

# NCERA-101 Station Report 2019



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## 1 NEW FACILITIES AND EQUIPMENT

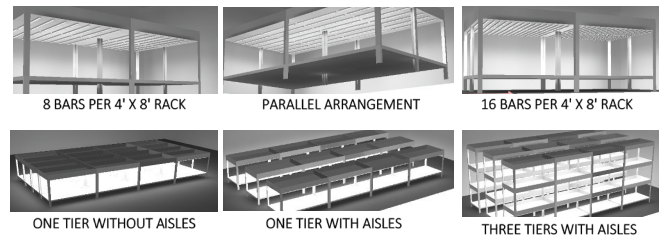
BIOS Lighting added two new products to the Icarus® Product Line in response to industry demand. The first product is a durable, broad spectrum, high efficacy greenhouse fixture, called the Icarus Ti. The second is a cost-effective, commercial-grade, light-weight vertical farming fixture called the Icarus Li. More details can be found at the company website: [www.bioslighting.com](http://www.bioslighting.com)

## 2 UNIQUE PLANT RESPONSES

No findings to report.

## 3 ACCOMPLISHMENT SUMMARIES

➤ In order to quickly determine lighting requirements, BIOS Lighting is preparing lookup tables and manuals for the sales team and will eventually release these to the public. For example, simulations were conducted to compare the light intensity for six common vertical farming racking applications using the new Icarus Li. These were generated for two different light bar densities in a 4 x 8 ft racking system (8 and 16 bars per rack), and for four different racking system set-ups for light installations and simulated for distances at 12-36" above canopy. The results were compared to theoretical light capture and allow for improved customer light level predictions. Below are a sampling of the vertical rack set-up drawings, tabular data and charts to be released in the future.



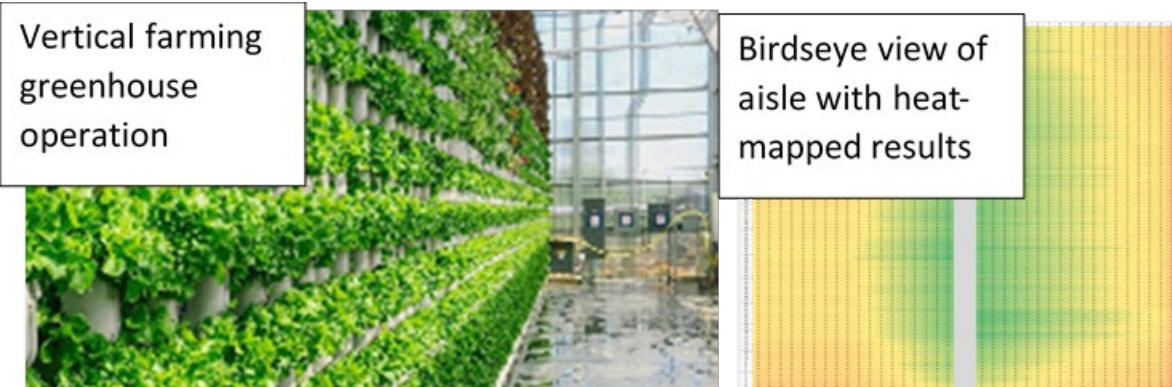
➤ In 2018 BIOS Lighting presented on VoltServer Digital Electricity as a safer alternative to traditional electrical wiring in CEA environments. The system works by centralizing power and AC/DC conversion into a subsection of the grow facility and then sending it in packets along an ethernet cable requiring a return signal between each packet. This year BIOS configured fixtures with transmitters and worked with VoltServer on a large lighting installation in California. Based on the innovative nature of the project, SMUD became involved and is in the process of writing a report.



- BIOS Lighting worked with a company called Soleil to install mesh network lighting control in a commercial grow facility outside Portland, OR. Soleil uses HD-IoT (high density internet of things) technology and BIOS incorporated this into the Icarus Gi2, allowing light intensities to ramp on and off which resulted in a significant decrease in energy load to HVAC.



- BIOS Lighting is designing custom supplemental lighting for a greenhouse outside Dallas, TX. The greenhouse uses a unique vertical farming operation for leafy greens. Without supplemental lighting, the tall towers create light limiting striation along each row; in amounts depending on row location, cloud cover, time of day, and time of year. BIOS took light density measurements at different days and light scenarios and built simulation models to determine the light maps. BIOS also installed a set of new Icarus Li fixtures and data is being collected on the effects within the greenhouse with the extra supplemental light.



## 4 IMPACT STATEMENTS

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BIOS Lighting is addressing several problems in CEA. First and foremost, by creating manuals with lookup tables and charts, growers can quickly estimate lighting requirements and needs for optimal productivity. This is important because oftentimes the lighting requirements and lighting layout in controlled environmental agriculture are unique to the grower, operation, and facility. Having this information as a manual allows for quick reference for lighting design, electricity use calculations, and estimated ROI.

Additionally, by partnering with innovative technology partners like Soleil for HD-IoT and VoltServer for digital electricity, BIOS Lighting is ensuring a position on the cutting edge of CEA Agricultural technology, without needing to do the specialized development work. This means BIOS Lighting can focus on quality lighting products and solutions.

## 5 PUBLISHED WRITTEN WORKS

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Thomas Graham, Neil Yorio, Ping Zhang, Gioia Massa, Raymond Wheeler. *Life Sciences in Space Research*. “Early seedling response of six candidate crop species to increasing levels of blue light.” V21, pp40-48 (2019).

## 6 OTHER RELEVANT ACTIVITIES OR INFORMATION

This year BIOS posted several educational and helpful website articles and videos for the CEA community. Here is a sampling:

[A Useful Forum for Indoor Growers: The Indoor Ag Science Café.](https://bioslighting.com/ag-cafe/) “Introducing the Indoor Ag Science Café – a monthly community forum that discusses how cutting-edge science and technology can contribute to sustainable and profitable indoor agriculture.” <https://bioslighting.com/ag-cafe/>

[The Newest Technology In Lighting Your Commercial Grow.](https://bioslighting.com/knight-anniversary/) “At a recent Cannabis Expo, Eric Thosteson joined three other lighting experts to discuss the importance of sensor control networks, power re-distribution, and edge devices in next generation LED Lighting design and technology.” <https://bioslighting.com/knight-anniversary/>

[Customer Success Story: Medici Products and Solutions.](https://bioslighting.com/medici/) “Every customer has a story. Meet Chris Roy at his family-run Cannabis Operation in Rhode Island. Follow the journey from humble beginnings to a giant future.” <https://bioslighting.com/medici/>

[BIOS Lighting – Partners in Sustainability.](https://bioslighting.com/partners-in-sustainability/) “The experts at BIOS Lighting continue to demonstrate their thought leadership in horticultural LED lighting as various organizations turn to them for help in developing new tools and resources.” <https://bioslighting.com/partners-in-sustainability/>

[BIOS Lighting – Dimming Control.](https://bioslighting.com/dimming/) “When it comes to dimming control systems, our engineers know the importance of quality components and device adaptability.” <https://bioslighting.com/dimming/>

[Controlled Environment Ag Community Shines at This Year’s NCERA-101.](https://bioslighting.com/ncera101/) “The NCERA-101 is an academic, research-based conference that focuses on challenges and innovation in controlled environment agriculture (CEA).” <https://bioslighting.com/ncera101/>

YouTube Channel: [https://www.youtube.com/channel/UCb1ic-o5-uSS2-jL-7\\_eoS](https://www.youtube.com/channel/UCb1ic-o5-uSS2-jL-7_eoS)

