. BOULDER, COLO., REV. CODE § 6-16-1(b)(8). One of the stated purposes of the code is to "[s]upport Boulder's Sustainability and Climate Action Plan goals by requiring renewable sources for energy use to grow recreational marijuana." *Id.* Also of note, Boulder County has a Climate Change Preparedness Plan with sustainability requirements, including energy sustainability. *See* Stratus Consulting, *Boulder County*

integrated, aggressive set of programs and strategies to reduce Boulder's greenhouse gas emissions and address the growing impact of human activity on global climate change."²⁰²

Likewise, Boulder County enacted a set of regulations to control the cultivation, use, and distribution of marijuana within the County.²⁰³ The County's regulations set forth standard provisions for licensing, zoning, and business operations, but also include unique provisions for mandating that indoor cultivators utilize renewable energy.²⁰⁴ County regulations provided marijuana cultivation businesses—medical and recreational—with a deadline of October 22, 2014 to offset fifty percent of their energy consumption with qualifying on-site renewable generation, a subscription to the Community Solar Garden,²⁰⁵ or some equivalent source approved by County officials.²⁰⁶ By the following year,

Climate Change Preparedness Plan, CITY OF BOULDER, COLO. (2012), <http://www.bouldercounty.org/doc/sustainability/ccpp.pdf> [<http://perma.cc/PET7-NPTV>].

202. *Let's Show the World How It's Done*, CITY OF BOULDER, COLO., <https://boulder.colorado.gov/climate> [<http://perma.cc/MZV5-6WWX>] (last visited Mar. 27, 2015); *Climate Action Plan*, CITY OF BOULDER, COLO. (2006), <https://www-static.boulder.colorado.gov/docs/city-2006-climate-action-plan-1-201305081127.pdf> [<http://perma.cc/3VEW-4923>].

203. BOULDER CNTY, COLO., MARIJUANA LICENSING REGULATIONS (2013), *available at* <http://www.bouldercounty.org/doc/bocc/rmjregsoct2013final.pdf> [<http://perma.cc/R6HH-L6EF>].

204. *Id.* at 7.

205. *Id.* In 2010, Colorado enacted the Community Solar Gardens Act, which amended the Community energy funds statute from 2007. *See* 2010 Colo. Legis. Serv. Ch. 344 (H.B. 10-1342) (West) (amending COLO. REV. STAT. § 40-2-127 (2007)). The purpose of the Community Solar Gardens Act was to boost distributed generation and to “encourage additional investment in solar energy generation facilities, and, in connection therewith, authoriz[e] the creation of community solar gardens.” Colo. Legis. Serv. Ch. 344. Thus, for example, the current Community energy funds statute allows retail customers to “subscribe” to a community solar garden. COLO. REV. STAT. ANN. § 40-2-127(2)(b) (West 2015). A “subscription” is defined as “a proportional interest in solar electric generation facilities installed at a community solar garden, together with the renewable energy credits associated with or attributable to such facilities,” and “shall be sized to represent at least one kilowatt of the community solar garden's generating capacity.” *Id.* § 40-2-127(2)(b)(III).

206. *See* MARIJUANA LICENSING REGULATIONS, *supra* note 203, at 7. Pursuant to Article 8.5(g):

Sustainability. Unless the Authority in consultation with the Chief Building Official grants an extension of time for good cause shown, optional premises marijuana cultivation facilities and dual optional premises marijuana cultivation facilities /retail marijuana cultivation facilities must meet the following requirements:

cultivators are required to offset 100% of their energy consumption.²⁰⁷ In addition, any existing cultivation business wishing to expand production before October 2015 must meet the 100% energy offset requirement upon expansion.²⁰⁸ To ensure compliance, the County regulations require businesses to maintain records showing they meet the offset standards, and must permit county officials to inspect the records upon request.²⁰⁹

Not long after enacting the renewable energy requirement, however, it became apparent to County officials, and to growers attempting to meet the requirement, that the County simply did not have enough renewable energy to supply the amount required by indoor cultivators.²¹⁰ As a result, the County enacted a Resolution that created one additional avenue for

1. By October 22, 2014, directly offset 50% of electricity, propane, and natural gas consumption through a verified subscription in a Community Solar Garden, renewable energy generated on site, or equivalent approved by the Boulder County Chief Building Official. The offset must be demonstrated by a sustainability plan approved by the Boulder County Chief Building Official.

2. By October 22, 2015, directly offset 100% of electricity, propane, and natural gas consumption through a verified subscription in a Community Solar Garden, renewable energy generated on site, or equivalent approved by the Boulder County Chief Building Official. The offset must be demonstrated by a sustainability plan approved by the Boulder County Chief Building Official.

Id.

207. *See* MARIJUANA LICENSING REGULATIONS, *supra* note 203.

208. *Id.* In addition to the renewable energy requirements, the regulations require all lamps to be recycled and prohibit cultivation businesses from discarding them in the trash or landfill. *Id.*

209. Article 9 provides:

Inspection. By signing and submitting a license application, the owner of the premises certifies that the applicant has received permission from the property owner to allow inspections as may be required under state or local licensing law. In addition, the owner of the premises authorizes the Authority, its designee, and the Boulder County Building Official or the official's designee, to enter upon and inspect the premises. Such inspections, if necessary, shall take place at a reasonable time with prior notice to the property owner, and prior to a determination on the application. Upon request, the owner of the premises shall timely provide the Authority with records related to the business, including, but not limited to, utility bills from the commercial energy provider for the premises. This section shall not limit any inspection authority authorized under any other provision of law or regulation.

Id. at 8.

210. *See* Res. 2014-41, 2014 Bd. of Cnty. Comm'r. (Boulder, Colo. 2014) (creating the Boulder County Energy Impact Offset Fund).

cultivators to meet the renewable energy requirement. Cultivators could choose to pay a fee of 2.16 cents per kilowatt hour.²¹¹ The fee is paid directly to the County and is placed into the Boulder County Energy Impact Offset Fund.²¹² The majority of the fund (ninety-five percent) goes to “promote or facilitate reductions in fossil fuel energy consumption” or to “directly offset fossil fuel consumption.”²¹³ Cultivators who choose to pay the fee must either submit a periodic report outlining the amount of energy consumed or must install energy monitoring equipment available through the County.²¹⁴ According to a conversation with Ron Flax, the Boulder County Sustainability Examiner, the County has already begun installing energy-monitoring equipment for cultivators choosing to go that route.²¹⁵ The sustainability and monitoring reports will allow policymakers to gain a better understanding of the industry’s overall energy usage and to adopt policies to curb its negative impacts.

Washington. Washington producers can obtain licenses to grow the plants indoors, outdoors, or in greenhouses so long as they follow local and state permitting requirements.²¹⁶ Unlike

211. *Id.*

212. *Id.*

213. *Id.* Furthermore, the Resolution speculated on areas where the money could be spent:

Possible uses of the monies may include, but are not limited to:

1. Purchase and installation of monitoring equipment necessary for a business to participate in the Energy Monitoring Program.
2. Low-interest loans or grants to income qualified property owners in unincorporated Boulder County for rooftop solar or other measures that have demonstrable carbon reduction benefits.
3. Programs that accelerate the adoption of new technologies and operational methods that will result in less energy intensive cannabis grow operations.
4. Programs that improve the industry’s integration with local agricultural practices and organic farming methods for purposes of growing soil and reducing our dependence on fertilizers derived from fossil fuels.

Id.

214. *Id.*; Res. 2014-48, 2014 Bd. of Cnty. Comm’r. (Boulder, Colo. 2014) (amending the Boulder County Marijuana Licensing Regulations to require a sustainability reporting requirement).

215. Telephone interview with Ron Flax, Sustainability Exam’r, Boulder Cnty., Colo. (Mar. 31, 2015) (notes on file with author).

216. Producers can obtain a Tier 1, 2, or 3 license, which seems to only depend on the size of “plant canopy.” Tier 1 allows up to 2,000 square feet of plant canopy; Tier 2 allows between 2,001 to 10,000 square feet of plant canopy; and Tier 3 allows between

Colorado, state requirements include compliance with the State Environment Policy Act, state and regional environmental permitting requirements, regulations requiring water quality permits, chemigation and fertigation regulations, air quality permits, solid waste handling, and hazardous waste management.²¹⁷

Washington's Uniform Controlled Substances Act grants the state Liquor Control Board ("WSLCB")²¹⁸ the authority to adopt rules regarding the licensing process and the requirements that must be met to maintain the marijuana license.²¹⁹ Among the delineated areas, the WSLCB may adopt rules regarding the *methods* of production.²²⁰ This language could certainly be

10,001 to 30,000 square feet of plant canopy. The state licensing fee for all tiers, however, is the same: \$250 for the application and \$1,000 for issuance and the annual renewal. See WASH. STATE LIQUOR CONTROL BD., PRODUCER LICENSE DESCRIPTIONS AND FEES, available at http://www.liq.wa.gov/mjlicense/producer_license_discriptions_fees [<http://perma.cc/A6TE-TCN7>] (last visited Mar. 27, 2015).

217. *Regulatory/Permitting Guidance for Indoor Marijuana Producers*, WASH. ST. LIQUOR CONTROL BD., http://liq.wa.gov/publications/Marijuana/I-502/Indoor_Marijuana_Producer_guidance_11-19-13.pdf [<http://perma.cc/68J9-7GGT>] (last visited Mar. 27, 2015); *Regulatory/Permitting Guidance for Greenhouse Marijuana Producers*, WASH. ST. LIQUOR CONTROL BD., http://liq.wa.gov/publications/Marijuana/I-502/Greenhouse_MarijuanaProducer-FactSheet.pdf [<http://perma.cc/TLP5-3J57>] (last visited Mar. 27, 2015).

218. WASH. REV. CODE § 69.50.101(gg), 69.50.325(1) (2014). The WSLCB also collects an excise tax of twenty-five percent on each sale between the producer and processor. See *Fact Sheet*, WASH. ST. LIQUOR CONTROL BD., http://www.liq.wa.gov/marijuana/fact_sheet [<http://perma.cc/D6U5-H4H8>] (last visited Mar. 27, 2015).

219. WASH. REV. CODE § 69.50.342 (2014). Interestingly, one significant state-level barrier to licensing is that the facility (whether indoor, outdoor, or greenhouse) must be 1,000 feet from areas frequently patronized by persons under the age of twenty-one. *Id.* § 69.50.331(8). Responding to significant complaints that the 1,000 foot buffer rule would essentially prevent any marijuana facilities from obtaining a license in Seattle, given the city's layout, the WSLCB clarified the rule. The method of measurement is the "most common path," instead of "as the crow flies," thereby relieving some of the restrictiveness. See *Frequently Asked Questions About the I-502 Proposed Rules*, WASH. ST. LIQUOR CONTROL BD. (Sept. 4, 2013) http://www.liq.wa.gov/publications/Marijuana/I-502/proposed_rules/I-502_Proposed_Rules_FAQ2_9-18-13.pdf [<http://perma.cc/C82R-X74L>].

220. The Washington Code provides:

The state liquor control board is empowered to adopt rules regarding the following: Methods of producing, processing, and packaging marijuana, useable marijuana, and marijuana-infused products; conditions of sanitation; and standards of ingredients, quality, and identity of marijuana, useable marijuana, and marijuana-infused products produced, processed, packaged, or sold by licensees.

WASH. REV. CODE § 69.50.342(3) (2014). In addition, the law allows the control board to require licensees to maintain books of records for inspection. *Id.* § 69.50.342(2).

interpreted to allow the WSLCB (or local policymakers) to set restrictions on outdoor versus indoor cultivation, as well as the type of energy that must be used.

In addition to the state laws, local and regional governments have authority to issue moratoria, set more restrictive zoning laws, and adopt additional business licensing restrictions. The WSLCB notes that for indoor marijuana growers, local governments may “administer building, fire, electrical, mechanical, *energy* and plumbing codes,”²²¹ giving localities leeway to institute policies for climate risk assessment and to set mandates for carbon-free energy usage. In addition, for indoor marijuana growers who need to change their existing building use or structure, local regulations could require producers to incorporate green technologies for greater energy efficiency.²²² Yet, to date, no locality within Washington requires indoor cultivators to use carbon-free electricity sources.²²³

ii. Climate Risk Assessments and Energy Usage Restrictions:
Some Benefits, Some Obstacles

State and local governments that are contemplating a regulatory framework for marijuana should utilize the opportunity to implement climate risk assessments in their licensing schemes and to mandate that indoor growers utilize carbon-free electricity. Requiring indoor marijuana cultivators to utilize only carbon-free electricity will ensure that the burden will be borne by the industry creating the negative externality instead of the general public. In addition to carrying the burden, however, carbon-free energy mandates could also provide marijuana cultivators with a marketing tool: product labeling. For example, Washington has drafted regulations that would require all retail marijuana to have a label that discloses the pesticides, herbicides, and fungicides

221. See *Regulatory/Permitting Guidance for Indoor Marijuana Producers*, *supra* note 217 (emphasis added).

222. *Id.*

223. See, e.g., Bob Young, *Indoor Pot Production Leaves Giant Carbon Footprint*, SEATTLE TIMES (May 13, 2013, 10:47 AM), <http://www.seattletimes.com/seattle-news/indoor-pot-production-leaves-giant-carbon-footprint/> [<http://perma.cc/3YMC-GE6P>] (discussing Seattle’s Climate Action Plan which does not “mention the environmental impacts of producing marijuana in the city”).

used during cultivation and processing.²²⁴ But why stop there? The label could state that the product was cultivated with climate-friendly methods and the marijuana industry could actually market itself as the green industry that it is touted as being: “Organic marijuana cultivated with zero carbon emissions.”²²⁵ This could create a separate market demand for marijuana cultivated using renewable energy.²²⁶

Product labeling certainly has the benefit of educating the consumer about the product she is purchasing and allowing her to shop around for the highest quality.²²⁷ Consumers are only guaranteed quality, however, if appropriate regulatory standards and safeguards are put into place to ensure accuracy in labeling. As noted by Ezra Rosser, “[c]ompanies sometimes self-label products as ‘environmentally friendly’ or ‘green,’ but absent regulatory standards, such labeling is only a marginal improvement on the information available to consumers.”²²⁸ The establishment of local licensing schemes that require climate-friendly electricity generation will assure customers that the product is indeed “green,” as labeled.

While labeling would be a collateral benefit to the industry and its customers, it alone has little independent value as a means of addressing the bigger climate change picture. Consumerism and environmental economics, that is, “letting the market sort it all out,” has long been argued to be a viable means of climate change regulation.²²⁹ Self-labeling, offsets,²³⁰

224. O'HARE ET AL., *supra* note 81, at 17; *see also* WASH. ADMIN. CODE § 314-55-020 (2013).

225. Interestingly, there is actually a trend in indoor growing of agriculture generally. Attila Nagy, *14 High-Tech Farms Where Veggies Grow Indoors*, GIZMODO (June 17, 2013, 9:00 AM), <http://gizmodo.com/this-is-the-future-14-high-tech-farms-where-veggies-gr-513129450> [<http://perma.cc/V2YS-4USB>]. Some allege that it may be the only way to have pure organic produce. T. Caine, *Indoor Farming May Be Organic's Only Hope*, INTERCON (Feb. 10, 2011), <http://intercongreen.com/2011/02/10/indoor-farming-may-be-organics-only-hope/> [<http://perma.cc/W7BA-SMSX>]. And, just like marijuana, indoor growing of the crops allows for more control and more harvests. *Id.*

226. Christensen, *supra* note 99.

227. Rosser, *supra* note 5, at 56.

228. *Id.*

229. *Id.* at 64 (discussing the prevailing means of addressing climate change through consumerism and environmental economics).

230. “Quasi offsetting” describes the behavior of consumers who pay more for a product “out of a desire to correct for consumption.” *Id.* at 43. Examples of this are purchasing a hybrid car. The hybrid version of a car is generally exactly the same as the non-hybrid version. Consumers who choose to purchase the hybrid car because

and environmental economics are imperfect solutions that do little to incentivize changes in behavior that would prevent the harm or that would reduce consumption.²³¹ Requiring reliance on renewable energy sources, or requiring some other form of carbon-free generation, will avoid the harm. The labeling is simply a means of advertising that fact.

Despite the benefits, requiring indoor marijuana cultivators to utilize non-greenhouse gas producing energy sources could face some obstacles including the lack of available carbon-free energy resources, the concern that increased regulation will result in clandestine operations, and potential constitutional challenges.

Lack of Carbon-Free Energy Resources. The main obstacle is the lack of availability of carbon-free electricity sources. While cultivators in states like Washington²³² and

they believe it is the right thing to do for the environment are engaging in quasi offsetting. Rosser describes how customers, when purchasing an airplane ticket from Expedia, can offset their carbon footprint by paying a fee to TerraPass. The fee (investment) goes to support one of TerraPass's many projects across the United States. According to TerraPass's website, those projects "destroy greenhouse gases and produce renewable energy." The types of projects include 1) farm power—the use of anaerobic digesters to capture and transform manure into electricity; 2) landfill gas capture—the capture of methane emissions from refuse heaps to generate electricity; 3) wind power—the investment in wind energy; and 4) abandoned coal mine methane capture—the capture of methane from abandoned coal mines to generate electricity. *What Our Projects Do*, TERRAPASS, <http://www.terrapass.com/projects-2/> [<http://perma.cc/89BS-QX9C>] (last visited Apr. 30, 2015). A full listing of their projects is available at *Our Projects*, TERRAPASS, <http://www.terrapass.com/our-projects/> [<http://perma.cc/59LE-9ZPY>] (last visited Apr. 30, 2015). One project is wind energy. "But it isn't clear that the money you spend there really leads to lower pollution. While they are investing in clean-energy projects, those projects might have proceeded even without your investment." Ian Ayres & Barry Nalebuff, *Environmental Atonement*, FORBES (Dec. 25, 2006), available at <http://www.law.yale.edu/news/3954.htm> [<http://perma.cc/4JJB-DBGS>]; see also Rosser, *supra* note 5, at 74. Similarly, Boulder's offsets include a subscription to the solar farm. Like TerraPass, it is unclear whether the money the marijuana cultivator pays to the solar farm will really lead to less pollution, or if it would be better spent on development of onsite small-scale renewable energy.

231. Rosser, *supra* note 5, at 76 ("Global warming and the problem of over-consumption of fossil fuels cannot be solved by relatively wealthy American consumers voluntarily making offsetting payments. More is demanded at both the global and individual levels.").

232. *Washington: State Profile and Energy Estimates*, U.S. ENERGY INFO. ADMIN., <http://www.eia.gov/state/?sid=WA> [<http://perma.cc/SZW3-3F8U>] (last visited Apr. 30, 2015).

Oregon²³³—that generate the majority of their electricity from hydropower—will have less of an issue obtaining the carbon-free electricity, depending on the state’s energy mix, it may be difficult for utility companies in certain states to supply the required zero carbon electricity.

Utilities are generally under state mandates to supply a certain percentage (usually around fifteen to twenty percent) of their electricity from qualifying renewable energy sources.²³⁴ Most, however, do not generate all of their electricity from renewable sources. If utilities cannot supply the electricity, marijuana growers would need to install on-site distributed generation (i.e. solar panels, micro-wind, micro-hydro) or connect to a community solar, wind, or hydropower project.²³⁵

The concern, however, is that on-site or community distribution may not be enough to power the industry’s highly energy-intensive needs. As seen in Boulder County, Colorado, indoor cultivators wanting to comply with the County’s renewable energy requirement found it difficult to do so, in part, because of a lack of utility and community scale renewable energy generation, and in part due to the inability to install enough rooftop solar to power the facility.²³⁶ Colorado’s grid is rich in fossil fuels, with eighty-four percent of its electricity coming from coal or natural gas.²³⁷ With only seventeen percent of its electricity generated from renewable energy, the demand for carbon-free energy may outweigh the supply. Furthermore, facility rooftops may not be big enough to install the amount of solar panels needed to generate the amount of energy consumed. According to one expert, it takes approximately 3 kilowatts of energy to power one 1,000 watt light bulb. This adds up to 1.5 megawatts for a facility

233. *Oregon: State Profile and Energy Estimates*, U.S. ENERGY INFO. ADMIN., <http://www.eia.gov/state/?sid=OR> [<http://perma.cc/PU2J-QXUP>] (last visited May. 3, 2015).

234. *See, e.g.*, D.C. CODE § 34-1432(C)(10) (2015) (mandating twenty percent of utility sales from renewable sources by 2020).

235. *See, e.g.*, MARIJUANA LICENSING REGULATIONS, *supra* note 203, at 7 (detailing sustainability requirements for all retail marijuana cultivation facilities).

236. Cultivators also had difficulty meeting the requirement because (1) some facilities are leased, and the growers are not allowed to install solar panels; and (2) the limited availability of energy from the solar gardens, which require long term subscriptions. *See* Res. 2014-41, 2014 Bd. of Cnty. Comm’r. (Boulder, Colo. 2014).

237. *See Washington: State Profile and Energy Estimates*, *supra* note 232.

utilizing 500 lights.²³⁸ With that magnitude of electricity required, indoor cultivators may need to look beyond rooftop solar.

One option for policymakers faced with this dilemma is to take a two-pronged approach by requiring indoor growers to pay an ever-increasing carbon fee, which would go into a fund for the development of more efficient technology and climate-friendly electricity facilities, *in conjunction with* requiring growers to meet an incrementally increasing requirement to incorporate carbon-free electricity sources. Combining these requirements would ensure growers do not become complacent just to pay the fee. Instead, it would encourage a shift in behavior to implement more efficient technology to keep the cost down and at the same time encourage indoor growers and policymakers to find a solution to ending fossil-fuel consumption.

Concerns of Clandestine Activity. Another concern is that adding an extra burden of requiring cultivators to utilize only carbon-free electricity could result in continued clandestine operations. No doubt public policymakers need to be careful that their policies do not encourage harmful illicit cultivation activities; however, requiring indoor cultivators to use climate-friendly electricity is unlikely to have this negative effect. First, while on-site or distributed renewable energy generation can be more expensive than centralized generation, it is unclear whether it would in fact be more expensive than using inefficient gasoline and diesel generators under illegal operating conditions. Second, and more importantly, comparing the legalization of marijuana to the lifting of Prohibition, it appears unlikely that the increased requirement would result in continued or increased clandestine operations. After Prohibition, alcohol became a highly regulated industry, under the authority of state alcohol control agencies.²³⁹ The regulation resulted in increased profits for the legitimate liquor

238. See Chris Meehan, *Can Solar Power Help Marijuana Growers?*, SOLAR REVIEWS (Mar. 3, 2014), <http://www.solarreviews.com/news/solar-power-marijuana-030314/> [<http://perma.cc/YT63-Q7CN>] (describing Brian Nye's presentation at a session at the Colorado Solar Energy Industries Association's Solar Power Colorado conference in early 2014).

239. Harry G. Levine & Craig Reinerman, *Alcohol Prohibition and Drug Prohibition: Lessons from Alcohol Policy for Drug Policy*, in DRUGS AND SOCIETY: U.S. PUBLIC POLICY 43, 54–55 (Jefferson M. Fish ed., 2006).

businesses, with owners tending to obey the laws so as to protect their operating licenses.²⁴⁰ Likewise, legitimate marijuana businesses stand to make significant profits by maintaining their licenses. In 2014, Colorado marijuana businesses alone sold nearly \$700 million in recreational and medical marijuana.²⁴¹ And, according to Elizabeth Hernandez of *The Denver Post*, the Colorado marijuana industry made \$36.4 million in recreational sales in a single month (January 2015).²⁴² It is unlikely that heightened licensing requirements will result in underground operations.

Potential Constitutional Challenges. Another potential obstacle to requiring marijuana businesses to use carbon-free electricity is that it could elicit constitutional challenges. While potential constitutional issues are beyond the scope of this article, it is important to note that mandates that ultimately require local distributed energy generation, such as community solar farms, could run afoul of the Dormant Commerce Clause.²⁴³ This particular situation, however, would create a unique and interesting case. The power of the Dormant Commerce Clause has come to light in energy-related cases where state commissions have attempted to favor local energy sources.²⁴⁴ Courts have historically rejected even

240. *Id.* at 58.

241. Ricardo Baca, *Chart: Colorado Marijuana Sales Hit \$700 Million for 2014*, CANNABIST (Feb. 12, 2015, 3:19 PM), <http://www.thecannabist.co/2015/02/12/colorado-marijuana-sales-2014-700-million/27565/> [<http://perma.cc/5YQ2-LH2K>].

242. Elizabeth Hernandez, *Colorado's Record January Marijuana Sales Yield \$2.3M for Schools*, CANNABIST (Mar. 11, 2015, 9:33 AM), <http://www.thecannabist.co/2015/03/11/colorado-pot-tax-results-january-2015/31462/> [<http://perma.cc/768W-V9ED>].

243. The Commerce Clause grants Congress the authority to regulate channels and instrumentalities of interstate commerce as well as activities that substantially affect interstate commerce. In 2004, the U.S. Supreme Court held that the Commerce Clause grants the federal government the power to regulate local marijuana cultivation for personal use, pursuant to the Controlled Substances Act. *Gonzales v. Raich*, 545 U.S. 1, 9 (2005).

244. *See Wyoming v. Oklahoma*, 502 U.S. 437, 454 (1992) (striking down an Oklahoma law that required Oklahoma power plants to use ten percent Oklahoma coal); *Alliance for Clean Coal v. Miller*, 44 F.3d 591, 596–597 (7th Cir. 1995) (striking down an Illinois law that favored the use of in-state coal in generation of electricity). There have also been discussions regarding renewable portfolio standards with carve outs or multipliers for distributed generation and their potential conflict with the Commerce Clause. *See Lincoln L. Davies, Power Forward: The Argument for a National RPS*, 42 CONN. L. REV. 1339, 1364–75 (2010) (discussing the benefits and problems with promulgating a federal renewable portfolio standard); Daniel K. Lee & Timothy P. Duane, *Putting the Dormant Commerce Clause Back to Sleep: Adapting the Doctrine to Support State Renewable Portfolio Standards*, 43 ENVTL. L. 295, 354–60

intrastate laws that will have the effect of discriminating against or burdening interstate commerce. Given that marijuana cultivation is currently federally illegal, and therefore an illegal interstate activity, it is unlikely that a case could be brought claiming discrimination against out-of-state energy. As discussed above, utilities that receive power or water from federal projects are already concerned with whether they can even legally supply that resource.²⁴⁵ On the other hand, the U.S. Supreme Court held in *Gonzales v. Raich* that Congress has the authority to regulate intrastate marijuana cultivation under the Controlled Substances Act, even if it is solely for personal use, because home-consumed marijuana outside federal control would similarly affect price and market conditions.²⁴⁶

Regardless of these obstacles, climate change is a global negative externality that threatens to impact nearly everyone and everything on the planet. Business as usual is simply no longer an option. Moving the business of marijuana from the shadows into a highly-regulated, legalized industry provides a chance to include energy use regulations that create a small burden on the industry and provide a global benefit. Policymakers establishing new state and local regulatory schemes have the opportunity to analyze climate risks prior to

(2013) (setting forth various ways the judiciary can address these problems such as utilizing intermediate scrutiny instead of strict scrutiny and extending the applicability of the market-participant exception); Jim Rossi, *The Limits of a National Renewable Portfolio Standard*, 42 CONN. L. REV. 1425, 1441–49 (2010).

245. Christensen, *supra* note 99; *see also* Faulk, *supra* note 144.

246. In *Gonzales*, the respondents lawfully cultivated marijuana for personal medical use under California's Compassionate Use Act. Nevertheless, county sheriffs and Drug Enforcement Administration agents seized and destroyed the cannabis plants (after a three-hour standoff). *See* 545 U.S. at 7. Respondents brought suit alleging that the "categorical prohibition of the manufacture and possession of marijuana as applied to the intrastate manufacture and possession of marijuana for medical purposes pursuant to California law exceeds Congress' authority under the Commerce Clause." *Id.* at 15. Even with the limitations set forth in the recent cases of *United States v. Lopez*, 514 U.S. 549 (1995), and *United States v. Morrison*, 529 U.S. 598 (2000), the Court looked to the older and far-reaching case of *Wickard v. Filburn*, 317 U.S. 111 (1942), with particular relevance. In *Wickard*, the Court held that even local growing of wheat for private use can trigger the Commerce Clause because "failure to regulate that class of activity would undercut the regulation of the interstate market in that commodity." *Gonzales*, 545 U.S. at 18 (citing *Wickard*, 317 U.S. 111, 118). Utilizing analogical reasoning, the Court stated that "[h]ere too, Congress had a rational basis for concluding that leaving home-consumed marijuana outside federal control would similarly affect price and market conditions." *Id.* at 19.

issuing the licenses and to mitigate those risks by requiring indoor cultivators to use only climate-friendly energy sources as a condition of licensing.

VI. CONCLUSION

If marijuana is cultivated outdoors, policymakers will most likely be able to mitigate the multiple environmental externalities by integrating producers into the existing environmental regulatory framework. Climate and energy externalities of indoor production, however, cannot be mitigated by simply plugging into the grid. Given the high climate risks, the only responsible option is to require highly energy-intensive industries, such as the indoor marijuana industry, to power their operations with carbon-free electricity.

Connecting to the existing national energy delivery system and utilizing energy efficiency programs and innovation are great opportunities to lessen some of marijuana's carbon footprint, but it will do little to offset the millions of metric tons of carbon dioxide that the industry has emitted and will continue to emit.²⁴⁷ The vast majority of the electricity supplied by the U.S. grid is from fossil fuel sources. The marijuana industry is already one of the most energy-intensive industries in the United States. With legalization, that impact is expected to grow. This is at a time when the IPCC is reporting that the energy supply sector alone itself is not only the largest consumer of energy but also responsible for nearly thirty-five percent of global anthropogenic greenhouse gas emissions. State and local policymakers have a unique opportunity to regulate this massive existing and growing industry and to require, as a condition of licensing, that indoor cultivators use only carbon-free electricity.

This article does not intend to unfairly single out the marijuana industry and simultaneously excuse the activities of other highly energy-intensive industries. Instead, the indoor

247. Mills, *supra* note 83, at 59. This number is only one percent less than the emissions of the entire state of New Hampshire, and greater than that of four other states (South Dakota, Delaware, Rhode Island, and Vermont) and the District of Columbia. *State CO₂ Emissions*, U.S. ENERGY INFO. ADMIN. (Feb. 25, 2014), http://www.eia.gov/environment/emissions/state/state_emissions.cfm [<http://perma.cc/M98S-9PSJ>].

marijuana industry simply provides a platform to emphasize both the importance of climate risk assessment prior to licensing, and the difference public policymakers can have on climate when starting from a clean slate. The marijuana industry, like the alcohol industry, is and will most likely always be a highly regulated industry. It already requires stakeholders to jump through many hoops on the way to licensing. This article humbly encourages the policymakers to include one additional hoop—the use of climate-friendly electricity.