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Reject Horticulture Lighting Proposal; Inadequate analysis, invalid energy savings claims

Thank you for the opportunity to comment. Please see the attached letter from Seinergy LLC.

Respectfully submitted, Bob Gunn

Additional submitted attachment is included below.

November 10, 2020

Dear CEC Title 24 team

Seinergy LLC is an energy and utility consulting company with a focus on horticulture energy efficiency programs and policy. Seinergy's founder, Bob Gunn, author of these comments, has worked with or for utilities on matters related to energy efficiency program planning and evaluation, codes, standards, market research and market transformation since 2008.

Please consider rejecting the CASE team proposal regarding horticulture lighting in its entirety until the CASE team—or other stakeholder—provides any actual data about the energy end uses they intend to regulate, performs a systems based economic analysis of the proposed changes, and engages directly and transparently with market participants whom they seek to regulate. **The energy analysis is flawed, the projected energy savings numbers are without merit, the economic analysis is limited, the stakeholder engagement process was insufficient and the proposed changes risk stifling innovation in a nascent and rapidly changing industry.**

Data

Market transformation is a data based effort that is well understood among utilities, regulators and codes and standards bodies. Any good market transformation effort must be based on verifiable data, and must identify the causal relationships and sensitivity of different variables on the outcome. The CASE analysis data and analysis is insufficient for the following reasons:

- **Baseline.** Baseline horticulture lighting data would tell us what the saturation rate or penetration rates of equipment in use today. It is a critical data point for any energy savings claim or policy baseline, and such data does not exist - unfortunately! Lacking this, the report cites:
 - DOE 2017 and 2019 reports that *characterize* the market for horticulture lighting as 4% LED in 2017 and 11% LED in 2019. Do not confuse this market characterization as data! Seinergy spoke directly with the authors of this report and confirmed the report was based on 19 conversations with “market actors” (growers, manufacturers, energy efficiency analysts) in 2017 and “a couple dozen market actors” in 2019”, **none of them cannabis growers.** They confirmed that the purpose of their report (as stated in the title) is to estimate the conservation

potential at a macro level, and not to be used as a statistically significant data point attesting to the saturation of horticulture LEDs in use today.

The CASE team used this market characterization report to state that “the market share of LEDs in horticulture lighting nearly tripled from 4 to 11 percent from 2017 to 2019. If LEDs presented significant obstacles to growing effectively, such an increase in their usage would not be occurring” (Final CASE report, Apx L.)

- Cannabis Business Times survey of growers. This survey asked growers if they had used any LEDs in any stage of growth, and reported all “yes” responses in an unweighted manner. While interesting for a business article about trends and attitudes towards lighting technology, this is not data representative of market saturation rates for horticulture LEDs.
- The Resource Innovation Institute Cannabis Power Score published a collection of self-reported data points that try to correlate energy use with yield. While also interesting, it does measure fixture efficacy, provide weighted average fixture efficacy statistics, is not unbiased or a random sample and does not attempt to provide a statistically significant report of fixture saturation rates; it should not be cited as such.

Codes and standards work generally invests in baseline information such as a CBSA (commercial building stock assessment) or appliance saturation study. A random sample of unbiased empirical data is generally considered the minimum data requirement for any type of published market saturation value. The CASE report team does not attempt to collect any such data, or acknowledge the lack of reliable data or the risk in proposing state level policy without such data. We encourage the CEC—or any energy agency—to invest in this baseline usage and fixture inventory data to guide future energy policy.

Unreliable Energy Savings and Economic Impacts

Any impact of a proposed change to one input of a manufacturing process should be thoroughly modeled, tested and vetted. A sensitivity analysis should link various inputs to different outcomes. The CASE analysis report fails to model the following *possible* impacts of a mandatory switch to LED:

- Change to yields. Will mandatory LED use increase yields on a per-square foot basis or decrease them? The report assumes no impact.

- In order to meet market demand, will the square footage of cultivation be the same, greater or smaller under the proposed regulation. The report assumes no change to square footage of canopy.
- Change in revenues. Will the quality of the product on a wholesale basis yield a higher or lower price? The report assumes no impact.
- Impact on the illicit market and associated energy benefit or cost. What % of the market that is *or would be* part of the regulated market will enter or return to the illicit market? Is the illicit market more or less energy intensive than the regulated market? What is the impact of such movement into or from the illicit market? How much tax revenue will be lost if x% of market demand for cannabis comes from the illicit market? The report assumes no impact on or relationship between energy regulations for the regulated market and the illicit market.
- Cost of capital. What is the assumed cost of capital for startup cannabis businesses? We would hope that the CASE team used at least a 25% cost of capital, but this input is unclear from the report. Many cannabis startup businesses pay interest rates in excess of 25%.
- Transition costs. What is the cost of loss of (or increase in) productivity during a growers transition from legacy lighting to LED lighting? A 6 month transition time is often considered normal - what is the financial impact to growers of 6 months of lost profitability?

Confused costs of benefits: the CASE report appears to confuse some of the proposed regulations' costs as a benefit. Specifically, the report estimated that 1,703 new jobs will be created in the construction and inspection trades, worth over \$270 million in economic activity! Won't these costs be borne by the subjected cannabis market participants? The report appears to treat these costs as a societal benefit (presumably for its Total Resource Cost test calculations).

The report minimizes the concerns about the difficulty of transitioning from HPS to LED by citing 4 anecdotal reports from growers - two of which indicate a 40% loss in productivity! The report glosses over this detail, and continues to assume no impact to yields, quality, strain selection, interactivity with other systems, revenue impact, changes in canopy or impact on illicit market. Rather than address these factors the CASE report states simply that

“growing with LEDs may necessitate a change in practices for some growers and [the CASE Team] is working to develop education materials to ease this potential transition.”

Energy claims from this report should not be accepted by the CPUC. California’s Investor owned utilities funded this CASE report, who in turn proposed over 300 GWH of savings that will fall under the “Codes and Savings” program initiatives. As previously mentioned, the energy savings claims from the CASE team assume that the baseline condition is a single ended high pressure sodium fixture. But they have not validated this baseline assumption with any empirical evidence. PG&E and SMUD assume double-ended HPS as the baseline (based on a hunch of their own, or rather discussions with a dozen utility-friendly growers), but Southern California Edison assumes single-ended. The difference in the energy savings claims could be as much as 50% difference - or 150 GWh of savings uncertainty. Our assumption is that if this mandate did go forward and the utilities submitted the energy savings to the CPUC the CPUC would look closely at the source data and underlying analysis and come to similar conclusions as ours—or at least raise similar questions.

Stifling Innovation

LED is almost certainly the future of horticulture lighting, and many early adopters have invested in the learning to find success with LED today. However, the industry is too nascent and too rapidly changing to pick winners today.

Micromole-per-joule efficacy ratings are a new metric that are extremely useful in comparing unweighted photon output within a limited range of the photo-biologically active radiation of one fixture to another. It is a metric that has been made popular by the Design Lights Consortium and ASABE (and many other stakeholders). The DLC’s horticulture qualified product list is the first time micromole-per-joule efficacy has been used in a quasi-regulatory context; this list has only been live for 25 months since October 2018! Leading researchers continue to research methods to measure horticulture lighting, it’s interaction with other factors such as strain, CO₂, plant stage of growth. The simple definition of PAR (the only range of photosynthetic active radiation that “counts” under today’s definition) is under close scrutiny. Whether or not photons should be weighted differently based on their value to plants is still under healthy debate. The use of far red light, cycled or pulsed on and off in different patterns is one example of a practice that holds much promise (according to Bruce

Bugbee at the University of Utah). However, under the proposed regulations as written today, a standalone far red LED fixture would be illegal for use in California as it would rank poorly on a micromole-per-joule basis for the narrowly defined range of useful photosynthetically active radiation.

The current proposed regulation could introduce low cost, poor quality LED products into the market will satisfy compliance, but will grow terrible plants. If required by law, such products are all but inevitable to flood the market. LED manufacturers who are engaged in the market today are the early adopters and the innovators and continue to push the envelope about what is possible from an efficacy and performance standpoint. The proposed regulation could commoditize the horticulture LED market in CA and push out the companies investing in actual research and development and collaboration with growers of food and cannabis alike.

The internet of things is closing in on horticulture lighting and facility infrastructure, blurring the line between horticulture lighting and other energy uses, further complicated energy performance metrics measured at the fixture level as proposed today. For example, several fixtures incorporate infrared sensors for pest management and disease recognition, CO2 sensors, security lighting, relative humidity sensors, cameras, USB ports, fans, UV and infrared LEDs outside of the PAR range for plant growth, UV chips for facility sterilization, advanced dimming, demand response integration, etc. Each of these energy draws would count against the efficacy of what is allowable under the proposed regulations. A narrow definition of what is and is not allowable today could stifle potential breakthrough innovation for tomorrow, costing the state much more in the domain of energy and non-energy productivity.

Stakeholder Engagement

Briefly, Seinerger participated in numerous CASE stakeholder engagement meetings and feels that the process failed to engage the right stakeholders. These meetings were full of utilities, clean energy advocates and LED manufacturers. Notably absent from all of these meetings were growers and grower trade groups who are numerous especially in California. The primary communication platform was an email list-serve of individuals who opted-in to email updates at www.title24stakeholders.com. The CASE team's research was all but unseen by cannabis operators, greenhouse operators and California farmers. We did not see any

evidence of outreach, advertising or call for engagement in any single cannabis publication or event. Lastly, the CASE team and the website “title24stakeholders.com” has the appearance of being sanctioned by the CEC and Title 24. However we learned from the comments submitted to the CASE team and from 1:1 conversations with CEC staff that the CASE team is not affiliated with the CEC and has no responsibility to report findings in a manner consistent with a public agency. The process of engagement with the CASE team felt disingenuous.

In conclusion, we don't know what we don't know yet about horticulture lighting and it is much too early to manage something that has not yet been measured. In the words of Dr Evan Mills, author of the Carbon Cost of Cannabis, in his earlier written comments to the CEC: ***“I am dismayed to see the Commission building code proceedings are taking a myopic approach to this without first looking at the broader and more fundamental problems with indoor cultivation....Higher-level analysis should be performed before charging ahead with a standard-setting process”.***

Recommendations to the CEC

- Reject the CASE report horticulture lighting proposal in its entirety.
- Propose mandatory energy disclosure for all facilities (horticulture and non-horticulture) over 750 kW peak load.
 - Mandatory energy disclosures are used in real estate markets (i.e.: in Seattle, New York, Austin) and are widely accepted as a valuable first step towards energy management.
 - Such an approach may lay the groundwork for facility or meter level energy management, rather than such a focus on a single element within a complicated and dynamic manufacturing process.
- Proposed mandatory lighting inventory for all horticulture facilities over 150 kW peak load. This simple effort will provide the elusive and invaluable baseline energy needed to design market interventions, utility programs, and claims from future codes and standards initiatives.
 - Work with the CDFA, who may be in a position of reporting and facility inventory design with growers already.

- Work with lighting manufactures to define easy collectable data (e.g.: single ended HPS, double ended HPS, T5 HO fluorescent, 1.6-1.9 PPE LED, 2.0-2.2 PPE LEC) that will not overly burden growers to report, and will allow grower flexibility.
- Create a workgroup with 75% growers and 25% manufacturers. Learn from the experts and practitioners.
- Acknowledge that **all cannabis growers are SB350 compliant thanks to the CDFA regulations** in place holding cannabis businesses (and no other businesses) to the same state renewable portfolio standards that are applied to utilities.

Kind regards,
Bob Gunn
CEO, Seinergy LLC