ENERGY EFFICIENCY IMPLICATIONS OF THE 2020 ILLINOIS CANNABIS REGULATION AND TAX ACT

PRESENTED TO THE ILLINOIS STAKEHOLDER ADVISORY GROUP (SAG)

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NAVIGANT
A Guidehouse Company

OUTLINE

OBJECTIVES

Introduction to the context and implications of HB1438:

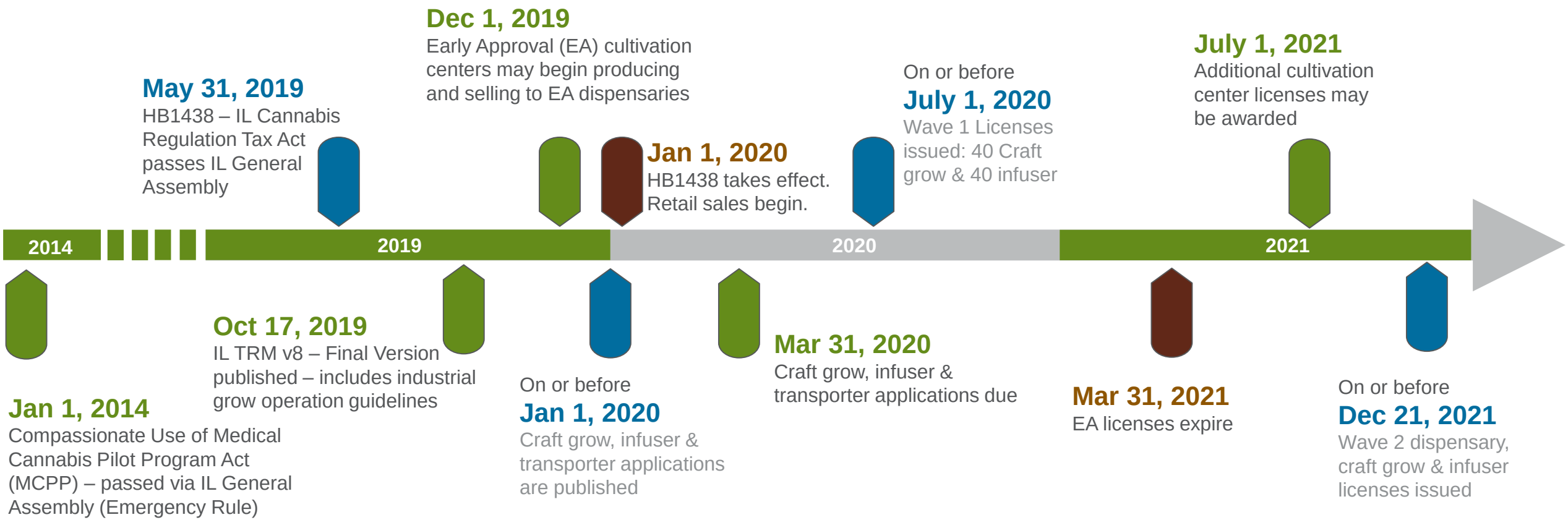
- Legislative Timeline
- Letter of the Law
- Impact on equipment selection and baselines
- Technical challenges with savings estimation
- Q&A

Measures covered:

- Lighting
- HVAC
  - Ductless Mini-split
  - Variable Refrigerant Flow (VRF)
  - Chilled Water
- Dehumidification
- Additional Opportunities

INTRODUCTION & OVERVIEW

LEGISLATIVE TIMELINE



Source: www.cannabisindustrylawyer.com/illinois-cannabis-license-timeline/

ILLINOIS CANNABIS REGULATION AND TAX ACT (AKA HB1438)

Adult Use Cultivation Centers (Subpart B) - Section 1300.102, Part D, Item #33
Craft Grower (Subpart D) - Section 1300.300, Part C, Item #21

A) Lighting

The Lighting Power Densities (LPD) for cultivation space commits to not exceed an average of 36 watts per gross square foot of active and growing space canopy, or all installed lighting technology shall meet a photosynthetic photon efficacy (PPE) of no less than 2.2 micromoles per joule fixture and shall be featured on the Design Lights Consortium (DLC) Horticultural Specification Qualified Products List (QPL). In the event that DLC requirement for minimum efficacy exceeds 2.2 micromoles per joule fixture, that PPE shall become the new standard;

B) HVAC

i) For cannabis grow operations with less than 6,000 square feet of canopy, the licensee commits that all HVAC units will be high-efficiency ductless split HVAC units, or other more energy efficient equipment; and

ii) For cannabis grow operations with 6,000 square feet of canopy or more, the licensee commits that all HVAC units will be variable refrigerant flow HVAC units, or other more energy efficient equipment.

Source: ILLINOIS DEPARTMENT OF AGRICULTURE, NOTICE OF EMERGENCY RULES, TITLE 8: AGRICULTURE AND ANIMALS, CHAPTER I: ILLINOIS DEPT. OF AGRICULTURE, SUBCHAPTER V: LICENSING AND REGULATIONS, PART 1300, CANNABIS REGULATION AND TAX ACT, SUBPART A: GENERAL PROVISIONS

ILLINOIS CANNABIS REGULATION AND TAX ACT (AKA HB1438)

What does this mean:

A) Lighting

- The Lighting Power Densities (LPD) for cultivation space commits to not exceed an average of 36 watts per gross square foot of active and growing space canopy [no distinction between vegetative and flowering], or
- All installed lighting technology shall meet a photosynthetic photon efficacy (PPE) of no less than 2.2 micromoles per joule fixture and shall be featured on the Design Lights Consortium (DLC) Horticultural Specification Qualified Products List (QPL).
- In the event that DLC requirement for minimum efficacy exceeds 2.2 micromoles per joule fixture, that PPE shall become the new standard.

B) HVAC

- For cannabis grow operations with **less than 6,000 square feet of canopy [i.e. craft grower, market entrant],** the licensee commits that all HVAC units will be high-efficiency ductless split HVAC units, ***or*** other more energy efficient equipment;
- For cannabis grow operations with **6,000 square feet of canopy or more [larger commercial grow],** the licensee commits that all HVAC units will be variable refrigerant flow HVAC units, ***or*** other more energy efficient equipment;

  Source: Id.

CRAFT GROWER – FUTURE HURDLE WITH EXPANSION

- **<u>Craft grower may contain up to 5,000 square feet of canopy space on its premises for plants in the flowering state</u>**

  - The Department may authorize an **increase or decrease of flowering stage cultivation space in increments of 3,000 square feet** by rule based on market need, craft grower capacity, and the licensee's history of compliance or noncompliance
  - This is for a maximum space of 14,000 square feet for cultivating plants in the flowering stage.

- **<u>Interpretation</u>: The HVAC requirements change at 6,000 square feet of TOTAL canopy**

  - Implication to monitor is that a craft grower who starts below 5,000 square feet of flowering canopy, but then applies for a 3,000 sq. ft. increase, is likely to become subject to the requirement for using VRF.

  - Unclear at this point how this requirement would be enforced.

TECHNICAL RESOURCE MANUAL (TRM)

IL TRM v8 excludes cannabis lighting

- TRM will need to be updated if this measure is to move to the prescriptive track

2020 IL TRM v.8.0 Vol. 2 - Section 4.1.11 - Commercial LED Grow Lights

- “Cannabis cultivation facilities are exempt from participation in this measure due to Illinois legislation…”
- “…code requirements dictate cannabis cultivation facilities use efficient lamp technologies and are not eligible for participation in this measure.”
- “This measure is designed for other interior horticultural applications that use artificial light stimulation in an indoor conditioned spaces.”

Source: 2020 IL TRM v.8.0 Vol. 2_September 20, 2019_FINAL Page 35 of 645

MEASURE SPECIFIC REQUIREMENTS & RAMIFICATIONS

LIGHTING

Requirement

- **The Lighting Power Densities (LPD) for cultivation space commits to not exceed an average of 36 watts per gross square foot of active and growing space canopy, or**
- **All installed lighting technology shall meet a photosynthetic photon efficacy (PPE) of no less than 2.2 micromoles per joule fixture and shall be featured on the Design Lights Consortium (DLC) Horticultural Specification Qualified Products List (QPL).**

Implications

- DLC requirement only applies for those pursing the maximum performance using PPE based rules.
- 36 watts per square foot is tight. LPD approach will likely limit production density; fewer plants in given floor area than in other states.
- LPD approach is open to non-DLC fixtures; beware low quality products that lack independent wattage verification.

Points of Consideration

- Canopy area expands as plant grows; unclear exactly when & how this space is measured or delineated.
- As of 2/1/2020 the DLC Horticulture QPL has 58 products from 18 manufacturers.
- Improved method would monitor site level impacts based on production efficiency metrics (kWh/pound of product produced)

HVAC – SMALL FACILITY

Requirement

- **For cannabis grow operations with less than 6,000 square feet of canopy, the licensee commits that all HVAC units will be high-efficiency ductless split HVAC units, or other more energy efficient equipment.**
- **Description of Ductless Mini-Split: Air source heat pump with compressor and fan coil located outdoors and one or more indoor fan coils with fan. Distribution system is non-existent with conditioned air delivered at the zone level. Building envelop penetrations are minimal: power and small refrigerant lines.**

Implications

- The baseline equipment for “craft” growers is more efficient than code minimum for other C&I applications.
- Savings, cost, and incentives are still possible, but are incremental from the minimum standard for air source heat pumps.

Points of Consideration

- Efficiency of multi-zone (multi-head) systems is dependent on the exact combination of outdoor compressor.
- Cold weather concerns mitigated in this application as loads are primarily cooling driven.

Photo Source: http://www.brighamhvac.com/ductless-mini-splits/

HVAC – LARGE FACILITY

Requirement

- **For cannabis grow operations with 6,000 square feet of canopy or more, the licensee commits that all HVAC units will be variable refrigerant flow HVAC units, or other more energy efficient equipment.**
- **Description of VRF: Very similar to ductless mini-split, but gains further efficiency by regulating the flow of refrigerant to match outdoor compressor operation to meet the loads. Particularly advantageous for multi-zone systems and situations where both heating and cooling loads are likely to occur simultaneously.**

Implications

- These systems are highly energy efficient and leave little room for incremental improvement.
- However, incremental savings opportunities do still exist within the range of products available in the VRF products.

Points of Consideration

- Incremental HVAC savings will be difficult to achieve for larger participants legally bound to deploy these (currently) state of the art systems.
- Systems integration such that dehumidification loads can be served by a single piece of equipment may offer one additional opportunity for savings, particularly if assessing overall building performance holistically.
- Further research needed to determine exactly how this measure will play out and what opportunities for program support may exist.
- General introduction to VRF system design and operation available from Carrier, here:
  - http://www.utcccs-cdn.com/hvac/docs/1001/Public/0B/04-581067-01.pdf

HVAC – VERY LARGE FACILITY

Requirement

- **… or other more energy efficient equipment….**

Implications

- Particularly large and well designed operations may elect to install a high efficiency chiller to supply both cooling and dehumidification.

Points of Consideration

- Chiller performance is dependent on part load; therefore, savings should account for expected performance during both active (lights on) and inactive (lights off) portions of the daily operations.
- Dehumidification end-use will add load to the chiller, but offsets the need for additional dehumidification; take a wholistic approach to savings analysis.
- Baseline for this system design is a chilled water system supplied by a chiller that meets the code minimum efficiency.

ADDITIONAL OPPORTUNITIES - DEHUMIDIFICATION

Requirement

- **Nothing explicitly stated.**

Implications

- Non-trivial savings opportunity for standalone equipment.
- Task partially addressed by HVAC equipment. Look for opportunities to integrate between systems.

Technical Complications

- Difficult to forecast water removal load per year.
- Growers are responsible for carefully tracking water use and recovery. Source for data to improve future savings estimates.
- Recommend monitoring and iterative, annual data review to hone savings estimates.

ADDITIONAL OPPORTUNITIES - OTHER

Opportunities NOT Addressed by HB1438

- **Air Filtration**
- **Computing (UPS)**
- **Fans**
- **Pumps**
- **Building Envelope**
- **Daylighting**
- **Heat Recovery**

Implications

- Program offerings targeting cannabis production have opportunities to support energy savings beyond the scope of HB1438.
- Measure guidelines and savings algorithms available in IL TRM v8

Technical Complications

- Systems level integration may require at least basic energy modeling.
- Grower risk aversion to unfamiliar products and techniques.
- Steep cost for licensing, insurance, and other start-up expenses are likely to pose an added barrier to funding ECMs.
- General capital & lending constraints.

CONCLUSIONS

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Efficiency standards set in HB1438 DO NOT PRECLUDE additional program supported savings

- However, the baseline efficiency requirements are firm, therefore, BOTH incremental costs and savings are lower than other C&I applications where a standard code baseline applies.

Additional equipment and savings opportunities exist in the grow facility beyond that addressed in HB1438

- Look beyond individual widget based approach to define savings at the facility level.
- Promote savings not only at the end-use level, but through controls and broader systems integration.

Added cost for legal production is passed through to the customer – may encourage continued grey markets

- License and application fees
- Upfront building costs
- Product Tracking (Staff time and equipment)
- Security Equipment
- Taxes

Implementers & evaluators will need to collect more detailed system specific operational & performance data beyond the standard for more common C&I projects given the lack of history for these measures

IL Dept. of Agriculture is responsible for enforcement with ability to revoke licenses

DISCUSSION

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Q&A

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