

# CASE STUDY



**NYSERDA**  
Supported

## Basic LASSI Pilot

*Suffolk County, New York*

Basic LASSI Pilot Launches Yearlong 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, CO<sub>2</sub> 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 where available, on crop yields, existing control system lighting use, and LASSI performance.

### ***Operations at a Glance:***

Industry: Floriculture

Location: Suffolk County, New York

This greenhouse operation employs pots with drip irrigation in the production of flowers. They use high pressure sodium lighting to provide supplemental lighting to their crop as they produce year round. The facility produces a steady weekly yield, emphasizing precision, and environmental stewardship.

## ***Lighting Control***

The current lighting control system uses a threshold based approach to controlling their lights. When the natural sunlight is below a set threshold, the lights are turned on, and when that threshold is exceeded, the lights are turned off. There are also delay factors to prevent the lights from rapid switching which can damage High Pressure Sodium lights. Lighting is also limited at night to improve neighbor relations.

The LASSI lighting algorithm uses a predictive model of how much light the crop is likely to receive during the day, based on the light history for the day, as well as the time of year. LASSI was originally developed for use with High Pressure Sodium lighting with lighting decisions made every hour. The latest versions of LASSI, developed to take advantage of LED lighting that can be dimmed, makes adjustments every 5 minutes.

### **LASSI performance**

The supplemental lighting capacity in the greenhouse is unfortunately quite low at 25  $\mu\text{mol}/\text{m}^2/\text{s}$ . This level is likely sufficient for daylight extension (photoperiodic control), but is inadequate to provide balanced light levels throughout the dark winter months with shorter daylengths.

During the winter months the LASSI control system performed in a very similar fashion to the existing control system. These days are dominated by the lights being on for most of the day as the natural light levels are low. We did notice that LASSI provides a bit more light as it was not limited by the intensity of the natural light which is what the existing control system is based on. This was also apparent in the higher light days of the spring where the Daily light integral target of 15 Mols was exceeded. The existing control system would operate the lights on these days, typically in the morning and evening when lights are lower, whereas LASSI would not run the lights at these times.

## ***Recommendations***

The main objective of the LASSI control system is to provide a consistent Daily Light integral year round, and at the lowest cost. It typically meets this goal through a combination of a properly sized lighting system (typically an intensity of at least 150 to 180  $\mu\text{mol}/\text{m}^2/\text{s}$ ) at the crop level, and a shade control system to limit the light during the brighter parts of the year.

Ideally it would be great to further look into how this crop responds to light in terms of the ideal daily light integral, and any photoperiod requirements, and then size a lighting system to test out the findings on a smaller scale, before investing in a new system for their greenhouse.