

## Dr. Greenhouse Announces Literature Review of Controlled Environment Horticulture

Literature Review Shares Potential Efficiency Opportunities

## Dr. Greenhouse

SACRAMENTO, CALIF., USA, November 29, 2022 /EINPresswire.com/ -- <u>Dr.</u> <u>Greenhouse, Inc.</u>, a leading provider of state-of-the-art HVAC design and

controls solutions for indoor grows, vertical farms and greenhouses, is pleased to announce the public availability of "<u>Literature Review of Energy & Water Use in Controlled Environment</u> <u>Horticulture and Potential Efficiency Opportunities</u>."

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Our team worked to identify & review literature across the Controlled Environment Horticulture industry to present opportunities for higher energy & resource efficiency, improved crop quality & yield." *Dr. Nadia Sabeh, PE, LEED AP*  This literature review, a collaboration among Dr. Greenhouse, Pacific Gas and Electric Company (PG&E) and 2050 Partners, aims to provide an overview of previously published works, specifically the current state of knowledge about the Controlled Environment Horticulture (CEH) industry and its energy and water use. In addition, this literature review identifies potential energy-saving measures for consideration in future California Energy Code cycles as they relate to greenhouses and indoor farms used to grow vegetables, ornamentals, cannabis, and other crops.

"The Dr. Greenhouse team worked to identify and review literature across the CEH industry to present opportunities for higher energy and resource efficiency and improved crop quality and yield," notes Dr. Nadia Sabeh. "It is rare – but tremendously valuable – to have the opportunity to do this kind of focused survey of existing research and the state of the industry. This study will help to ensure that future energy research investments address remaining knowledge gaps and data needs to support energy code development and technological advances in the CEH market."

Developed for greenhouses and indoor plant environments without sunlight, the key findings of the literature review include:

1. Best management practices are not well-established, especially for new crops and indoor farms without sunlight.

2. A lack of energy use data collected from operating CEH facilities limits the development of effective computer models for estimating and predicting current and future energy use.

3. Energy codes and standards across California and the U.S. are varied and inconsistent.

4. CEH facilities do not disclose HVAC energy and dehumidification performance metrics, limiting evaluation of product energy use effectiveness.

5. Energy-savings opportunities exist for lighting, envelope, HVAC, irrigation, and controls, with new opportunities needing additional investigation.

Dr. Sabeh concludes that the goals of the literature review can be far-reaching, "As an emerging industry with rapidly advancing technologies and operational practices, the entire CEH industry benefits from the sharing of what works best for indoor crop production."

The Project Sponsor is Andrew Doeschot (andrew.doeschot@pge.com) of PG&E. The Project Manager is Coleman Stivers of 2050 Partners. The Primary Authors are Nadia Sabeh, Derrick Ross, Lydia Miner, and Sam Everett of Dr. Greenhouse, Inc., with additional contributions from Steffi Becking and Garth Torvestad of 2050 Partners. Please contact Andrew Doeschot (andrew.doeschot@pge.com) for more information on this project.

## About Dr. Greenhouse, Inc.

Dr. Greenhouse, Inc. is a Sacramento-based agriculture and mechanical engineering design firm providing state-of-the-art HVAC design and controls solutions for indoor grows. The firm is led by Dr. Nadia Sabeh, a recognized subject matter expert in controlled environment agriculture (CEA). Dr. Greenhouse helps farmers efficiently control their environments, allowing them to produce high-quality crops within indoor grows, vertical farms and greenhouses. Dr. Greenhouse has provided expert early-stage programming and mechanical design for 150 facilities worldwide.

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