TECHNICAL ASSISTANCE REQUEST

Solar greenhouse microgrid and supplemental lights

Soliculture, Scotts Valley, CA
LED Lighting IQ, North Olmstead, Ohio
Whiskey Hill Farms, Watsonville, CA

This project plans to combine agriculture integrated solar panels (AIPV) with high efficiency LED lighting and battery storage for a NET-zero greenhouse with up to 2x higher productivity by extending growing hours. Soliculture will be providing the semitransparent solar panels that include a luminescent film that enhances the spectral components of sunlight where photosynthesis is highest. LED Lighting IQ will supply the high efficiency LED grow lights and DC microgrid to store energy during the daytime and use it at night to power the LED lights. Whiskey Hill farms will provide the research greenhouse with Soliculture panels.

The overall goal of this project is to increase the use of clean solar energy in the agriculture industry with sustainable energy combined with sustainable food production.

Challenges include the following that could benefit from National Labo:ratory support.

Agrivoltaics: Solar energy is often excluded from land that is zoned for agriculture. If solar and agriculture can be co-located then new potential sites are opened up. The DOE and NREL has several programs in Agrivoltaics that this effort could be applied to. The Soliculture panel is the only commercial solar panel designed specifically for agriculture. It has been implemented in large scale commercial greenhouses such as the one to the right.

High Efficiency Lighting: The DOE has been instrumental in advancing high efficiency solid state lighting. The EERE in particular has done many studies of the energy savings associated with solid state lighting in agriculture. In this case the efficiency of the lights will be critical to get as many hours as possible from a fixed battery charge.

Battery Technology: The capacity, durability and cost of Li-ion batteries has improved dramatically in the last few years driven mostly by the automotive industry. The cost of battery storage is now less than $.50/Whr at which point the increased crop yields will pay for the system in less than 3 years. Assistance from DOE labs on different battery technologies would be a great benefit.

Ag-tech commercialization: The ultimate customer for this project is going to be growers. Assistance from the American Made Network can help us connect with Ag-tech partners to test the concept and make sure that it meets the needs of our customers. Controlled environment agriculture is a rapidly growing industry driven by the increased need for a sustainable, secure food supply that is resilient to climate change.