


4/20 v 4/22:

Earth Day & Weed Day are an Odd Couple

Evan Mills, Ph.D. Keynote for Washington Sungrowers Industry Association, April 22, 2021

Earth Day and Weed Day Are an Odd Couple

Evan Mills · 2 days ago · 5 min read



Zero-energy outdoor farm in Washington

Planned 80-megawatt indoor farm in California

Long before there was an Earth Day — and very long before there was a Weed Day, observed on 4/20 by those in the know — cannabis culture was aligned with environmental values. That went out the window when cultivation moved indoors, particularly conspicuously in California.

While this pair of April celebrations are separated by only a day, the expanding carbon footprint of indoor factory farming creates a chasm running wide and deep.

The local environmental effects of irresponsible outdoor cultivation are relatively well known, but scant attention has been paid to the arguably more serious global impacts of indoor methods, which, mind-bogglingly, require around 400-times as much energy pound-for-pound as needed to smelt aluminum.

In the rush to legalize, state governments from California to New York turned a blind eye to this elephant in the room as indoor cultivation quietly became the dominant industry practice. Federal agencies have also been

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To Make Cannabis Green, We Need to Grow It Outdoors

BY EVAN MILLS · MARCH 10, 2021 · 4:40 PM



It takes a lot of energy to grow cannabis indoors. — Joseph Lupo/Getty Images

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Cannabis may look green, but the environmental metaphor mostly stops there.

Virginia—the latest state to approach full legalization—and the 46 others that have implemented some degree of liberalization all share the dubious honor of doing so with little or no consideration of environmental consequences, particularly those stemming from the prodigious energy use associated with indoor cultivation. In one mind-boggling illustration of this, a new study says that Colorado's cannabis industry emits more CO₂ than its coal industry.

The Biden administration thus faces an acute disconnect between drug policy and environmental policy. Let's hope it nips the cannabis carbon bomb in the bud before recent pushes from the House and Senate—together with a stock-trading frenzy—usher in a full-on national market.

The cultivation of cannabis has long prompted concerns about water, land use, and pollution.

Golfers finish a round as massive Oregon wildfire rages behind them



By [Doug Criss](#), CNN

Updated 11:26 AM EDT, Thu September 7, 2017



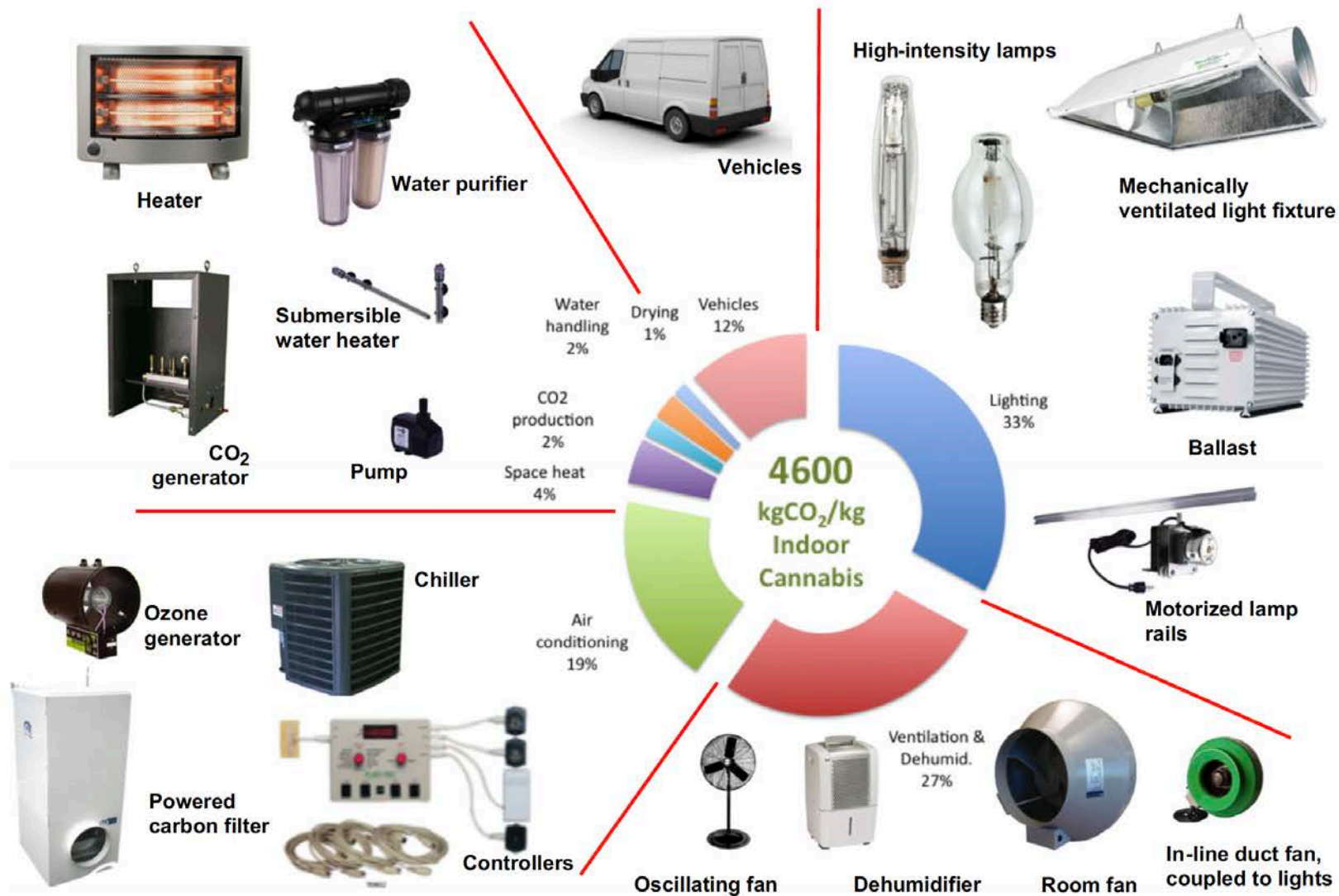
EAGLE CREEK GOLF COURSE/FROM FACEBOOK

Washington-state golfers “play through” as the 31,000-acre Eagle Creek fire in Oregon blazes in 2017 (CNN).

A whopping carbon footprint

My estimate from 2012:

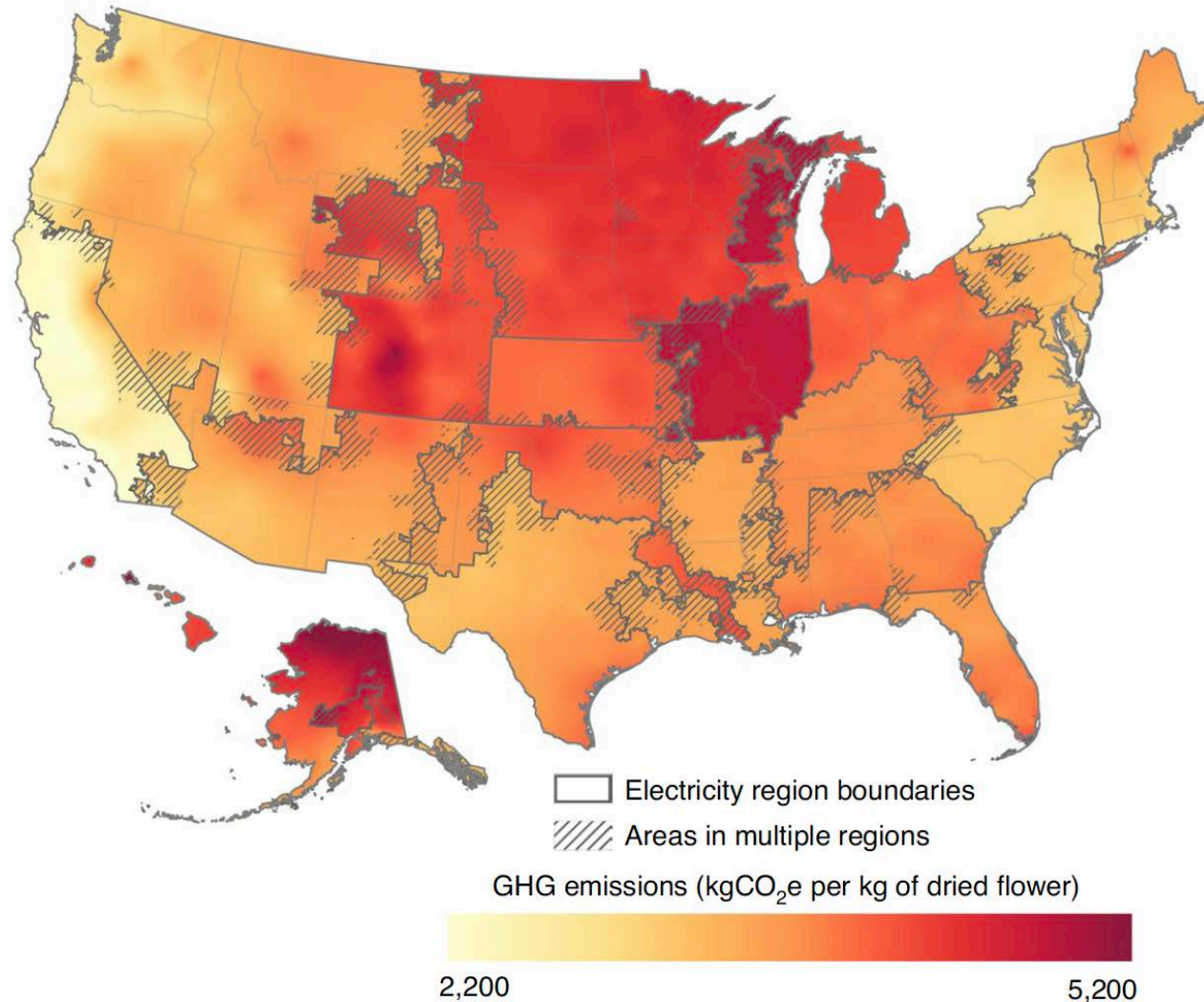
Cannabis cultivation emits ~4500-times its weight in CO₂



A coast-to-coast problem

2021 article from Colorado State University:
2,200 to 5,200 kg CO₂/kg flower, depending on location

a



Source: Summers, H.M. E. Sproul, and J.C. Quinn. 2021. "The Greenhouse Gas Emissions of Indoor Cannabis Production in the United States." *Nature Communications*.

The carbon emissions are like



400x as much per pound as smelting aluminum



One joint is like driving a 44-mpg car 22 miles



3 million cars nationally



60%

Colorado smoker's footprint is equivalent to 60% of their household carbon footprint



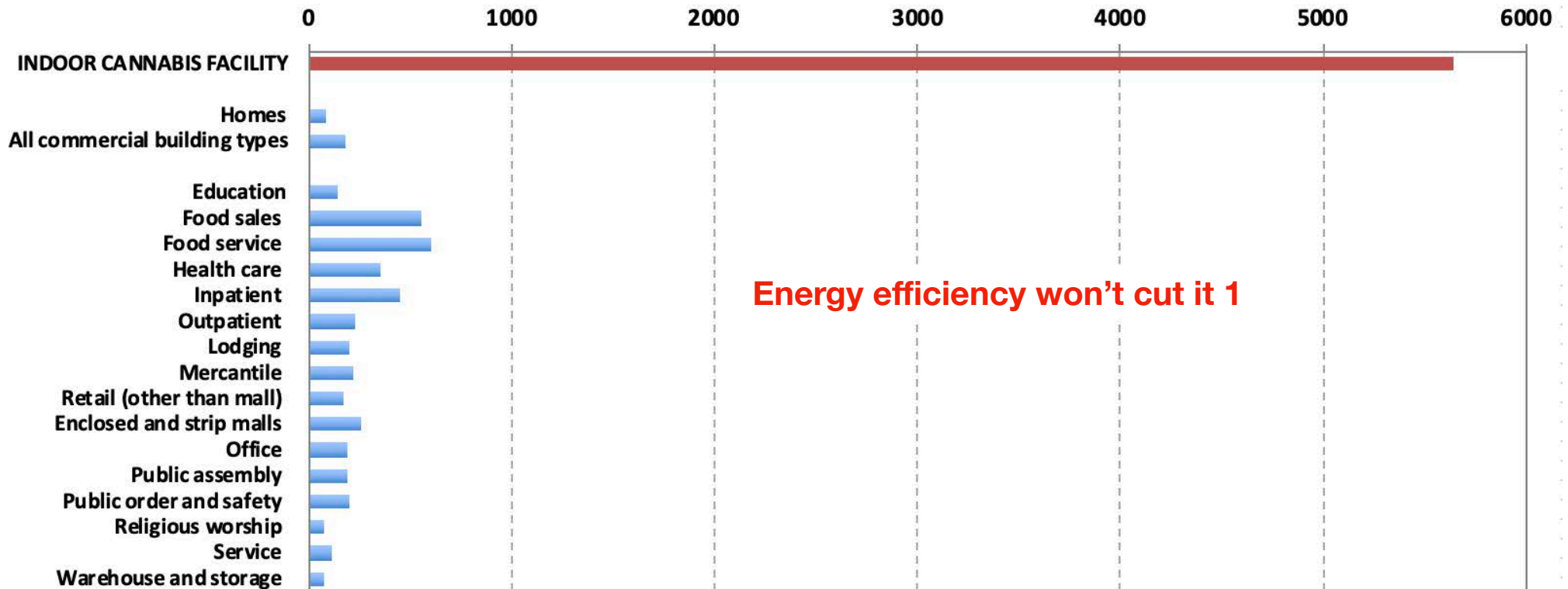
Greater than Colorado's 14 million tons/year coal production

Energy intensity is off the charts

Cannabis grows emit 10- to 100-x as much as other types of buildings

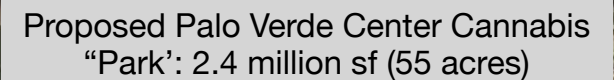
Energy intensity of indoor cannabis cultivation in context with conventional buildings

Primary energy for electricity production (kBtu per square foot per year)



Source: Mills, E. and S. Zeramby. 2021. "Energy Use by the Indoor Cannabis Industry: Inconvenient Truths for Producers, Policymakers, and Consumers." Chapter in *The Routledge Handbook of Post-Prohibition Cannabis Research*, D. Corva and J. Meisel, eds.

Requires ~25x the roof area in PV panels



**Solar array
area
needed for
net zero
energy**

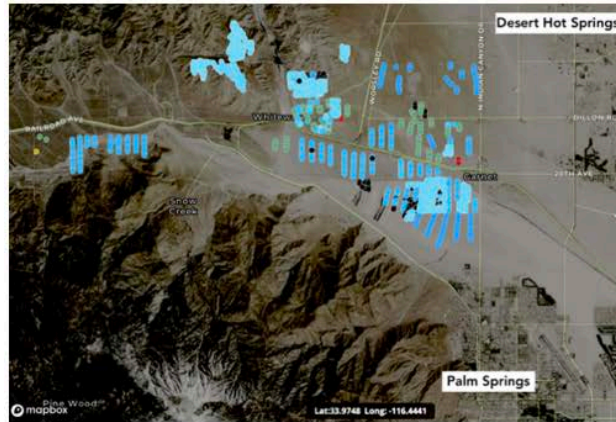
The Coachilla effect

Offsetting grid energy with solar/wind not realistic

Indoor cannabis energy stands to negate ALL the wind power installed *throughout* California



2,229 wind turbines in Coachella Valley, CA



663 megawatts of wind power across 40 projects



Large-scale indoor cannabis cultivation



Indoor cannabis facility, Cathedral City, CA

Coachella cannabis energy:
build-out with entitlements (16.1 TWh/y)

California wind energy in 2018
(14.2 TWh/y)

Coachella cannabis energy:
in development or proposed (10.4 TWh/y)

Coachella wind energy in 2019:
(1.5 TWh/y)

Coachella
cannabis
energy: 2019
(0.2 TWh/y)

Optimizing the suboptimal

Clean energy won't cut it, either



Looking before and beyond the grow

Carbon emissions common to sun-grown and indoor-grown



Transport



Retail



Inputs



Extracts & Preparations



Curing / Preserving

Water...

If you count evaporation from making electricity ... it takes 20-40 gallons/plant/day to grow *indoors*



What's needed?

- Be proud / Be sustainable
- Push for transparency
- Educate / Engage
 - Consumers
 - Budtenders
 - Investors
 - Green/ESG fund managers
 - Environmental organizations
 - Politicians

