

USU Biological Engineering Researchers Get \$1.9M DOE Grant | College of Engineering

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Sept. 4, 2020 — The Department of Energy has awarded \$1.9 million for a Utah State University study focused on improving wastewater treatment and the prevention of toxic algae blooms.



From left, graduate student Nathan Guymon, Professor Ron Sims, WesTech Senior Engineer Brad Hansen, undergraduate Jacob Watson, graduate student Dylan Ellis, and undergraduate Tallon Beckstrom.

Historically, treated wastewater may contain elevated levels of nutrients, which, when released to the environment, promote harmful algae growth in lakes and reservoirs. Researchers in USU's Department of Biological Engineering are developing a technology that turns unwanted algae into a resource.

"Instead of releasing nutrients and algae into the environment, we promote algae growth inside a controlled environment where we can harvest it and use it for something beneficial," said Ron Sims, professor of biological engineering and lead researcher on the project.

Sims and colleague Charles Miller, associate professor of biological engineering, developed a simple machine to cultivate algae using wastewater. The Rotating Algae Biofilm Reactor, known as RABR, slowly spins a flat disk that contains a film of microalgae. The disk rotates slowly, exposing the organisms to a mix of nutrient-rich wastewater, carbon dioxide and sunshine. The result is a thick film of biomass that can be easily harvested and converted into bio-based products including fuel, fertilizer and plastics.



Biological Engineering undergraduate Jacob Watson maintains a Rotating Algae Biofilm Reactor, known as a RABR, at the Central Valley Water Reclamation Facility.

DOE says the project will help expand the nation's energy supply and accelerate the bioeconomy. Sims added that RABR technology is a game changer because it addresses additional problems in wastewater treatment.

"What was once considered a waste is really a resource when viewed from a different perspective," he said. "The RABRs extract nutrients from the wastewater before those nutrients end up downstream in an algal bloom. This process helps operators meet higher water quality standards and lowers treatment costs."

The research is a collaborative effort led by USU's Sustainable Waste to Bioproducts Engineering Center, known as SWBEC. Partners include the Pacific Northwest National Laboratory, Central Valley Water Reclamation Facility —the largest wastewater treatment facility in Utah — WesTech Engineering, and ALGIX, a clean technology company.

The project will span three years. Funding will support nine undergraduate students and five graduate students in the Biological Engineering Department. Funding will also support engineers and staff at collaborating institutions.

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