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Ian Atkins Comments on CEH Pre-Rulemaking Draft

Additional submitted attachment is included below.

Hello,

I previously submitted comments (TN #271531) on the Final CASE Report for Controlled Environment Horticulture. The CASE Team responded to my comments in its letter (TN #272957).

The latest Pre-Rulemaking Draft does not fully incorporate all of the changes the CASE Team said they would make in their response. However, my broader comment on the draft is that it continues to impose a large number of requirements without demonstrating the energy savings attributable to many of those individual requirements. And, these requirements would limit some good options for these facilities. I am compelled to continue commenting to try to avoid these regulations from limiting common and energy efficient options that are currently applied and avoid setting misguided precedent for future regulations, such as future additions to ASHRAE 90.1.

1. Previously agreed revisions were not incorporated into the Pre-Rulemaking Draft

In their response to my prior comments, the CASE Team stated:

"The Statewide CASE Team will recommend new language to allow the use of multiple pieces of single-stage equipment in 908.1.6.2.2.2 in Section 3 of this document…"

However, the Pre-Rulemaking Draft does not include this revision. Section 908.1.6.2.2.2 still requires a minimum of two stages of cooling capacity and at least two stages of fan control for unitary equipment.

The CASE Team also agreed that a chilled-water cooling system used with standalone commercial dehumidifiers should explicitly be allowed, but this change was also not added to the Pre-Rulemaking Draft.

I continue to support allowing single stage DX cooling units and chilled water cooling in decoupled systems. However, these revisions alone do not resolve my broader concern that the proposal continues to limit good, efficient system options and that many of the proposed requirements lack an energy efficiency basis.

2. The proposed measure has changed substantially during the CASE process, and the technical basis should be reevaluated against the requirements that are actually being proposed

As I noted in my comments on the Final CASE Report, and is then acknowledged in the response from the Case Team the modeled comparison is between a "representative current-code, fixed-capacity decoupled system and a representative integrated system meeting the proposed package".

The premise of the CEH space-conditioning proposal also changed substantially between the Draft CASE Report, Final CASE Report, and the current Pre-Rulemaking Draft.

The Draft CASE Report used the modeled comparison to support moving the code away from decoupled systems toward what it described as "much more efficient, better

performing, integrated equipment." I opposed the premise that integrated equipment is more energy efficient in general or on average than decoupled systems in comments directly to the CASE Team, and that narrative has been largely removed.

Despite this evolution in the underlying premise, the same modeled comparison -- a decoupled baseline against a representative integrated system -- continues to provide much of the energy-savings basis for the proposed requirements.

In other words, the CASE Team modelled a decoupled system vs an integrated system with particular modeled features, and is using that comparison to justify the proposed requirements to both integrated and decoupled systems, without showing that each of the proposed requirements for each system type will save energy compared to the current requirements for each system type.

3. The proposed requirements unnecessarily restrict equipment and system architecture without demonstrating the energy benefit of many of those restrictions

Several provisions illustrate this concern, in addition to the revisions discussed in Point 1.

First, I continue to object to the restriction in Section 908.1.6.2.2.2 that effectively limits qualifying unitary equipment to capacities of 65,000 Btu/h and greater. This excludes common and potentially efficient equipment such as mini-splits and nominal 5-ton condensing-unit/AHU systems.

The CASE Team's response explained that the 65,000 Btu/h threshold corresponds to more stringent federal efficiency standards that will apply beginning in 2029. No modeling was performed to demonstrate the energy efficiency of these more stringent federal requirements in grow facilities, so I believe this unnecessarily restricts a type of equipment that is currently commonly applied in these facilities, and in the case of mini-splits, usually very energy efficient.

I also oppose the requirement in Section 908.1.6.2.5 that a decoupled system including dehumidifiers be controlled by a central control system. A central control system may provide operational benefits, but the CASE Report has not demonstrated the HVAC energy savings attributable to requiring this particular control architecture instead of local AC and dehumidifier controls. Local dehumidifier and AC controls can and are often manually staged by setting different temperature and humidity setpoints at the various local controllers.

I also opposed 908.1.6.2.6. It is important to realize conceptually that a dehumidifier only runs on a call for dehumidification (humidity is above setpoint). So whenever a dehumidifier runs, it is because it is called for, meaning the air condition system is not meeting the dehumidification load alone. Therefore, in a decoupled system a dehumidifier runs when the cooling system is not meeting the humidity load alone. It is true that in combination with an integrated unit, the humidity load can either be addressed via reheat or with the dehumidifiers running. It is not demonstrated in the CASE Report that

sequencing reheat preferentially to the dehumidifiers saves energy, so this should not be required.

In addition, I continue to object to Section 908.1.6.2.2.1.2, which requires at least 80 percent of the peak sensible and latent load to be met by the “integrated system”, in the case an “integrated” unit is used.

The CASE Team's response to my earlier comments acknowledges that the Final CASE Report “does not establish 80 percent as a uniquely energy-optimal division of capacity.”

If the analysis does not establish that 80 percent is necessary to achieve the energy objective, I do not believe a mandatory ratio between integrated and supplemental dehumidification capacity is justified.

I support requirements intended to minimize electric resistance or combustion reheat. The existing requirement that at least 75 percent of annual dehumidification reheat energy be provided through onsite heat recovery serves a clear energy objective, and increasing that requirement to 90 percent could provide additional benefit.

However, the proposed regulation requires up to 90% of the “heat of rejection” to be recovered vs 75% of “annual energy for dehumidification reheat” in the existing rules. This could unnecessarily restrict cooling units that recover lesser percentages of the heat of rejection that are incorporated into systems with dehumidifiers and that do not require any resistance or combustion reheat.

For example, an integrated system that recovers less than 90 percent of its heat of rejection, such as 50 to 70 percent, should be allowed if paired with standalone dehumidifiers that minimize or eliminate the need for resistance or combustion reheat. This may require dehumidifiers in a greater proportion than the requirement for 80 percent of the load to be met by the integrated system would allow. This system architecture is effectively similar to a decoupled system, but with some amount of hot-gas reheat on the cooling unit. There is nothing inherently inefficient about this system configuration as long as it uses little or no combustion or resistance reheat.

If the complete system satisfies the dehumidification and temperature requirements without material reliance on electric resistance or combustion reheat, the energy objective has been achieved regardless of whether the heat is supplied by the integrated unit, the dehumidifiers, or both.

The requirement for SHR and fan in integrated systems are also poorly defined. The proposed regulations say SHR must be able to modulate but I do not see it defined how much. Similarly for supply fan, there is a requirement to vary the supply fan based on unit operation, but no required amount is given.

In 908.1.6.2.3, I don’t have fundamental issue with requiring a recovered reheat capacity ratio greater than 0.9, other than the potential for confusion or misinterpretation, since I don’t see “reheat capacity ratio” defined anywhere and I am unfamiliar with this phrase.

This is also unnecessary since standalone dehumidifiers by definition of “standing alone” in the space recover and reject all their heat into the space.

On a side note, the current draft also appears to retain a detailed mandatory CEH load-calculation and sizing procedure in NA7.21.3. My understanding from prior stakeholder discussions was that the appendix-specific load calculation would not remain a mandatory compliance requirement. If that remains the Commission’s intent, the current draft should be revised to make that clear. At minimum, the current references between Section 908.1.6 and the Reference Appendices should be reconciled, as the draft currently points to NA9 while the CEH calculation procedure is located in NA7.21.3.

4. Recommended approach

I recommend that the Commission simplify Section 908.1.6 and avoid limiting compliant indoor growing space-conditioning systems to specifically enumerated equipment categories or system architectures, unless a clear energy-efficiency basis for that limitation has been demonstrated. I have noted some of these specific requirements under Point 3 above.

The objective should be to establish energy efficiency regulations that will clearly save energy.

Sincerely:

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