ENERGY MODELING AND DESIGN OF PROTOTYPE HYDROPONIC GROW SYSTEM

Presenters

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Team members at the project site, collecting data to support their energy model.

Energy and food security relies on innovations that spur sustainable ideologies. This project considers a novel approach to grow microgreens within a controlled environment in a manner that conserves water, minimizes environmental impacts from agriculture runoff, and enables successful agriculture in virtually any environment. The eQUEST® software package, an energy simulator, has been used to create a model of the "grow box" considered in this study. The dimensions were specified, and heating, cooling, and other loads were incorporated into the model which was used to estimate energy consumption. Real-time data were collected from sensors installed in the container, analyzed in Excel and used to validate model performance. The modeling approach allowed for multiple locations to be selected in eQUEST® in order to simulate energy consumption within different climates, and simulations are used to size renewable energy systems and storage in future iterations of the grow box. Potential future applications include military deployments, disaster relief, and urban developments. Grow boxes that completely utilize renewable sources and battery storage will bring these applications to fruition.