DLC Horticultural Lighting Resources:

Horticultural Lighting & Active Cooling

Reproducible lighting fixture performance is critical

The DLC requires test reports from an appropriately accredited test lab for all threshold values in its Technical Requirements for Horticultural Lighting. These facilities earn accreditation for a reference test standard by certification bodies. Thanks to this intensively-maintained infrastructure, the lighting industry has certainty that test facilities around the world will accurately report a product's performance.

Some lighting fixture manufacturers use externally-supplied air or liquid to remove waste heat, extend product life, and increase efficacy. While these products show great promise, there are challenges surrounding performance measurements for this cooling architecture.

Existing standards rely on assumptions that do not apply to these externally-cooled products (e.g., that a single self-contained fixture with only an external electrical power connection can be evaluated in a closed test environment). To test one of these products, the test lab and product manufacturer would have to make judgement calls outside of the reference test standards. Until standards bodies have published a reference test standard for actively-cooled, externally-supplied products (activity for which is currently underway), the DLC cannot qualify products using these methods for its prescriptive QPL.

Creating custom incentive paths with utilities

While a reference test standard for consistent performance measurements does not yet exist, actively-cooled, externally-supplied products hold great promise for increased efficacy and lifetime, as well as the ability to more efficiently move and use waste heat in an enclosed facility. Utilities interested in carrying out custom incentives for these products should reach out to manufacturers and test labs to help ensure they are getting adequate performance data. Questions to address might include:

- What is the coolant fluid and what is its composition?
- What is the cooling fluid temperature and flow rate?
- How much time is required for fixture stabilization before assuming that the fixture has reached steady state?
- For a reasonable whole-facility design, what is the per-fixture energy consumption of the active cooling mechanism?

- What test protocols accurately mimic the steady-state operation of the fixture while avoiding light blockage or thermal buildup? For example, a short-duration pulse of a coolant-disconnected fixture that has been “thermally soaked” to the coolant temperature may prove a useful proxy for a continuously operating model with a steady coolant supply.

Would you like to know more?

This document is intended to introduce concepts at a basic level. For more detailed information, please refer to the standards and/or research bodies listed below:

- The American Society of Agricultural and Biological Engineers (ASABE)
- Greenhouse Lighting and Systems Engineering (GLASE)
- The Illuminating Engineering Society (IES)
- Lighting Enabled Systems & Applications (LESA)
- The Lighting Research Center (LRC)
- The Resource Innovation Institute (RII)

Each of these entities has been instrumental in the development of the DLC horticultural lighting requirements, and the DLC looks forward to continued cooperation with all in maximizing the horticultural sector’s energy efficiency and productivity.