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Title 5 Amendments: Cannabis Business Standards

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1. INTRODUCTION

In May 2021 the Montana State Legislature passed House Bill 701 (HB-701) in response to the citizen-initiated legalization of recreational cannabis. In November 2021 the Missoula City Council approved an ordinance generally amending Title 20 Zoning Code to accommodate the State's newly introduced and amended cannabis business types. During the public process for the Title 20 amendments, the Missoula Consolidated Planning Board and City Council expressed interest in regulating energy consumption at cannabis cultivation operations. On November 29, 2021, City Council voted to direct staff in the Community Planning, Development and Innovation Department to begin amendments to Title 5, the Business Licenses and Regulations Code, to address and mitigate the impacts of high energy consumption at cultivation operations.

This white paper details staff research and recommended approaches to regulating energy consumed by cannabis cultivators in the City of Missoula.

2. CANNABIS CULTIVATION: ENERGY USE & IMPACTS

Big Ideas

1. **Cannabis cultivation is highly energy intensive when compared to other uses.**
2. **Jurisdictions which have legalized cannabis cultivation have experienced an overall increase in energy demand.**

HB-701 prohibits outdoor cannabis cultivation with the exception that former medical cannabis licensees who engaged in outdoor cultivation before November 3, 2020, may continue to grow outdoors. As a result of this regulation, new cultivation licensees must grow cannabis indoors. Though cultivators may grow in greenhouses, other structures utilized for indoor cannabis cultivation do not allow cultivators to make use of natural sunlight. Without the ability to make use of natural sunlight, cultivators must use energy intensive lightbulbs to mimic sunlight and provide sufficient energy to their plants.

Indoor cannabis cultivation, compared to other commercial and manufacturing uses, has an extremely high energy demand. When Boulder County, Colorado started tracking the energy used by their cultivators they found the typical cannabis cultivation facility uses seven (7) times more energy per square foot than the average commercial facility. Energy costs at breweries, for example, account for an average of 6 to 12% of their total operating costs. At indoor cannabis cultivation operations, average energy costs comprise 20 to 25% of their total operating costs (Kolwey, 2017).

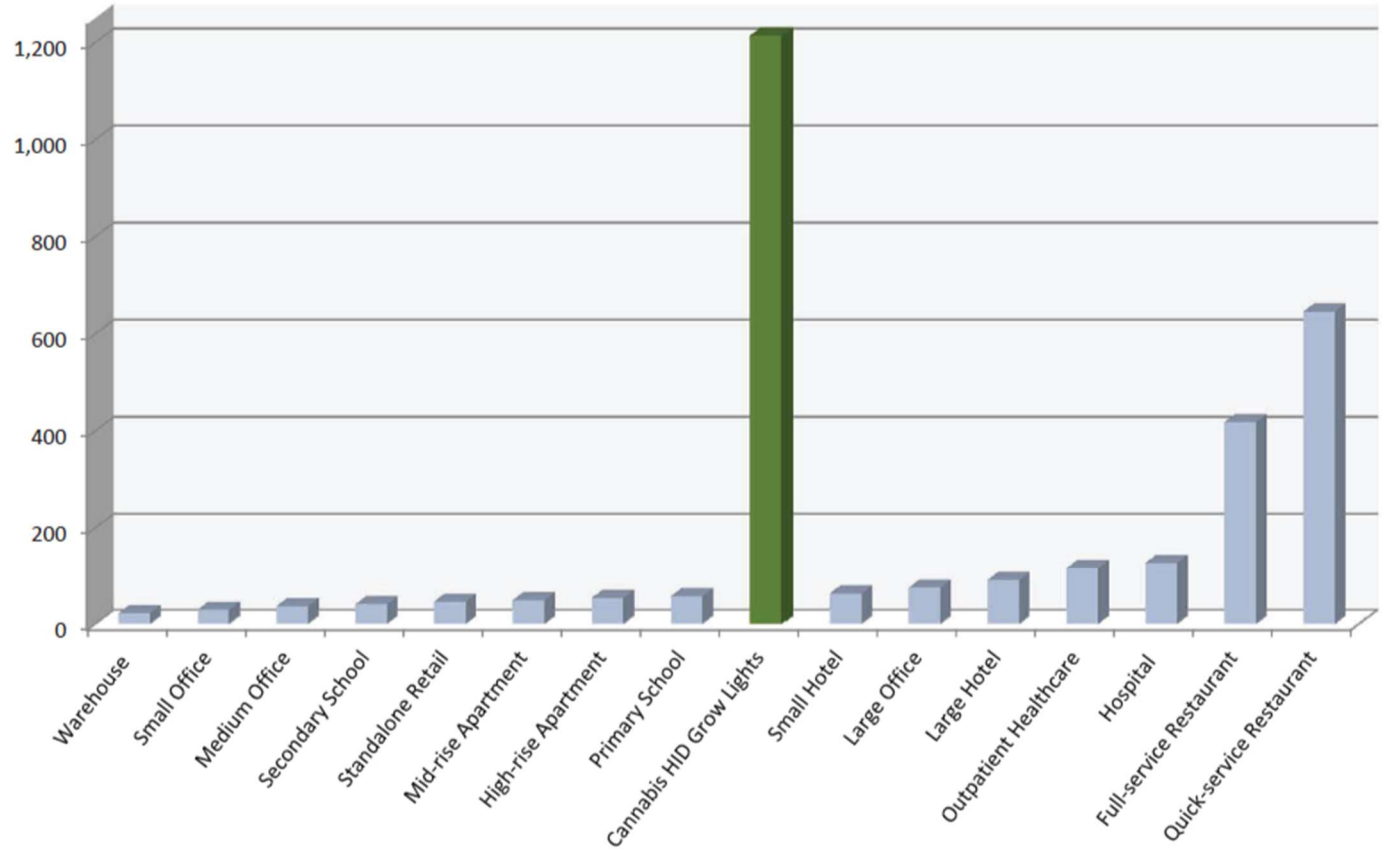


Figure 1. Energy Use Intensity (kBtu) per Square Foot. This graph identifies the energy use per square foot for cannabis production using HID grow lights as compared to other commercial and industrial uses. (Massachusetts Department of Energy Resources Energy and Environmental Affairs, 2018.)

The energy intensity demanded by cultivators, compounded by the anticipated increase in the total number of cultivators due to recreational legalization, indicate that energy companies in Montana can expect an increase in consumption. This trend has been observed in other states which have legalized recreational cannabis. In Seattle, recreational cannabis operations accounted for 3% of the City's load growth, which is the increase in energy consumption (Bade, 2015). Indoor medical cannabis production increased Humboldt County's overall electricity consumption by 50% (Sweet, 2016). Municipalities such as Portland found themselves unable to keep up with demand and saw widespread blackouts following an increase in recreational cannabis cultivation

businesses (Durkay & Freeman, 2016). In response to increased energy demands many cities, counties, and states are choosing to regulate energy efficiency at cultivation operations.

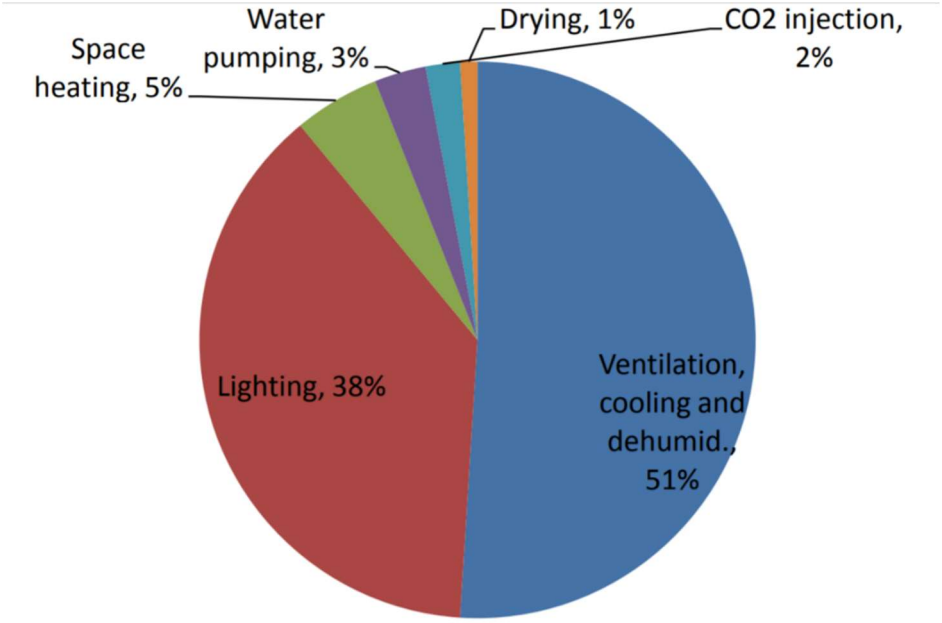
3. LIGHTING TYPES

Big Ideas

1. **LED lights are becoming more prevalent for cannabis cultivation.**
2. **HID lights are more energy intensive than LED lights, to varying extents.**
3. **Switching to more efficient lighting can reduce overall energy consumption.**
4. **Reducing the cost of energy gives cultivators a competitive advantage.**
5. **The upfront cost to switch to LED is high, but the payback period is relatively short.**

At typical indoor cannabis cultivation facilities, lighting alone accounts for 38% of the facility's total energy consumption. The lighting needs of cannabis plants vary depending on the plants' growth stage. These needs range from the type of lighting to required hours of light per day. While flowering plants require the least amount of light (around twelve hours per day), a seedling may need to be provided with up to twenty-four hours of light (Kolwey, 2017). Furthermore, the intensity and color of lighting demanded by plants evolves as the plants grow. As a result, cultivators often utilize different types and combinations of lighting for each growth stage (CBT Staff, 2021).

Figure 2. Energy Use Breakdown for a Typical Indoor Cannabis Grow.



High-intensity discharge (HID) lights have traditionally been used to grow cannabis indoors. Prior to a few years ago, light-emitting diode (LED) lights were unable to meet cannabis cultivator needs. Recent improved LED technology has made it possible for cultivators to switch to LED lights or incorporate LED lights into their mix of lighting types (Smith, 2021). A survey conducted by Cannabis Times Weekly found that between 2016 and 2021, LED usage by cannabis cultivators increased by at least 45% for all stages of plant growth. Cultivators are choosing to switch to LED lights because they use approximately half as much energy, resulting in savings over time. (Kolwey, 2017)

HID lights are both energy intensive and generate excessive radiant heat. This excess heat generated by HID lights places additional stress on cooling systems and increases the overall energy demand from cultivators (Singh, 2015). Cooling systems, in addition to ventilation and humidity control, comprise over half (51%) of the total energy use at a typical indoor cannabis cultivation facility. These operations, in conjunction with lighting energy consumption, account for a staggering 89% of cultivator energy demands (Kolwey, 2017). By switching from HID to LED lights, cultivation operations can reduce energy consumption of both lighting and cooling.

Not all HID lights are equal. There are two types of HID lighting: metal halide and high-pressure sodium (HPS). Metal halide lights are traditionally used during the vegetative stage and are the least efficient of the two types (Smith, 2021). HPS lighting comes in single-ended and double-ended models. Double-ended HPS lights are more efficient than single-ended HPS lights and can reduce energy use in flower rooms by 20% to 25% (Kolwey, 2017).

A major hurdle to installing LED lighting is the upfront cost of equipment. LED lighting can cost two to five times more than HPS lighting, which can be a significant barrier to some small cultivation operations (Smith, 2021). In a case study of Yerba Buena, a cultivator in Oregon, the upfront cost to switch from HPS to LED lights was just under $30,000 (Kolwey, 2017). The initial capital required to switch to LEDs could be out of reach for some small cultivators (Smith, 2021). Though the initial cost of installing LED lighting is high, business owners save money in the long run. As a result of the switch, the cultivator saved 259,000 kilowatt-hours of electricity annually – equating to an annual fiscal savings of about $22,000. Within nine months the upfront project cost was fully recovered through both the energy savings and rebates from the local energy company (Kolwey, 2017). While Yerba Buena was able to recover the cost within nine months, a one-to-two-year recovery period is common. Missoula's leading energy provider, Northwestern Energy, offers rebates for businesses switching to LED lighting which can assist cultivators with recouping the cost (Northwestern Energy).

4. LIGHTING METRICS

Big Ideas

1. **Jurisdictions have used lighting power density and/or lighting efficacy metrics to regulate lighting energy consumption.**
2. **Jurisdictions have adopted the option for cultivators to choose lights from the DesignLights Consortium list.**

Jurisdictions have commonly regulated cannabis cultivation lighting in two ways: lighting power density (LPD) and Photosynthetic photon efficacy (PPE). Lighting power density uses watts per square foot and is the standard metric for building code. Massachusetts and Illinois adopted the requirement that cannabis cultivation canopy areas not exceed 36 watts per square foot (Smith, 2021).

Lighting efficacy is the amount of light produced per unit of energy consumed (Smith, 2021). Lighting efficacy in horticulture uses photosynthetic photon efficacy (PPE) as a metric because it describes the ability of lighting to produce the spectral range that drives photosynthesis in plants (Runkle & Bugbee, 2017). PPE is measured in µmol /J (micro [µ] moles [mol] per Joule [J]). Lighting with a higher PPE is more effective at converting electricity to photosynthetic photons, which means less energy is used to create the same amount of light needed for plant growth (Smith, 2021). Figure 3 below shows the PPE for various lighting types. While LED lights have the highest efficacy range, low efficacy LED lights are comparable to some high efficacy HID lights on the market.

Lighting Type	Photosynthetic Photon Efficacy (µmol/J)
LED	1.9 to 3.7
High Efficiency Double-Ended HPS	1.7 to 1.9
HPS (General)	Up to 1.7
Metal Hallide Lamps	1.2 to 2.0
Fluorescent Lights	0.9 to 1.0

Figure 3. PPE by Lighting Type. (Smith, 2021)

In addition to the lighting power density option, Massachusetts and Illinois also allow cultivators to meet the energy regulations by using lighting with a high PPE rating. California and Vermont are both proposing to adopt regulations which set a minimum PPE for lighting at cultivation operations. Higher efficacy levels of 1.9 µmol/J will push cultivators toward using strictly LED lights. PPE levels of 1.7 µmol/J will consistently allow double-ended HPS lights (Smith, 2021).

The DesignLights Consortium is a third-party organization that maintains lists of high-quality lighting products. For lighting to be included on the Horticulture Lighting Qualified Products List, it must be meet specific requirements including a minimum PPE of 1.9 µmol/J and at least 50,000 hours of lifetime (Smith, 2021). Several states have included the option to comply with cultivation energy regulations by choosing lighting from the DesignLights Consortium list.

Click here to see the full DesignLights Consortium list for horticulture lighting.
https://qpl.designlights.org/horticulture

5. OTHER COMMUNITIES

Big Ideas

1. **States are often the jurisdiction regulating energy consumption at cannabis cultivation operations.**
2. **Lighting regulations are commonly included in Building Code, Energy Code, or State Cannabis code.**
3. **Jurisdictions often provide options for meeting the regulations, including combinations of lights from the DesignLights Consortium List, Power Density requirements, and PPE minimums.**
4. **Many jurisdictions have lower requirements for small facilities**

California: Statewide

California is updating Title 24, Building Energy Efficiency Standards, to include standards for horticultural lighting. The code update includes a PPE minimum of 1.9 µmol/J for indoor operations, and 1.7 µmol/J for greenhouse operations with more than 40 kW connected load. The requirement will not apply to existing facilities. New operations, additions, and use type alterations must comply with the PPE minimum. This code update is set to take effect in 2023 (Smith, 2021).

Colorado: Boulder County

Commercial cannabis cultivators must offset their electricity use by purchasing local renewable energy or pay a fee of 2.16 cents/kWh into the Boulder County Energy Impact Offset Fund. This fund is used to educate cannabis growers about energy efficiency and to support local energy efficiency and renewable energy projects.

Colorado: City of Denver

Denver's Building Code requires that 80% of watts of lighting used for plant growth must be provided by lighting with a PPE of at least 1.6 µmol/J for fixtures or 1.9 µmol/J for bulbs and lamps. Lighting must also be verified by the Design Light Consortium's Horticultural Qualified Products List or another third part list in addition to the PPE minimums (Smith, 2021).

Massachusetts: Statewide

The state of Massachusetts states that lighting energy use may not exceed 36 watts per square foot, or 50 watts per square foot for smaller facilities (less than 10,000 sq. ft.). Many LED lights can meet this requirement while HID lights cannot.

Alternatively, growers may use specific types of lighting that appear on the DesignLights Consortium list and are 15% above the minimum list requirements which equates to a PPE of 2.2 µmol /J.

Growers are exempt from these requirements if they generate more than 80% of their energy from an on-site renewable source. Annual energy reporting (benchmarking) is required for licensure (Smith, 2021). Requirements are included under the state cannabis code.

Vermont: Statewide

Vermont is proposing rules at the Cannabis Control Board that would require cultivation to meet specific PPE standards. For indoor cultivation, PPE must be a minimum of 1.9 µmol/J. For greenhouses with envelopes that have a u-factor of 0.7, lighting fixtures used to supplement the sun must have a minimum PPE of 1.7. Similar to California, greenhouses that have a connected lighting load of less than 40 kW are exempt from the requirements (State of Vermont, 2021)

Illinois: Statewide

Like Massachusetts' regulations, lighting used by cultivators in Illinois must either comply with the 36 watts per square foot maximum or must be sourced from the Design Lights Consortium list and have a PPE of at least 2.2 µmol/J. Illinois also regulates efficiency of water use and HVAC equipment by cannabis businesses. Cultivation operations smaller than 6,000 square feet must use high-efficiency ductless split units, while operations larger than 6,000 square feet must implement variable refrigerant flow units (or HVAC equipment of equal efficiency). Energy reporting (benchmarking) is required (Smith, 2021).

6. ODOR & AIR QUALITY

Big Ideas

1. **Odor and VOCs from cannabis cultivation and manufacturing negatively impact air quality.**
2. **Air filtration and HVAC maintenance is crucial for mitigating impacts of odor, mold, and VOCs.**

Movement of air through the cultivation space is critical for plant health and mold prevention. As a result, odors from cannabis cultivation and product manufacturing may spread into public space where they may be perceived as offensive to individuals or sensitive populations.

In addition to the prevalence and risk of moisture and mold in all horticultural operation, cannabis plants emit terpenes – a type of volatile organic compound (VOC) (Zheng, 2021). This occurs both naturally through bio-generation and through solvent evaporation during extraction processes (Denver, 2019). VOCs can negatively impact occupational health of indoor cultivation workers and compound issues of odor and air quality.

According to the 2019 Cannabis Environmental Best Practices Guide released by the Denver Department of Public Health and Environment, investment in a high-quality HVAC system (and maintaining this system) is the most effective method for mitigating risks of mold, VOCs, odor, and improving overall air quality. "The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) publishes commonly accepted HVAC standards for architects and engineers" (Denver, 2019). Selecting the appropriate energy-efficient HVAC, filtration, and dehumidification systems is highly dependent on individual goals and financial

constraints. Denver's guide recommends filtration systems have a high VOC removal efficiency and do not exceed the maximum rated cubic feet-per-minute rating for air circulation through the filter. Regular maintenance and inspection of filters and HVAC systems is also crucial to filter efficacy. Generally, filters will need to be replaced at six months to a year but should be replaced according to manufacturer recommendations (Denver, 2019).

Denver's report identifies carbon filters are simple to install, inexpensive, effective, and reliable when properly maintained and replaced; other sources point to the limitations of carbon filters in effectively filtering non-gaseous particles. Alternative filtration types seen in the cultivation industry include ozone and High-Efficiency Particulate Absorbing (HEPA) filters; each of these come with their own set of strengths and weaknesses depending on the particulates being filters and the volume of the space requiring filtration. More cultivators have been moving towards a system of combining different filtration and dehumidification technologies to properly address the immense scale of air quality control.

7. CITY OF MISSOULA: CLIMATE ACTION

Governing bodies in the City and County of Missoula have been working for years to identify and address the impacts climate change will have on our community. Staff considered the following policies, plans, and initiatives when drafting recommendations.

Climate Ready Missoula

The City and County of Missoula have identified several area-specific hazards that human-induced climate change will have on the area. These impacts include more wildfires, more pervasive and lingering wildfire smoke, higher temperatures, wetter winters/springs and flooding, drier summers and drought, climate variability, and climate migration resulting in population increases. The Plan outlines several goals and strategies meant to address and mitigate these impacts, with some relating directly to the research outlined in this White Paper. Several strategies focus specifically around energy savings and efficiency. These strategies include:

Figure 4. Climate Ready Strategies Related to Energy Savings

Goal I, Strategy 21	Develop programs to implement and incentivize more energy efficient building practices (new and retrofits) that are accessible to all socio-economic groups, including weatherization and cool roofs.
Goal BB, Strategy 71	Enhance energy efficiency and weatherization workforce and business opportunities
Goal CC, Strategy 73	Collaborate statewide to facilitate and advocate for legislative, regulatory, and utility program change that accelerates development of renewable energy, energy storage, energy efficiency, and load flexibility, and reduces our reliance on fossil fuels.
Goal CC, Strategy 74	Develop local energy savings programs to reduce energy cost burden and exposure to energy price volatility.

100% Clean Electricity Initiative

Missoula is committed to addressing the climate change emergency by taking actionable steps that reduce carbon pollution while building a healthy, resilient community. In 2019, the City of Missoula, Missoula County, Climate Smart Missoula and other community partners began the ambitious journey of transitioning our community's power supply to 100% clean electricity.

Climate Smart Action Plan

The City of Missoula made a commitment in 2013 to our citizens to join in the effort to use less energy and generate fewer greenhouse gas emissions with our municipal Conservation and Climate Action Plan. This Climate Smart Action Plan v1.0 serves as Missoula's collaborative response to climate change, outlining the values, vision, goals, and actionable steps to build environmental, economic, and social resilience and sustainability for and in our community.

Figure 5. Climate Smart Actions Related to Energy Savings

Green Building, Energy Efficiency and Conservation	
Goal 3, Action A	Develop project objectives and specifics and potential ways to fund (foundation grants, public-private partnerships, etc.).
Goal 3, Action C	Develop and implement incentives and competitions programs.
Goal 4, Action A	Provide free or affordable energy audits and consultations to homeowners, renters, and businesses.
Goal 4, Action G	Establish mandatory reporting of energy consumption for homes and commercial buildings, including existing private buildings, existing public buildings and new construction.
Renewable Energy	
Goal 1, Action E	Work with financial institutions and local and state government to address upfront financing costs.
Goal 2, Action A	Research and document barriers and outdated local and state policies that hamper efforts to move renewable energy forward.
Goal 2, Action C	Encourage pro-renewable energy policy with both Montana's Public Service Commission and Northwestern Energy.
Sustainable Economic Development	
Goal 1, Action B	Work with partners to articulate and showcase economic benefits of restoration, climate adaptation, energy savings/carbon reduction efforts, and triple bottom line: people, planet, profit.
Goal 2, Action B	Create incentive programs to encourage green building and energy efficiency efforts and businesses; utilize best funding options (see A, above).

8. CITY OF MISSOULA: LONG-RANGE POLICIES & GOALS

City of Missoula: 2020-2023 Strategic Plan

Figure 6. Strategic Plan Goals Related to Energy Savings

Community Design & Livability	
Goal 3: Support sustainable growth initiatives.	**Action 1:** Partner with community organizations to provide information and create incentives for green building practices.
Environmental Quality	
Goal 2: Implement adopted Energy Conversation and Climate Action initiatives.	**Action 3:** Partner to implement the 100% Clean Electricity initiative.
	Action 4: Reflect the goals of the Climate Action Plan and 100% Clean Electricity within zoning code and design standards for an effective pathway to implementation.

Our Missoula 2035 City Growth Policy

The Our Missoula 2035 City Growth Policy is the guiding regional plan. The Policy includes several climate related items. The recommendations of this White Paper promote energy conservation and green building infrastructure. However, the Growth Policy recommends incentives and carbon offsets which are not included as part of the White Paper recommendations.

Figure 7. Our Missoula 2035 Growth Policy Actions Related to Energy Savings

Sustainable Community Action 3.3	Conduct community outreach with schools, businesses, non-profits, and residents to increase awareness, explain benefits and promote voluntary efforts to address climate change, carbon neutral lifestyle, zero waste and other related sustainability objective topics.
Sustainable Community Action 5.5	Promote and incentivize green building infrastructure, energy conservation, recycling, renewable energy (solar/geothermal), zero-waste, etc. Also consider disincentives such as fees and pollution pricing
Incentives – Subsidies Action 5.18	Provide incentives to promote net zero energy districts.
Programmatic Action 8.25	Promote a community-wide program for carbon offsets and exchanges, and work with recognized registries.
Regulatory, Permitting, & Design Standards Action 9.15	Streamline approval process for green buildings and renewable energy systems.

9. STAKEHOLDER FEEDBACK

Meetings with and surveys from local cannabis industry stakeholders illustrated a wide variety of lighting types and practices used in Missoula. Staff contacted over fifty business by email or phone. Of those contacted, representatives from three (3) businesses attended the Stakeholder meeting on January 7th, 2022. Seven (7) individuals completed the survey which requested information about current lighting and filters used, as well as general feedback. Additionally, a few businesses provided feedback to staff over the phone or by email.

1. Seedling Stage: a majority of stakeholders report using 90-100% LEDs.
2. Vegetative Stage: a majority of stakeholders reporting using 75-100% LEDs.
3. Pre-Flowering Stage: cultivators are pretty evenly split between those who employ a majority of LED lighting and those who use lighting alternatives.
4. Flowering Stage: most cultivators reported using a lighting type other than LED.

The lighting types used, in addition to LEDs were: HPS, HID, CFL, fluorescent, UVB fluorescent, T5 bulbs, metal halide, and ceramic metal halide. Cultivators use different types of lighting for various reasons, including specific strain needs, stage of plant growth, and the effects of outdoor air temperature. Many stakeholders voiced their intention to convert their operations to use 100% LEDs within the coming years.

When surveyed on approaches to air quality and filtration, an overwhelming majority of stakeholders (80%) reported using carbon filters in their facilities with 60% of those surveyed reporting using a mix of methods to mitigate/reduce odor and related impacts.

Nearly all cultivators expressed their desire for any new regulatory requirements to incorporate a 12-month grace period to come into compliance.

Additional Themes:

- **Desire** for established businesses/medical to have lesser requirements: "Some of us have been here for 10 years or longer and we are not the same people that are only setting up shop because rec has happened."
- **Concerns** growth in industry and legalization of recreational will make it difficult for existing cultivators to survive the payback period associated with switching lighting.
- **Interest** in metric that still allows a mix of lighting.
- **Concern** about inability to secure loans for lighting upgrades from banks due to cannabis being federally illegal.
- **Claims** existing heating systems have been designed to account for heat produced by lamps. One business owner of a small cultivation operation (under 1,000 square feet of canopy area) stated he worries he will need to use space heaters if required to switch to LED.
- **Desire** to incorporate flexibility for growers to continue using a mix of different lighting types for specific strains and stages.
- **Advocacy** for partnerships with organizations that rent, lease, and finance various cultivation equipment, including affordable, high-quality LEDs and dehumidification systems.
- **Desire** to promote water recycling programs for water generated from dehumidifiers for continuous re-use and reaching for zero-waste goals.
- **Expressed** intent for the industry to engage in renewable energy programs including wind, hydro, and solar power with some facilities starting their own small-scale programs.
- **Concerns** regarding reach of City/County Authority: "We chose to locate our cultivation facility in another county. This type of regulation, along with the long building permit waits and over burdensome health department, is just too prohibitive. I appreciate your efforts, but I find this industry-targeting regulation troublesome."

10. STAFF RECOMMENDATIONS

Staff recommend regulating energy consumption at cannabis cultivation operations by requiring cultivators to switch to high efficacy lighting or to produce renewable energy on site. Similar to other jurisdictions, including Missoula County, staff recommend providing several options for compliance. Cultivators would be required to meet one (1) of the following options:

1. Selecting lights which have a minimum PPE of 1.9 µmol/J.
2. Selecting lights from DesignLights Consortium Horticultural Lighting Qualified Product List
3. On-site production of renewable energy

Lighting Requirement Options

1. **Minimum Photosynthetic Photon Efficacy (PPE)**

   At this point in time, staff are not recommending a lighting power density option. Lighting power density requirements have shown to be more difficult to enforce due to confusion about canopy area measurements (Smith, 2021). Additionally, staff research indicates a lack of sufficient data to support a specific compliance threshold. Available data pertaining to average watts per square foot for different lighting types varies significantly, making it difficult to determine which lighting power density threshold is effective versus overly restrictive. Lighting power density requires accurate self-reporting, as this calculation is more difficult for inspectors to verify compliance.

   Alternatively, the PPE for grow lights is frequently listed in the manufacturing specifications, allowing cultivators to easily verify the efficacy of the lighting they are purchasing. At inspection, staff can verify the installed lighting fixtures or bulbs match the lighting proposed at the time of licensing. PPE is a measure of efficacy that is specifically tied to horticultural lighting, making it a tailored metric for cannabis cultivation than watts per square foot.

   Staff are recommending following California and Vermont's proposal to set the minimum PPE requirement at 1.9 µmol/J for indoor cultivation operations. Additionally, staff may recommend including a lower requirement of 1.7 µmol/J for greenhouses utilizing a mix of natural sunlight and lighting fixtures considering they are reducing their overall energy consumption by making use of the sun. City Council should note that a 1.7 µmol/J minimum PPE for indoor cultivation would allow some high efficiency HPS lighting. If City Council would like to allow cultivators to utilize a mix of lighting, including high efficacy HPS, a lower PPE minimum of 1.7 µmol/J is appropriate. Staff are requesting feedback from City Council on which threshold better aligns with city goals.

2. **Selecting Lights from the Horticultural Lighting Qualified Product List**

   Staff recommend providing the option to meet the regulations by providing lighting from the Horticultural Lighting Qualified Product List created by DesignLigths Consortium. DesignLights Consortium is a third-party, non-profit that maintains a list of high efficiency, quality lighting. Lighting on this list is required to meet the 1.9 µmol/J minimum PPE standard. DesignLights Consortium updates the technical requirements every twelve to twenty-four months, ensuring the list is kept up to date (Smith, 2021). Like the first recommendation, this option is easily enforceable as it would require inspectors to check the lighting types themselves.

3. **Producing Renewable Energy On-Site**

   Staff recommend providing the option to meet the code by producing renewable energy on-site. Production of renewable energy on the same parcel as the cultivation operation will allow the business

to offset their energy use, mitigating the impact of any energy intensive lighting they may be using. This option could work for cultivators generally interested in reducing their carbon footprint, or for cultivators who would prefer to continue using HID lighting.

Specific Items for Council's Consideration

In addition to the overall proposal, staff would like specific feedback from Missoula City Council on what level of regulation should be implemented in terms of metric thresholds and cultivation operation size. As previously mentioned, if the goal is to move toward requiring LED use, then a minimum PPE of 1.9 µmol/J is appropriate. If Council would like to provide more flexibility to cultivators in choosing different lighting types including high-efficiency HPS lights, a minimum PPE of 1.7 µmol/J is more appropriate.

Staff would like feedback from City Council on whether small cultivation operations should be exempt from energy reduction requirements due to the high upfront cost associated with upgrading to LED lighting. Small, local operations may have less upfront capital to meet the regulations, potentially putting some businesses at risk. However, in order to stay competitive in the long term, reducing lighting costs through use of LEDs is recommended. Staff would like City Council to weigh the importance of industry equity and climate action when deciding if small operations should be exempt.

Carbon Filters

In addition to the energy requirements, staff recommend requiring carbon filters be installed and maintained per the manufacturer sizing requirements in all cannabis cultivation operations. The goal of this recommendation is to reduce odor impacts on adjacent properties and to improve work-place air quality.

11. POTENTIAL ROADBLOCK: LEGAL CONCERNS REGARDING STATE ENERGY REGULATIONS

Staff were notified by the City Building Department that the proposed amendments to Title 5, Business Licenses and Regulations, may conflict with Montana State Law. The State of Montana owns the building Code. Cities then adopt the state building code but may not adopt requirements that go above and beyond the requirements of the state building code.

Montana Code Annotated (MCA) states in Section 50-60-102(6):

> (a) *A county, city, or town with a building code enforcement program may, as part of its building code or by town ordinance or resolution, adopt* ***voluntary*** *energy conservation standards for new construction for the purpose of providing* ***incentives to encourage voluntary energy conservation****. The incentive-based standards adopted may exceed any applicable energy conservation standards contained in the state building code.*
>
> (b) *New construction is not required to meet local standards that exceed state energy conservation standards* ***unless the building contractor elects to receive a local incentive****.*

This means that even if included in the building code, the City of Missoula's energy-efficiency standards could not be requirements. Violations of this regulation could result in the dissolution of the City Building Department.

Staff were advised by the City Attorney's Office to request feedback from the state once we have completed the first draft of the ordinance. At the ordinance drafting stage of the process, the language will be specific enough for the Sate to provide detailed feedback. While at face value this proposal may sound like an energy code in conflict with the state, the State may find that some or all recommendation options do not conflict.

In the event the State indicates our entire ordinance recommendation conflicts with state law, staff will provide an update at Land Use and Planning Committee, requesting next steps. If the State indicates some, but not all, options in the recommendation must be incentive based, staff are prepared to pivot toward an alternative plan. This alternative concept has not been evaluated by the State at this time. Prior to shifting to an alternative plan, staff will update City Council and request guidance moving forward.

Alternative Plan:

1. Energy conservation items required to be incentive based must be located in Title 15, Buildings and Construction.
2. Staff would pursue simultaneous updates to Title 5, Business Licenses and Regulations and Title 15, Buildings and Construction.
3. Title 15 would be amended to include the options identified by the State as required to be incentive based. An incentive would need to be established. These options in the building code would be voluntary.
4. Title 5 would still require cultivators to choose one option from the list. The list would include options that are not in conflict with state law, as well as the option to meet the licensing requirement by choosing the voluntary incentive outlined in Title 15.
5. Considering the cultivator had the ability to choose an option not included in Title 15 as an incentive, the incentive is still voluntary and not in conflict with State Law.

12. ZONING IMPLICATIONS

In November 2021 City Council voted to adopt an ordinance generally amending Title 20 zoning code. This amendment included updating the use classifications to incorporate cannabis cultivation. The ordinance classified cultivation as manufacturing, subclassified based on the size of the cultivation canopy area.

Local cultivators have suggested they would like larger canopy areas to be permitted in the artisan and/or limited manufacturing classifications once Title 5 amendments have been implemented. Modifying the use classifications would require a future amendment to Title 20 Zoning Code. Some cultivators believe that Title 5 amendments to reduce odor and energy consumption will mitigate the impacts of cultivation, making higher intensity grow operations appropriate in lower intensity zoning districts.

At this point in time, staff do not recommend amending Title 20 to allow larger canopy areas in the artisan and limited manufacturing use classifications following Title 5 amendments. While the recommendations in this white paper will mitigate the impacts of cultivation on climate and neighborhood odor, the original use classifications were designed with urban form in mind. However, staff request feedback from City Council on this item. When classifying cultivation by size, the impacts of the use on the lowest intensity zoning districts where the use is permitted were taken into consideration. Cultivation is permitted in the Business, Commercial, and Industrial zoning districts. Business districts are least intensive, while industrial districts are more intensive. Business, Commercial, and the Limited-Industrial Residential (M1R) zoning districts permit residential uses.

Cultivation businesses with canopy areas up to 1,000 square feet were classified as artisan manufacturing which is permitted by right in the B3 Business Mixed-Use, all commercial, and all industrial zoning districts, and permitted through conditional use in the B1 Neighborhood Business and B2 Community Business zoning districts. With the last amendment to Title 20, 1,000 square feet of canopy area was determined to be the appropriate scale of cultivation in the least intense business districts, B1 and B2, where artisan manufacturing is permitted.

Cultivation operations of up to 2,500 square feet of canopy area are classified as limited manufacturing and permitted in all commercial and industrial zoning districts. Limited manufacturing is permitted in the B3 Business Mixed-Use district as a conditional use.

During Title 20 amendments, there was concern that downtown would become inundated with cannabis uses. Limited manufacturing allows canopy areas up to 2,500 square feet in all commercial zoning districts, which includes the Central Business District (CBD), downtown. Canopy areas up to 2,500 square feet in addition to other space required to operate would be appropriate for the size of commercial spaces in the downtown area. Larger canopy areas could promote expansion of cultivation into multiple downtown commercial spaces, reducing availability of the spaces for other businesses.

All cultivation operations with canopy areas above 2,500 square feet are classified as general manufacturing which is only permitted in the M1 Limited Industrial and M2 Heavy Industrial zoning districts. The M1 and M2 zoning districts do not permit residential uses. The City of Missoula adopted the Design Excellence Overlay which applies additional design standards to major commercial corridors and the downtown area. Requirements in Design Excellence include minimum glazing standards, natural/masonry siding materials, and building modulation. State law prohibits view of cannabis cultivation and cannabis product manufacturing from the street, limiting the ability to place transparent windows on street facing facades. Larger cultivation operations are more appropriate for industrial style buildings rather than structures in commercial Design Excellence corridors which promote glazing, street frontage activation, and high-quality design.

The updated cannabis use classifications established with the November 2021 Title 20 amendments considered the character of the zoning districts and their peculiar suitability for particular uses, and encouraged the most appropriate use of land throughout the jurisdictional area in compliance with the review criteria of Title 20, Section 20.85.040.G.

However, research shows that switching to LED lighting allows vertical farming which could reduce the impacts of large cultivation operations on neighborhood scale. The 2021 International Energy Conservation Code model language has a requirement that 95% of permanently installed fixtures/luminaires meet a photosynthetic photon efficacy (PPE) of not less than 1.6 µmol/J. Fixtures/luminaires meeting this PPE generate less heat, allowing plants can be close to lights making multi-layer (vertical) farming possible. Traditional HID lighting technology produces more heat than LED lighting, requiring that plants be about three feet from the lighting fixture. This distance makes vertical farming infeasible. City Council may consider whether vertical farming of a larger canopy size could be permitted in less intensive zoning districts. Stacking the canopy area would reduce the foot print of the grow operation, potentially mitigating the effects of large operations on urban form in commercial areas.

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