

seminar

Integration of Experimental Systems with Engineering Process Modeling for Sustainability Assessment

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abstract

Globally, we face an energy crisis due to an increase in energy consumption combined with the negative effects associated with traditional fossil energy sources. A variety of green technologies coming together to address environmental concerns, while meeting global increases in energy demand, is likely to be a critical component of the solution. This seminar presents the integration of experimental systems with engineering process modeling for sustainability assessment applied to a variety of renewable energy technologies. Sustainability modeling includes techno-economic assessments, life cycle assessments, and scalability assessment through resource availability. Data feedback from sustainability modeling is used to highlight areas for focused research and development on the metrics of economic viability and environmental impact. Further, engineering process modeling is used to identify knowledge gaps for experimental work. The integration of sustainability modeling with experimental systems is a valuable tool that can decrease experimental design space and focus research in areas that can accelerate commercialization. A primary focus of the research is the application of this tool set to microalgae-based biorefinery systems. Experimental research spans the value chain of a microalgal biorefinery system with the focus on the generation of data for system model validation. System models are leveraged for sustainability assessments with data feedback to experimental work for focused research and development. The seminar will include results from the application of this type of research to other energy centric topics: wireless power transfer for in-motion charging of electric vehicles, economic feasibility of small modular nuclear reactors, optimization of direct coupled water pumping and desalination systems, production of synthetic spider silk as a precursor for carbon fiber, and yeast-based biorefinery systems. This seminar will demonstrate that the research presented is dynamic in nature with the ability to be applied to a variety of technologies for sustainable commercialization.

biosketch

Jason Quinn is an assistant professor in the Mechanical and Aerospace Engineering Department at Utah State University. His education and research have always been centered on energy. Currently, his research efforts are dedicated to the development of engineering system models validated through experimentation and leveraged for life cycle assessment, economic feasibility, and resource demand of emerging technologies. Jason completed a master's degree at the University of Wisconsin-Madison in nuclear engineering and engineering physics, and a PhD at Colorado State University in Mechanical Engineering. Living in Utah, he takes advantage of the snow in the winter and the rivers in the summer.

March 2 at 3:30-4:30 p.m. in Santan 220

Seminar is free and available via Abode
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