

Lighting Strategies to Reduce Peak Demand and Improve Energy Efficiency in Greenhouse Vegetable Production

Grid Innovation Fund Project Details

Lead Proponent: Allegro Acres Inc.

Partners: Essex Energy, Harrow Research and Development Centre, Sollum Technologies

Strategic Area(s):	Enabling Non-Wires Alternatives
Project Total Cost:	\$6,458,264
Year Contracted:	2019
Status:	Active
Location:	Ruthven, Kingsville, Harrow
Economic Development:	N/A

Project Objectives

This project will demonstrate the effectiveness of lighting strategies to improve energy efficiency while maintaining or improving crop growth and yield.

Two concepts which will be piloted and further studied in this project:

- 1) Long photoperiods (up to 24 hours a day) of low intensity lighting instead of 16-17 hours of strong intensity lighting will be used to reduce the light intensity/electricity demand during the daytime by an expected 12 to 33 per cent, and shift part of the electricity use to off-peak hours during the night.
- 2) The use of a light sensor-based smart DLI (Daily Light Integral) program to precisely control lighting and reduce the excessive light application with conventional threshold based

control (such as 300 W/m² outside global solar radiation) and increase energy/electricity efficiency by 10% to 20%.

The lighting strategies will be piloted with 2 independent enclosed greenhouses, Allegro Acres and Harrow RDC, which offer 2 acres of growth area and over 2 full crop cycles.

The crux of the pilot is to evaluate the performance of low intensity lighting and controls used over a 24h period against the current practice of using high intensity lighting over 16-17h period. This novel approach has the potential to reduce electricity consumption while maintaining/improving crop growth/yield.

Expected Outcomes

This pilot will demonstrate that smart lighting control techniques can significantly reduce or shift electricity consumption while maintaining or improving crop growth and yield. The pilot will evaluate two approaches as described above and quantify their electricity savings potential. If successful, the lighting strategies could be rolled out to other greenhouses across Ontario.



L: Rows of peppers shown under Allegro's LED lights. R: Orange peppers from Allegro's greenhouse.