Cannabis and Energy

MA Department of Energy Resources

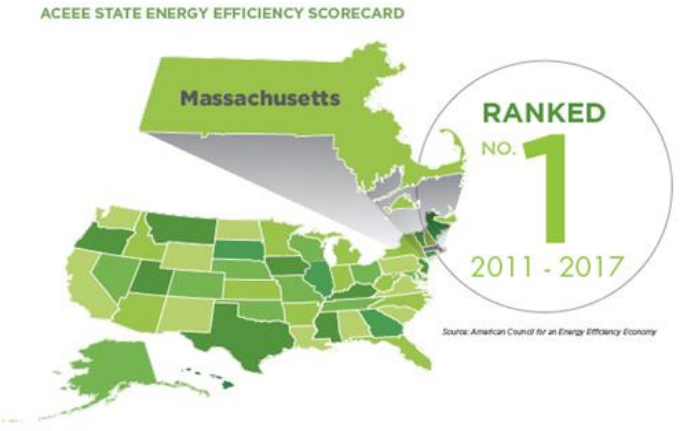
December 2018

Agenda

- Introduction to DOER
- Cannabis industry and Greenhouse Gasses
- Energy is NOT Just and Expense – It’s an Asset
  - Things you can do today to reduce energy impact
  - Longer term upgrades
  - Strategic energy enhancements
- Question & Answer

Massachusetts Energy Approach

- Reduce and stabilize the rising cost of energy for consumers
- Continue the Commonwealth's commitment to a clean energy future
  - GWSA GHG reductions: 25% by 2020 and 80% by 2050 (1990 baseline)
- Ensure that we have a safe, reliable, and resilient energy infrastructure
  - Ranked #1 by ACEEE for eight straight years (2011-2018) for our energy efficiency programs and policies
  - All EE offered under 1 statewide brand – Mass Save
  - 2016-2018 Three Year EE Plan has most aggressive energy efficiency goals in U.S.
  - 2019-2021 Plans in front of the DPU currently
  - 52,000 jobs and growing

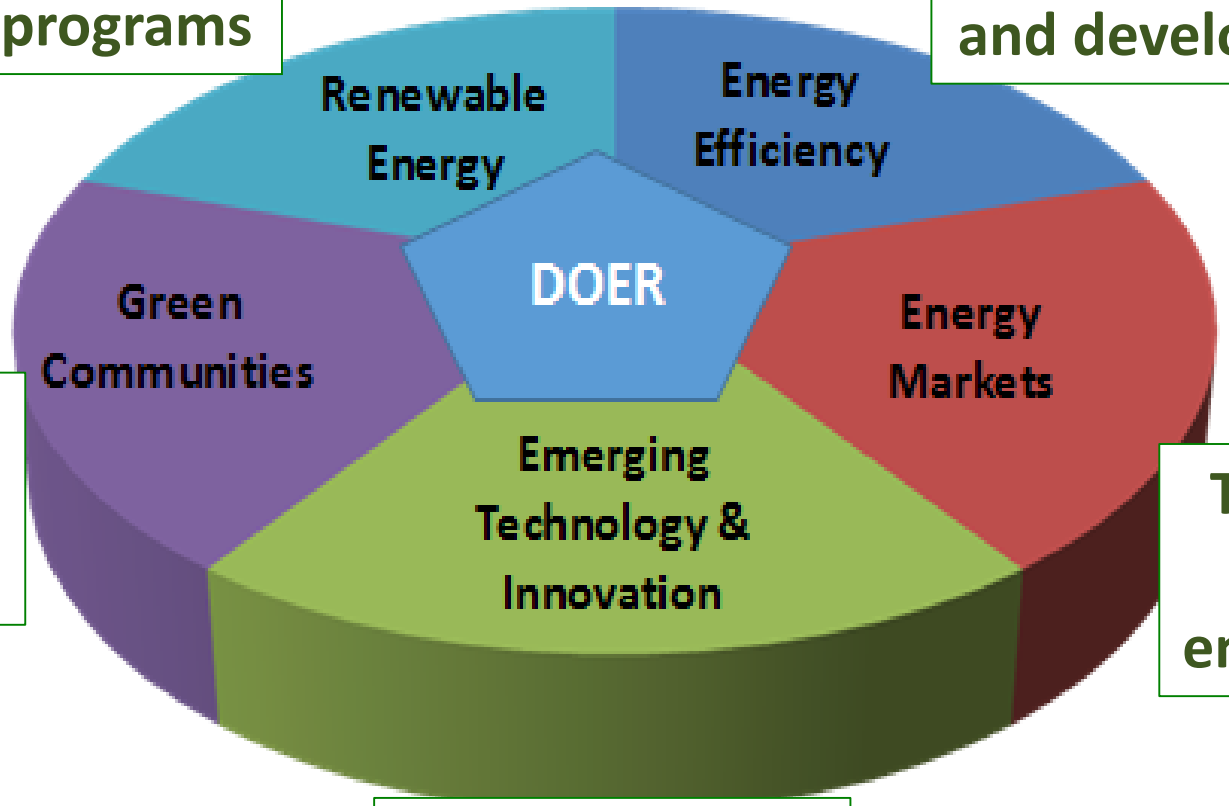


DOER Purpose and Organization

Creating a Clean, Affordable and Resilient Energy Future

Develops policies and manages RPS/APS programs

Chairs EEAC and supports innovation and development of EE



Supports cities and towns with grants, technical assistance

Tracks industry trends, develops policy for energy supply & security

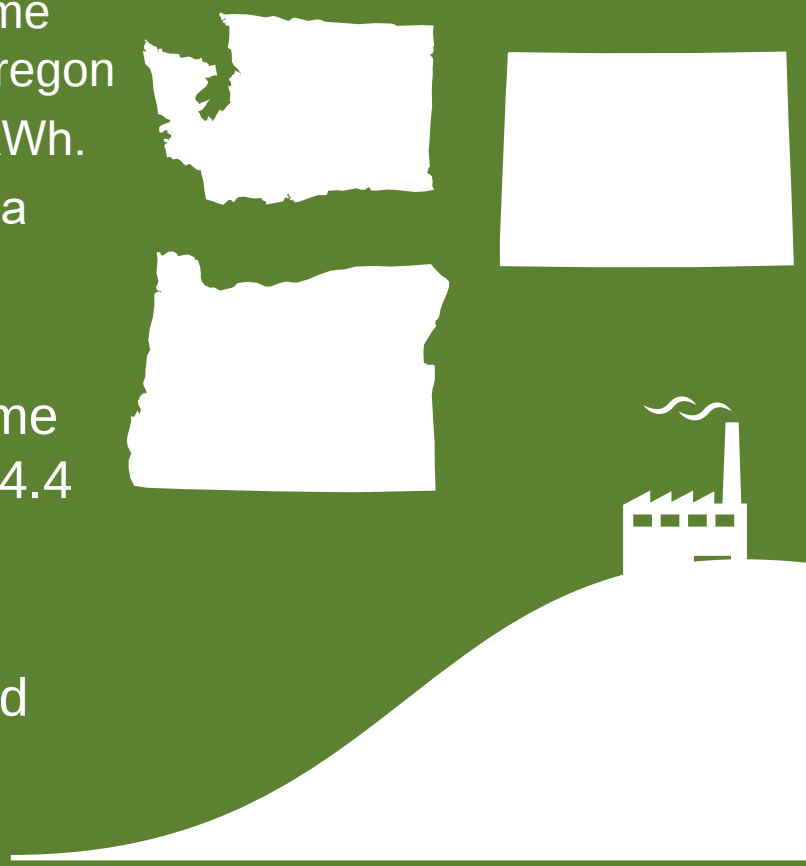
Smart Grid, Storage, EVs

The Cannabis Industry and Impact on Massachusetts Emissions

- Following the Global Warming Solutions Act (GWSA) Massachusetts must reduce emissions by 80% (below 1990 levels) by 2050
  - These emissions must account for all generation to cover electricity ***consumed*** by the Commonwealth
  - Therefore ***reducing the amount of energy use*** in the Commonwealth ***reduces our emissions***
- To meet the emissions targets, the Commonwealth must fully implement a suite of emission reduction policies in all energy sectors including electricity, transportation, and the building sector
  - In the most recent Clean Energy and Climate Plan (2020 CECP), All Cost Effective Energy Efficiency was the largest emission reduction strategy.
- The growth of a new industry, such as the cannabis industry, can have a significant impact on unpredicted energy consumption and meeting the GWSA targets.
  - Ensuring energy efficiency in the cannabis industry reduces energy consumption growth and limits new emissions attributed to the Commonwealth

Cannabis Energy Usage in Other States

- Other states with emerging recreational cannabis industries experienced increases in their electric usage in their first years of sales:
  - In 2014, Denver saw a 1.2% increase in electricity use; 45% of that came from cannabis[1]. Similar increases were also seen in Washington and Oregon
  - In 2015, Denver's 354 marijuana cultivation facilities used 200 million kWh.
  - Nearly 4% of Denver's electricity usage in now devoted to the marijuana industry.



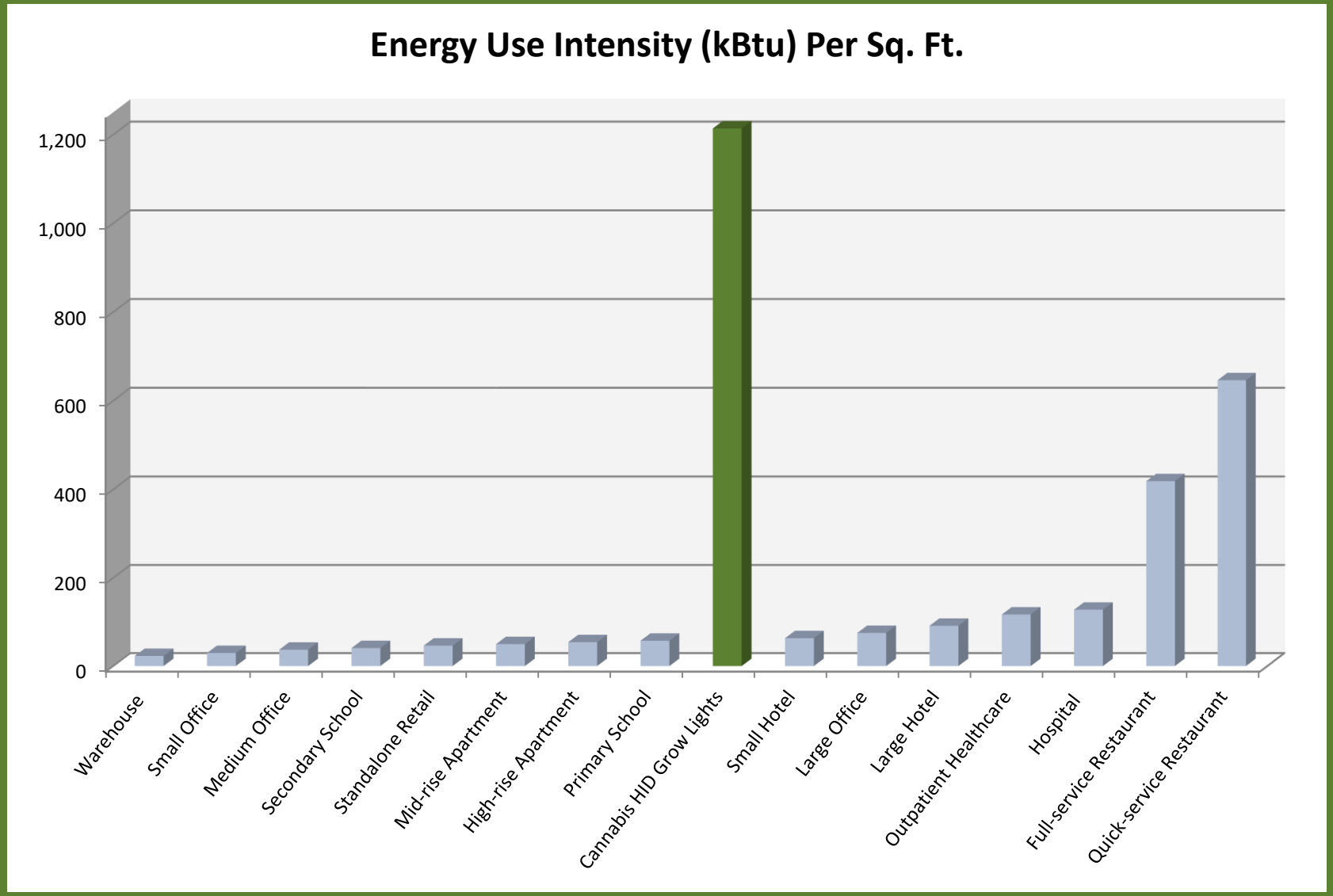
- Grow operations require about 360 kWh per 25 sq. ft. of space by some estimates. That means a 1 million sq. ft. facility would require about 14.4 million kWh.

- In 2018, producers are upgrading to energy-efficient lights, pumps and cooling systems to stay competitive in an environment with rapidly dropping wholesale prices

http://www.denverpost.com/2015/07/01/marijuana-growing-spikes-denver-electric-demand-challenges-clean-power-plan/
http://www.denverpost.com/2017/03/31/buzzkill-for-utilities-high-hopes-of-legal-weed-power-surge/
https://www.utilitydive.com/news/marijuana-grow-houses-boost-denver-power-demand-complicating-efficiency-pl/401751/

How Does the Energy Use of Indoor Cannabis Cultivation Compare to other industries?

- Energy Use Intensity (EUI) is a measure of how much energy a building uses per sq. ft.
- Most industries are well under 100 kBtu / sq. ft.
- The High Intensity grow lights (HIDs) in a marijuana cultivator facility are more intense than any other commercial or industrial use and it grows when all energy uses are considered (HVAC, dehumidification, et. al.)
- Other crops use LED grow lights with great success: carrots, potatoes, tomatoes and lettuce



https://www.prnewswire.com/news-releases/global-led-grow-lights-market-analysis--forecast--2016-to-2021-300539215.html

Energy Use – Indoor Growing

Lighting

Cooling

Dehumidification

- Cannabis cultivation facilities should be thought of as industrial/manufacturing – they have high energy use and are very energy intensive

- Much of the high energy use is caused by the type of equipment being used and the lack of energy efficient facilities.

3 Stages of Cannabis Growth

Propagation

3-5 weeks
18-24 hours of light per day
Lower intensity light

Vegetative

2-8 weeks
18-24 hours of light per day
High intensity light
High cooling needs
Dehumidification needs

Flowering

6-8 weeks
12 hours of light per day
VERY high intensity light
Very high cooling needs
High dehumidification needs

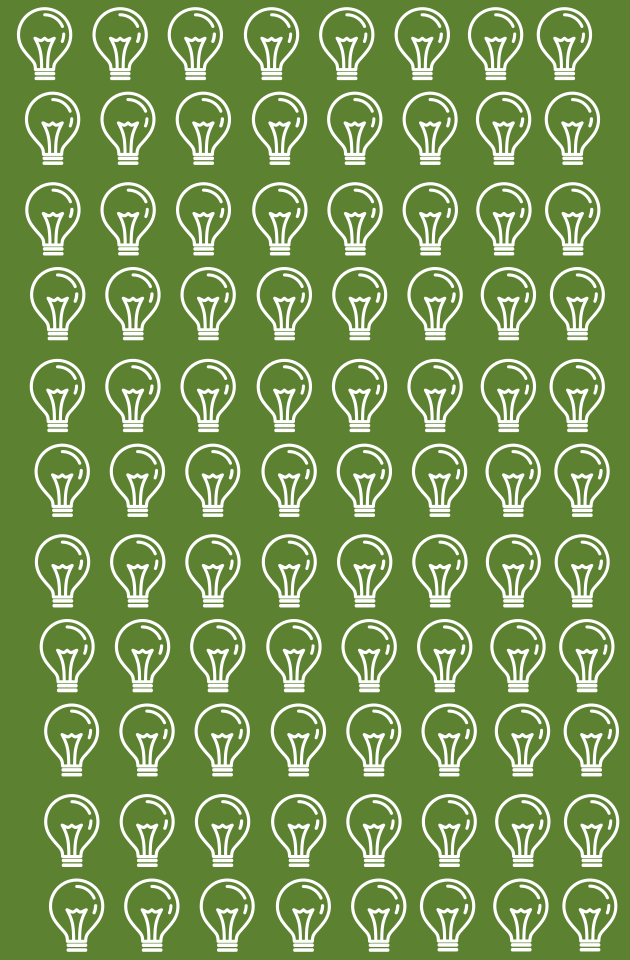
HID Lighting results in significant energy use

- High Intensity Discharge (HID) grow lights use 80x more energy than a 100w LED bulb (1050w vs 13w)
- HID lights are similar to 1970's streetlight technology.
- HID lights produce a significant amount of heat.
  - Cannabis cultivation facilities run AC all year to keep their plants at 65°-75° rather than 100°+.
- The energy consumption from the HID lights plus the consumption from the HVAC to combat the heat produced by the lights are top contributors to the energy concern of these facilities.

The energy used to power HID lights for an approximately 660,000 sq. ft. flowering grow space in MA could negate all LEDs installed in the DOER statewide LED streetlight replacement program. Over $11 million spent to convert over 130,000 streetlights

Intensity of a regular light

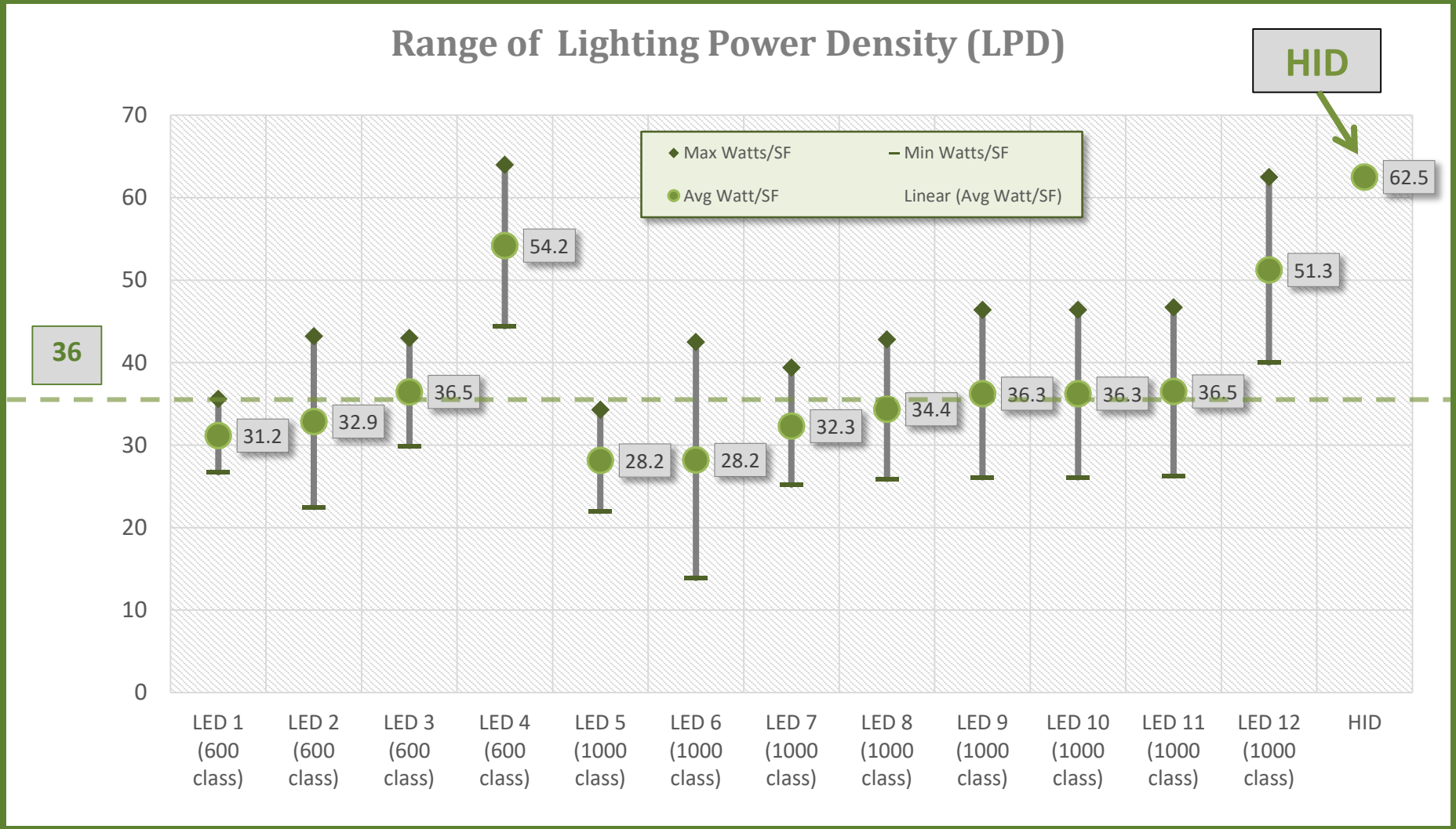
Intensity of a grow light



80 x

Lighting Power Density Standards

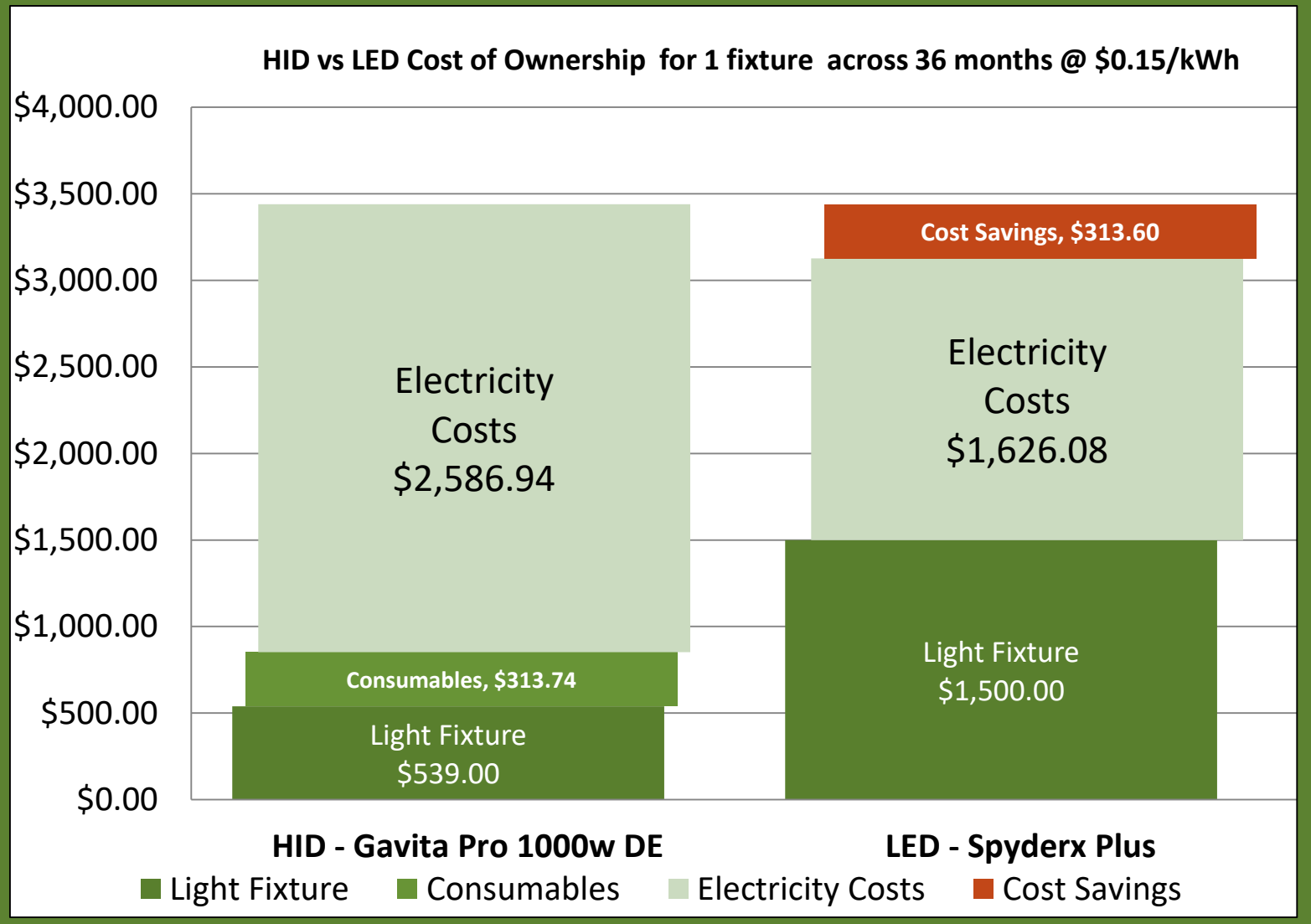
LED Fixtures LPD Sold by MA Grow Suppliers



- Lighting Power Density (LPD) – 36 watts per sq. ft. recommended by EEA
- LPD is an average measure across the production space – not a hard cap.
- Some grow phases may be above or below 36 watts per sq. ft

LED vs HID – Not a Significant Cost Difference

- 1000w equipment cost difference = $647
  - $314 reduction in 36 month energy spend per light by using LEDs
  - Equipment + Electricity lifetime =
    - HID: $3,439.68
    - LED: $3,126.08 ($314 less)
- Payback per light is 12 months.
- Comparing a typical commercial grow light vs a typical commercial LED grow lights
  Consumables for HID include new bulbs and reflectors.
  Assuming 2 additional lightbulbs and 1 reflector change in 36 months.
- Each light covers ~16-25 sq. ft. A facility could have thousands of lights.
- A facility with 1000 lights could save $313k in 36 months in just lighting electricity costs – more when considering HVAC and Dehumidification



+Estimate based on 15 hours usage per day, 365 days a year @ $0.15/kWh

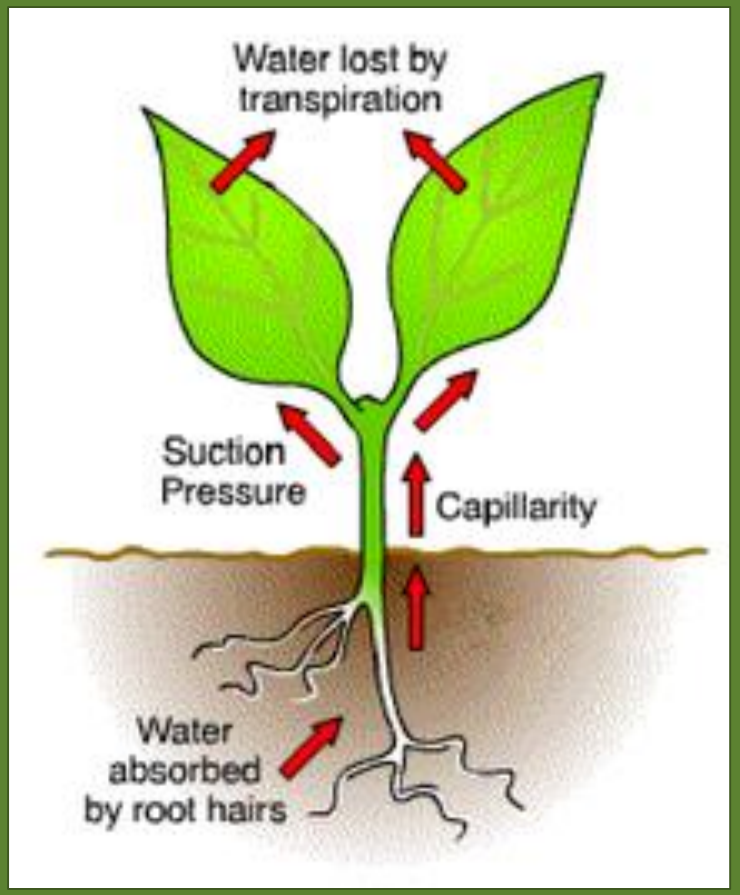
Cultivation of Marijuana Requires Significant Heating, Cooling, & Dehumidification

Heating & Cooling:

- Many growing facilities are re-using old buildings and are not being required to meet new construction building code.
- Many facilities tend to have leaky, under-insulated walls and ceilings which leads to HVAC systems being oversized or overrun.

Dehumidification:

- Unlike Colorado, the MA climate has a high dew point, causing growers to need to use dehumidifiers which require a significant amount of energy.
- The water transpires from the plant and creates a humid indoor environment which can cause mold and other parasites that can ruin the crop.



Energy is not just an expense – it is an Asset

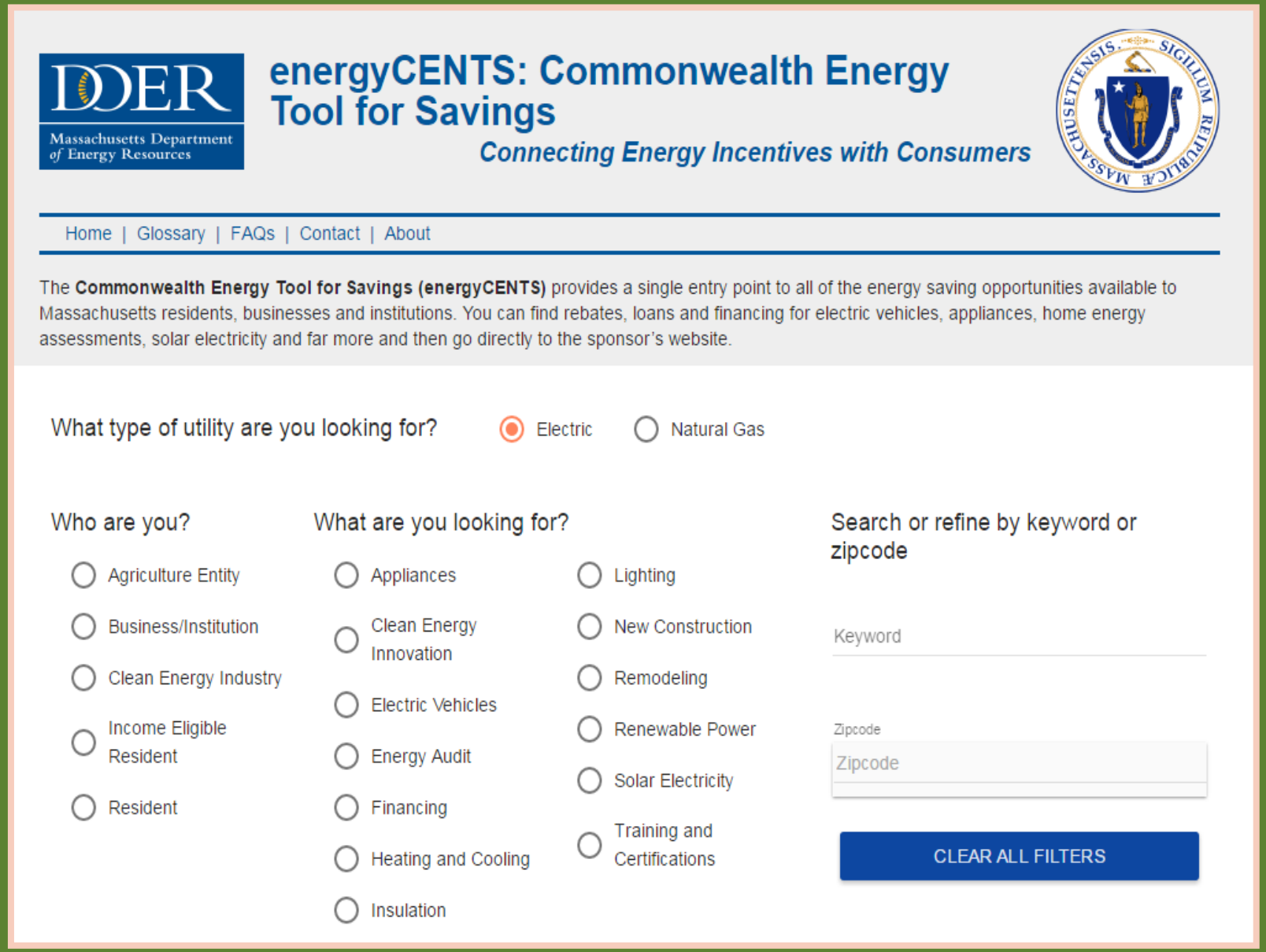
- Energy is the largest controllable expense for cultivators
- Energy efficiency and renewables can help a business be profitable
  - Financial Asset
    - Energy Efficiency reduces lifetime cost of facility
    - Renewable technology mitigates risk of energy cost changes
    - Demand management controls cost spikes
  - Resiliency and Safety Asset
    - Built to withstand disaster
    - Islanding to be self-sufficient in power outages
  - Mission-based Asset (Profits? Patient care?)
    - Maintains assets longer
    - Maximizes financial focus on key mission

Your First Stop – DOER energyCENTS

- MA has robust rebates and incentives for both energy efficiency and renewable energy projects.
- However, the current incentive and rebate infrastructure is requires multiple stops.

DOER developed a one stop website

- energyCENTS
- http://www.mass.gov/energycents



Today – Reduce Costs and Save Profits

- Energy cost savings directly impact to the bottom line
- Assume a Cannabis company is operating at a ~20% profit.
  - That means to make $1,000 in profit, $5,000 in sales is needed.
  - This means that $1,000 in energy savings has the same impact as $5,000 in sales
  - If profit margins fall, more sales are needed; at a 4% profit margin, $1,000 in energy savings is the same as $25,000 in sales.

- Competitive Energy Supply Bulk Purchasing
  - Can reduce the cost of your electric supply and reduce your bills.
  - Purchase renewable energy
  - No on-site work necessary

Today - Contact Energy Efficiency Programs

- MassSave provides no-cost energy efficiency audits, as well as trainings, rebates, incentives and financing.
  - Small Business program
    - Covers 70% of equipment costs
  - New Construction & Major equipment
    - Incentives for equipment, energy modeling, design
    - End of useful life equipment
- Mass Save® is an initiative sponsored by Massachusetts' natural gas and electric utilities and energy efficiency service providers.
  - http://www.masssave.com/business
  - Eversource, National Grid, Unitil, Cape Light
  - Columbia, Berkshire Gas, Liberty, Blackstone
- Municipal Light Plants (MLPs) – 41 in MA
  - http://www.mmwecgoprogram.org
  - https://www.ene.org/energy-efficiency/
  - Call your MLP directly

Today - Adjusting Schedules, Get Incentive$, $ave Money

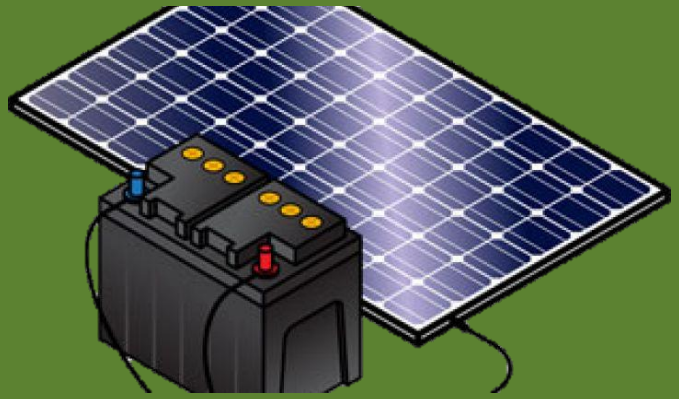
- Retrocommissioning (RCx)
  - Incentives for Retrocommissioning – A thorough review of the facility and equipment
  - Develop a plan for saving energy through low-cost and no-cost changes

- Strategic Energy Management –or – Continuous Energy Improvement
  - Instill a culture of energy efficiency and conservation
  - Optimize operations, save money, save energy

- Active Demand Management example
  - June-September are the hottest months, and where the grid has peak electric demand
  - Get a payment for reducing demand during a called event from 2pm-5pm 6 times a year.
  - Change grow room schedules and get paid for responding (90 minute reduction in light per room)
  - 2 MW reduction = $70,000 payment. Other revenue streams available.

Building Upgrades Can Mean Long Term Energy Stability

- Solar installations can provide long term price stability because you are generating your own electricity.
  - Electricity and Fuel prices are variable, with renewables you own the equipment to generate electricity and your energy cost is fixed
  - Solar can be paid for and financed, or done though a Power Purchase Agreement – owning is better.
- Battery storage can store electricity generated by solar systems for use later. Can reduce electricity demand.
  - SMART Program provides additional incentives for solar + storage
- Alternative Portfolio Standard (APS) – CHP, heat pumps, geothermal, fuel cells, et. al. generate alternative energy credits that can help defray operating costs.



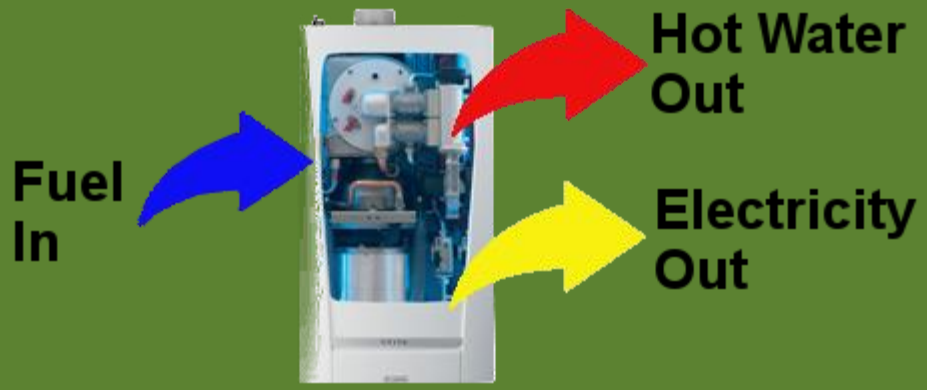


Photo Courtesy of https://www.renewableenergyhub.co.uk and http://www.greentechmedia.com

Other Energy Resources

- MA Clean Energy Center – Grants and rebates for renewable projects
- Office of Technical Assistance – confidential assistance to reduce use of toxics + energy advising
- MA Energy Efficiency Partnership – Education and outreach
- Building Operator Certification –
  - http://www.theboc.info/find-training/northeast/

Financing Energy Savings with PACE

- Property Assess Commercial Energy (PACE) financing was adopted as part of the energy legislation in August 2016.
- PACE will allow commercial property owners to finance energy efficiency, renewables, and gas line extensions as a tax assessment. This means financing for energy improvements will stay with the building even at sale.
- Some companies consider this off balance sheet financing
- This program is being developed by DOER and MassDevelopment

Current MA Practices in LEDs

Triple M Dispensary – Growing in Plymouth using LEDs

http://www.capecodtimes.com/photogallery/CC/20180203/PHOTOGALLERY/203009999/PH/1?start=2

Today's Indoor Agriculture is using LEDs

- Freight Farms started in 2010 and is based in Boston. They have modular, LED lit, shipping containers that grow crops in urban settings.
- The technology to grow crops in an energy efficient manner exists currently and is part of an existing thriving industry.

https://www.freightfarms.com/media-kit/

Thank you

Alex Pollard
Energy Efficiency Commercial Programs Manager
MA Department of Energy Resources
Alexander.Pollard@mass.gov