

CASE STUDY



NYSERDA
Supported

LASSI Pilot: Amos Zittel & Sons, Inc.

Erie County, New York

LASSI Pilot Launches Evaluation of Energy use and Crop Performance in Greenhouses

Background:

This series of case studies presents findings from pilot demonstrations of the Light and Shade System Implementation (LASSI), a project supported by the New York State Energy Research and Development Authority (NYSERDA). The work focuses on three approaches to advanced lighting control in greenhouse environments: Basic LASSI, CO₂ LASSI, and Real-time LASSI. Each version was implemented in commercial facilities to evaluate its effectiveness in improving energy efficiency and crop productivity under real-world conditions.

The pilots represent a collaborative effort to translate scientific research into practical applications for greenhouse operators. Over the course of one year, each facility collected data on sensors, crop yields, and utility use, which was normalized using weather data and compared to baseline performance.

These case studies highlight operational insights, economic considerations, and user benefits related to each lighting system. They include product descriptions, lighting demand calculations, cost estimates, and return on investment projections.

Operations at a Glance:

Company: Amos Zittel & Sons, Inc.
Industry: Agriculture
Crop: Floriculture

Amos Zittel & Sons, Inc. operates a dynamic greenhouse business in Eden, New York, focused on producing both unfinished and finished ornamental crops. Each year, the operation generates approximately two million rooted liners, including geraniums, ivy, fuchsia, and other vegetative spring plants. The greenhouse also encompasses four acres dedicated to finished spring annuals, which are sold directly to garden centers and nurseries across Western New York. The operation emphasizes sustainable growing methods, incorporating trickle irrigation, plastic mulches, and an integrated pest management program to maintain high production standards while minimizing environmental impact.

Lighting Control

The Zittel's greenhouse is equipped with a Damatex control system, that controls their light and shading system. The Damatex system controls the lighting in the greenhouse through the use of a time-control and intensity based control system, that is adjusted seasonally by the grower.

The greenhouse is equipped with an LED supplemental lighting system that provides an average of 36 $\mu\text{mol}/\text{m}^2/\text{s}$ at crop level. They restrict supplemental lighting to primarily daylight hours with no lighting permitted after 8 pm, and before 6 am.

The greenhouse is also equipped with a retractable shading system, that can reduce incoming sunlight by approximately 50%. Because the shade system for the entire greenhouse is controlled by their Damatex system, and the LASSI project was conducted in only 2 bays of the greenhouse, we were unable to assume control over the shade system, to demonstrate the shading capabilities of LASSI.

LASSI Performance

Unfortunately we were unable to directly monitor the performance of the Damatex control system and how it controlled the lights in the greenhouse. The daily light integrals we recorded in the LASSI system were heavily dominated by the natural light in the greenhouse. This was to be expected as the lighting system is quite low in intensity and the hours restricted to primarily during the day. LASSI was good at avoiding using supplemental light on days where the natural light exceeded the target. This is particularly useful as avoiding overlighting saves money as can potentially benefit the crop.

Recommendations

Ideally, LASSI would be used to control both the lights and the shading system in the greenhouse. Even though LASSI could not meet the daily light integral target on darker days, due to the low intensity supplemental lights and reduced photoperiod, LASSI would most likely do a much better job at limiting the integral during the higher light days.

Ideally the supplemental lighting system should be sized for the specific needs of the crops being produced in the greenhouse. This can be challenging in a multi-crop greenhouse where often compromise is needed to find a happy medium that might not be ideal, but works best for the crops produced.