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Seminar 67: Standards and Regulations Affecting HVAC Systems Used in the US Controlled Environment Agriculture Market

Energy Policies Regulating U.S. Cannabis Production Facilities

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Learning Objectives

Understand the pending Title 24 legislation in California for Controlled Environment Horticulture and its influence on HVAC system selection.

Understand the kinds of policies regulating cultivation facilities for cannabis and hemp products.

Determine the impacts of policies on building system design and operation.

Outline/Agenda

Energy Policies Regulating U.S. Cannabis Production Facilities

- Types of regulations
- States regulating controlled environment agriculture facilities
- Impacts on building system design
- Recommendations for HVAC professionals evaluating effective climate control systems to serve CEA applications

Regulations

Sources of regulations:

- Licensure requirements for cannabis businesses
- Building energy codes

Regulations address:

- Consumption of resources
- Production of emissions
- Resource efficiency and conservation

Regulations

Consumption & conservation of resources:

- Energy
- Water

Production of emissions

- Biomass / substrate waste
- Packaging waste
- Wastewater

Regulations

States regulating controlled environment agriculture facilities:

- Massachusetts
  - Now: Cannabis
- Illinois
  - Now: Cannabis
- California
  - Now: Cannabis in some regions
  - Next code cycle: All of CEA

Massachusetts

Cannabis Control Commission regulates:

- Cannabis production facilities (indoor, greenhouse, outdoor)
- CCC requires annual benchmarking of:
  - Energy consumption
    - Electricity
    - Fuels
  - Peak electric demand
  - Water consumption
  - Cannabis flower production

Massachusetts

- Cultivators are also required to:
  - Engage with energy efficiency programs (Mass Save)
  - Provide a certification from a Massachusetts Licensed Mechanical Engineer that the:
    - HVAC and dehumidification systems meets the Massachusetts State Building Code as specified in the regulations
    - Systems have been evaluated and sized for the anticipated loads of the facility

Illinois

Illinois Department of Agriculture regulates:

- Indoor cannabis production facilities
- Indoor cultivators are required to:
  - Submit a resource management plan detailing estimates of use and management of energy and water
  - Describe adoption of sustainable energy/water use and conservation policies and waste reduction policies
  - Describe extent of on-site energy generation

Illinois

- Indoor cultivators are also required to:
  - Commit to use automated watering systems, including, but not limited to, drip irrigation and flood tables, for irrigation
  - Commit to measure runoff from watering events and report runoff volume in water usage plans,
  - Commit that on average, watering events shall have no more than 20% of runoff of water.

Illinois

- Indoor cultivators are also required to:
  - Use efficient HVAC equipment:
    - For smaller cannabis grow operations: use high-efficiency ductless split HVAC units, or other more energy efficient equipment
    - For larger cannabis grow operations: use variable refrigerant flow HVAC units, or other more energy efficient equipment
  - Commit to capturing HVAC condensate, dehumidification water, excess runoff, and other wastewater and filtering for reuse
  - Report energy use and efficiency as required by rule

California

In some regions of California, some counties regulate:

- Cannabis production facilities (indoor, greenhouse, outdoor)
  - For example, Ventura County requires that indoor and mixed light cannabis production facilities demonstrate at least a 25% reduction of anticipated conventional energy use with energy conservation or energy generation infrastructure.
    - Regulations require submission of an Energy Conservation Plan with documentation verifying annual energy use
    - Alternative compliance: enroll in a 100% green power program

California

In some regions of California, cities regulate:

- Indoor cannabis production facilities

	City	Energy Efficiency Requirement	Renewable Energy Requirement	Annual Reporting Requirement	Minimal/Other Requirement
1	San Francisco*		X	X	
2	Sacramento	X			
3	Long Beach*	X		X	
4	Oakland*	X	X	X	
5	Chula Vista			X	
6	San Bernardino*				X
7	Modesto*				X
8	Moreno Valley		X		
9	Hayward	X			
10	Salinas				X
11	Berkeley	X	X	X	

*Cities did not participate in questionnaire; information was obtained through individual city webpages and/or municipal codes.

California

California is currently promoting best practices and refining regulations for all of Controlled Environment Horticulture (CEH) for the 2022 code cycle.

- Title 24 is being revised to include requirements that will affect:
  - Indoor cannabis production facilities
- The final CASE report proposes three submeasures related to CEH facilities:
  - Horticultural lighting minimum efficacy
  - Efficient dehumidification
  - Greenhouse envelope standards

Efficient Dehumidification

Applies to newly constructed indoor facilities and HVAC and dehumidification replacement systems in existing indoor facilities.

Proposes to exempt CEH facilities from the prescriptive requirement to install an air-side economizer where the use of an air economizer in controlled environment horticulture spaces will affect crop health, or dehumidification system, or carbon dioxide enrichment system.

California

Indoor growing facilities must use of one of the following dehumidification systems:

- Stand-alone dehumidifiers that meet the following minimum integrated energy factors as measured by the test conditions in Appendix X1 to Subpart B of Part 430:
    - Minimum integrated energy factor of 1.77 L/kWh for product case volumes of 8.0 cubic feet (0.23 cubic meters) or less
    - Minimum integrated energy factor of 2.41 L/kWh for product case volumes greater than 8.0 cubic feet (0.23 cubic meters)

California

Indoor growing facilities must use of one of the following dehumidification systems:

- Integrated HVAC system with on-site heat recovery to achieve designed to fulfill at least 75 percent of the annual energy for dehumidification reheat;

- Chilled water system with on-site heat recovery to achieve designed to fulfill at least 75 percent of the annual energy for dehumidification reheat; or

- Solid or liquid desiccant dehumidification system for system designs that require a 50°F (10°C) dewpoint or less.

Impacts

Regulations impact on building system design:

- Can reduce emissions associated with energy sources
  - Influence adoption of on-site energy generation
  - Accelerate electrification
- Can improve integrity of building envelope
  - Influence effectiveness of HVAC equipment
- Can affect selected lighting system type
  - Influence HVAC loads and sensible heat ratio
- Can affect selected HVAC system type
  - Influence facility energy performance and production of emissions

Conclusions

HVAC professionals evaluating effective climate control systems to comply and perform for CEA should:

- Understand the policy landscape affecting facilities at the state and local level
- Design and build facilities to comply with regional codes and licensure requirements
- Help CEA producers achieve competitive performance by designing and installing efficient HVAC systems to serve cultivation processes

Bibliography

Massachusetts:

https://www.mass.gov/doc/935-cmr-500-adult-use-of-marijuana/download

https://mass-cannabis-control.com/wp-content/uploads/2018/03/Reposted-031218-CCC-Final-Regulations-with-disclaimer.pdf

Illinois:

https://www.ilga.gov/legislation/publicacts/101/101-0027.htm

California:

https://vcportal.ventura.org/cannabis/20201224_VenturaCountyApplicationProcedureGuidelines_FINAL.pdf

https://vcportal.ventura.org/cannabis/Cannabis_Energy_Conservation_Plan_12-22-2020.xlsx

https://scholarworks.sjsu.edu/cgi/viewcontent.cgi?article=1946&context=etd_projects

https://title24stakeholders.com/wp-content/uploads/2021/03/2022-T24-NR-CEH-Final-CASE-Report_w-Addendum.pdf

Questions?

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