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SUNRISE shines on efforts to turn crop oils into biofuels for jet aircraft

By David Dodds

The area is affectionately known among "REAC 1" (Research Enterprise and Commercialization) builders and tenants as "Wayne's World," a reference to a classic — but worn — Saturday Night Live skit from the 1990s and a play on the name of Wayne Seames, University of North Dakota professor of chemical engineering.

But there's no joking around when it comes to the work going on there or its official name. The SUNRISE Renewables Co., a new UND spinoff, will be using the space as a fuels and chemical pilot facility to convert crop oils into a 100-percent renewable, 100-percent compatible jet fuel and other products using technology developed by Seames and his co-workers.

SUNRISE is a student-centered, faculty-led research program at UND, North Dakota State University and other North Dakota universities. The mission of SUNRISE is to conduct research that contributes to solving complex energy problems, investigations of sustainable energy options, and economic development and job creation for North Dakota. It also aims to increase UND and NDSU research competitiveness in sustainable energy and, finally, produce graduates who will develop and promote sustainable energy in North Dakota, the region and the nation.

All this is done within a unified, interdisciplinary program that translates fundamental research into commercial solutions, Seames said.

The initiative also was awarded a North Dakota Center of Excellence, called SUNRISE BioProducts, which will focus on developing chemicals, polymers and composite materials based on "cracked" crop oils. SUNRISE is one of only two state research groups included in the 2008-2013 North Dakota National Science Foundation (NSF) Experimental Program to Stimulate Competitive Research (EPSCoR) infrastructure improvement research grant.

Student focused

Student involvement is an essential component

property commercialization and economic development at UND. Petell now serves as the executive director of the UND Research Foundation (UNDRF), which is affiliated with the University and oversees management of REAC 1 and the surrounding 20-acre Research Enterprise and Commercialization park.

Collegial duo

Paul Overby, who just graduated from UND's School of Engineering and Mines in August, already is a key player in the SUNRISE Renewables team that is designing the special thermal-cracking and acid neutralizing reactors that aid in the production of hydrocarbons used to fuel jet aircraft.

"It's a great opportunity and one of the more exciting things that I've been involved in," Overby said. "Most chemical engineering graduates go to work for a large petroleum company and they get kind of pigeonholed in one particular area. But what I get to do here is work on the entire process of something that's never been done before."

Overby, 24, a graduate of Reynolds (N.D.) High School, is working on the project with Bill McDonald of Crown Iron Works, Inc., Roseville, Minn.

Crown Iron Works (CIW) has extensive experience in the biodiesel industry, having supplied process equipment to more than 20 industrial-scale facilities worldwide. SUNRISE approached CIW to work with its production process and help with the detailed engineering of its technology.

Overby keeps in regular communication with McDonald. He refers to McDonald as the more experienced engineer of the duo and, in many ways, a mentor.

But, McDonald, who in 1987 also graduated from UND with a degree in chemical engineering, said he views the relationship as one of colleagues, and one in which he has

www.und.edu/org/sunrise/
www.undrf.org

in SUNRISE Renewables, Seames said.

"I left the industry in 1995 and enrolled in graduate school to become a professor to a great extent because I was concerned that the fraction of engineering faculty with applied engineering experience had seriously declined," Seames said. "Engineering students need exposure to real-world opportunities."

SUNRISE Renewables will employ seven people in its offices located at the Skalicky Tech Incubator in UND's Center for Innovation. An additional eight people, many UND students, will be working at the new REAC 1 pilot center turning crop oils into a jet fuel that meets federally mandated standards, as well as chemicals and polymers that are direct replacements for products currently derived from crude oil or natural gas.

"I came to UND to teach and train students — not to build a commercial company," Seames said. "If I couldn't involve students in these endeavors, I would not be at UND. Fortunately, UND and particularly Jim Petell have provided an environment where we can accommodate student training into our commercialization activities."

SUNRISE Renewables is one of six new companies moving into REAC 1, and one of two new companies formed in North Dakota under the guidance of Petell, formerly associate vice president for intellectual

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actually learned a thing or two from the younger engineer.

"He (Overby) has done a great job on the computer model of the process, including creating chemical species in the software and outlining unit operations used to get from the raw material (vegetable oil) to the product (renewable jet fuel), so that others, especially myself, can make our contributions," McDonald said.

A new paradigm

Overby said his job is to find ways to optimize the process to make it better.

"There might be some new things that we find out along the way," he said. "It's kind of a big science project in that sense."

Overby lives in Grand Forks with his wife, Maria, and their two boys, Marques, 2, and Faron, 1.

Unlike years past, when major multinational companies and their research and development organizations were the only ones churning out innovations, today most of that activity happens in universities, Seames observed. The best of these innovations are turned into commercially viable technologies in small companies, such as SUNRISE Renewables.

"SUNRISE Renewables provides a model for this new world paradigm and enriches our ability to equip students to participate in this exciting future," Seames said.



Paul Overby describes his position with SUNRISE Renewables as a remarkable opportunity for a recent engineering graduate, one that allows him to work on an entire process rather than in a compartmentalized area

with a narrow range of duties.