

## CASE STUDY



**NYSERDA**  
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# Wheatfield Gardens Takes Advantage of the New York State Greenhouse Database and Benchmark Program

*Niagara County, New York*

A greenhouse owner accesses an insightful report and benchmarking tool to learn, compare, and improve their operation.

### ***Background:***

The Greenhouse Lighting and Systems Engineering (GLASE) consortium, with support from the New York State Energy Research and Development Authority (NYSERDA), and in partnership with EnSave, has shared a benchmarking tool for commercial greenhouses in New York State since 2020. The [New York State Greenhouse Benchmarking](#) initiative helps growers understand key greenhouse energy performance metrics and compares their operation's performance to that of their peers based on meaningful metrics such as input energy required per unit of crop produced. This program uses third-party [FlexTech consultants](#) to deliver benchmarking services and reviews final reports with GLASE Principal Investigators for accuracy.

As more growers benchmark their facilities to optimize operating expenses, the program aims to share anonymized state-level performance data so growers can compare against their competition while protecting data privacy.

Benchmarking reports are great tools to give businesses insights on ways to save money. Complete reports include: a facility overview with the current baseline energy usage; detailed usage and analysis to quantify relative energy performance of each greenhouse and crop; greenhouse technology scoring and upgrade recommendations that can be used to improve energy performance; and an appendix of references and resources. The reports, generated by

FlexTech consultants and reviewed by GLASE researchers, allow growers to focus on their operations and implement recommendations with confidence.

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

Company: Wheatfield Gardens

Industry: Agriculture

Location: North Tonawanda, NY

A variety of crops are grown at the 550,000 ft<sup>2</sup> hydroponic indoor Wheatfield Gardens facility, including lettuce, culinary herbs (e.g., basil), industrial hemp, adult-use cannabis, nursery plants (bedding, landscaping, and hemp), and blackberries. The greenhouse benchmarking report covered energy use and production from October 2021 to September 2022. The analysis is based on operations and equipment data collected during a site visit conducted on September 27, 2022, along with utility bill records from the preceding twelve-month period.

*“The granularity of the report was actually beneficial. Some people might find it too detailed, but I see it as the kind of analysis that helps improve operations and the bottom line. I’m responsible to investors, and they care about the bottom line. If we can make cuts or improvements in energy use, it helps everyone.”*

Paal Elfstrum, CEO and founder of Wheatfield Gardens



## ***Enhancing Energy Efficiency:***

Greenhouse Benchmark Reports include recommended actions for growers to enhance energy efficiency and performance. The report gave Wheatfield Gardens the data it needed to implement two key upgrades: (1) installing an energy curtain for the cannabis flower canopy to retain heat at night and improve efficiency and (2) replacing outdated lighting with 2.3  $\mu\text{mol/W}$  LEDs, based on the report's confirmation of inefficiencies in the existing setup.

### **Installing energy curtains**

Energy curtains, also known as energy screens, thermal curtains, or heat curtains, help retain heat in greenhouses during nights or cold, cloudy days, reducing heating fuel use by 30–60% compared to greenhouses without curtains. They conserve heat by creating an insulating air

layer, reducing the volume of air to be heated, and reflecting radiated heat back inside. Additionally, in summer, energy curtains offer shade, which lowers the electricity costs of mechanical cooling.

### **Installing a higher efficacy lighting system**

Horticultural lighting efficacy measures photosynthetically active radiation (PAR) output per watt, expressed as photosynthetic photon efficacy (PPE) in  $\mu\text{mol}/\text{J}$ . PPE ranges from 0.9 for older fluorescent and 1.7 for HID fixtures (e.g., HPS and metal halide) to 3.5 for advanced LED fixtures. LED fixtures offer benefits like dimmability and wavelength control for plant growth. While LEDs are pricier than HID options, utility incentives can help offset upgrade costs.

## ***What's next for Wheatfield Gardens?***

Wheatfield Gardens stands out for its innovative approach to sustainability, particularly its commitment to CO<sup>2</sup> capture and reuse. Unlike many cannabis operators that purchase CO<sup>2</sup> for crop fertilization, Wheatfield Gardens captures CO<sup>2</sup> from its natural gas combustion through its boiler and co-generation systems. This system reduces emissions and repurposes CO<sup>2</sup> as a resource for crop growth.

“We’ve never purchased CO<sup>2</sup>,” said Elfstrum. “We capture it from our natural gas combustion to fertilize our crops. It’s a huge investment, and yet I don’t see anywhere in the climate action plan where we can get credit for this.”

This approach highlights Wheatfield Gardens' commitment to exploring the environmental benefits of CO<sup>2</sup> sequestration and reuse, alongside other measures to enhance energy efficiency in their operations.

Learn how to [benchmark your greenhouse](#) and improve your operation.