Indoor Agriculture and the Opportunity for the 2018 IECC

Indoor agriculture has largely been in the realm of science fiction until recently. Today, startup companies are using artificial lighting to grow food, medical and recreational crops in indoor facilities. There are several primary trends driving this growth: the plummeting cost of high quality LED lights intended specifically for crop production, an increasing focus on local high-quality food in cities, and marijuana coming out of the shadows and becoming a legitimate industry.

Energy use in the burgeoning expansion of indoor agriculture is entirely unregulated. Practices between growers span a wide continuum between garage-scale operations and automated industrial facilities. City code officials are faced with all sorts of questions around indoor agriculture, including issues around energy use, electrical, fire, life safety, water quality, air quality, and more.

What can I do?
Vote! Vote for CE-200 as modified. If you are a voting member of the ICC, vote yes for NBI's public comment to CE200 either in person at the Kansas City hearings or through ICC's online voting system (cdpaccess.org). **Use your vote to make indoor agriculture energy efficient.**

Why is CE 200 such an important vote for code officials?

CE 200 addresses perhaps the fastest growing single energy application in the United States. Indoor agriculture is rapidly expanding because of a potent combination of policy, technology, and market factors. In some areas, it is already putting a strain on electric distribution networks. The equipment used in these facilities varies dramatically, from fluorescent or even incandescent consumer-grade lamps to color-tuned purpose-built LED fixtures. Project-level choices have huge energy implications.

Voting for the Modification to CE-200 is the code officials' only opportunity to provide this critically important model code language to jurisdictions across the nation. Failure to approve requirements for the 2018 IECC will delay action on this issue until at least 2021 for the next version of the IECC. By the time those codes become effective in the 2020s, many millions of square feet of facilities will have already been built out, and a huge opportunity will be lost. It is imperative that code officials be provided this model code language in the 2018 code cycle.

How fast are these loads growing?

The indoor agriculture industry's impact on regional loads is mostly manageable – for now. However, on a local scale already there have been cases in which high demand has caused overloaded transformers to fail. In one case (Pacific County PUD, WA) a new substation is being built to serve a marijuana growing complex that will draw 35 MW (for comparison, the local PUD's largest existing customer draws 6 MW).

The Northwest Planning and Conservation Council projects that indoor marijuana growing operations alone will add as much as 300 average MW by 2035 to the northwest states. That is equivalent to 3% of total regional electricity demand.

In Colorado, Xcel energy says 45% of its load growth is due to indoor marijuana cultivation operations. And startups from Silicon Valley to the heartland are emerging to grow high-value food crops indoors in major and mid-sized cities.

Is this only about marijuana?

The rapid shift in many parts of the United States toward increasing acceptance of marijuana is driving much of the energy load growth, technology innovation, and commercial enterprise in the indoor agriculture sector. Fully 25 states and the District of Columbia have already legalized marijuana in some form as of 2016. Four states have legalized recreational marijuana already, and full legalization measures are likely to be on the ballot in another eleven states in fall 2016. A survey of the list of approved producers provided by the Washington State Liquor Control Board reveals that more than half of producers choose indoor production (NWPCC Seventh Power Plan[1]).

However, indoor agriculture operations not related to marijuana are expanding too. The price of LEDs has fallen dramatically in the past few years and local food movements in cities are driving increased demand for fresh high-quality produce. More restaurants are interested in sourcing ingredients directly from nearby producers, and in dense urban areas a growing number of new indoor agriculture operations have begun to meet this demand.

What is the energy intensity of these facilities?

In general, indoor agriculture facilities are some of the most energy intensive buildings out there. Typically, the energy intensity of an indoor agriculture facility will be similar to that of a data center. The energy in the facility is used by three primary main end-uses:

1. Lighting is the most energy-intensive end-use, accounting for between one third and one half of total energy use. The lighting technology type used makes a huge difference here. Many growers use 1,000 Watt High Intensity Discharge (metal halide or high-pressure sodium) lamps, often with integrated ventilation to shed waste heat. Light Emitting Diodes are beginning to take significant market share. Some growers still use fluorescent or even incandescent lamps.
2. Ventilation and dehumidification accounts for approximately one third of the total energy use. In some facilities these are purpose-built systems designed by knowledgeable mechanical engineers using commercial-grade HVAC equipment; in other cases the equipment tends more toward the oscillating fan and plug-in dehumidifier.
3. Air conditioning may account for a quarter of total energy use, particularly in facilities with wasteful lighting practices and minimal ventilation. In some cases, growers burn propane or natural gas in unvented appliances specifically to generate CO^2 for plant photosynthesis, and this heat must be mitigated by added air conditioning capacity.

1 The Northwest Power and Conservation Council publishes plans, updated every five years, to ensure the region's power supply and acquire cost-effective energy efficiency. The Seventh Power Plan was published in February 2016 and is available at: https://www.nwcouncil.org/energy/powerplan/

Contact:

If you have questions on the Indoor Agriculture Energy initiative, please contact: Jim Edelson
jim@newbuildings.org

nbi new buildings institute

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