



DR. GEOFFREY PRICE

Geoffrey Price is a professor of chemical engineering and chairman of the department. He has over 30 years of experience in academia and is a Fellow of the American Institute of Chemical Engineers.

Price's expertise in the downstream petroleum industry, specifically his work with zeolites and zeolite catalysis, has earned him international acclaim. He now specializes in applying traditional refining techniques to innovative renewable fuels.

Under his leadership, the Department of Chemical Engineering has developed a biofuels catalysis program, secured significant research funding and won international alternative vehicle competitions.



DR. DANIEL CRUNKLETON

Daniel Crunkleton is an associate professor of chemical engineering and director of the university's Institute of Alternative Energy.

Crunkleton's research interests focus on the development of alternative energy and fuels, specifically the production of gasoline from algae.

In addition to his research, he has co-advised student competitions to design, model and manufacture the next generation of hybrid-electric vehicles.

Both Crunkleton and Price currently work with Sapphire Energy in producing gasoline from algae-based "green crude." The promising technology includes a patent-pending refining process developed at TU by Crunkleton and Price.



ABOUT THE UNIVERSITY OF TULSA

Ranked among the top 100 universities in the nation, The University of Tulsa is a private institution providing comprehensive educational opportunities to more than 4,100 graduate and undergraduate students in the arts, business, engineering, the sciences and law. Student for student, TU has one of the nation's most academically distinguished student bodies. Our students thrive in the university's rigorous programs that feature personalized attention, small class sizes and low student-to-faculty ratio. TU has distinguished itself as a national leader in several key disciplines including petroleum engineering, alternative fuel development, cybersecurity and energy management.

CONTACT US

Dr. Daniel Crunkleton
Chemical Engineering Graduate Program Advisor
chegradadvisor@utulsa.edu
(918) 631-2227

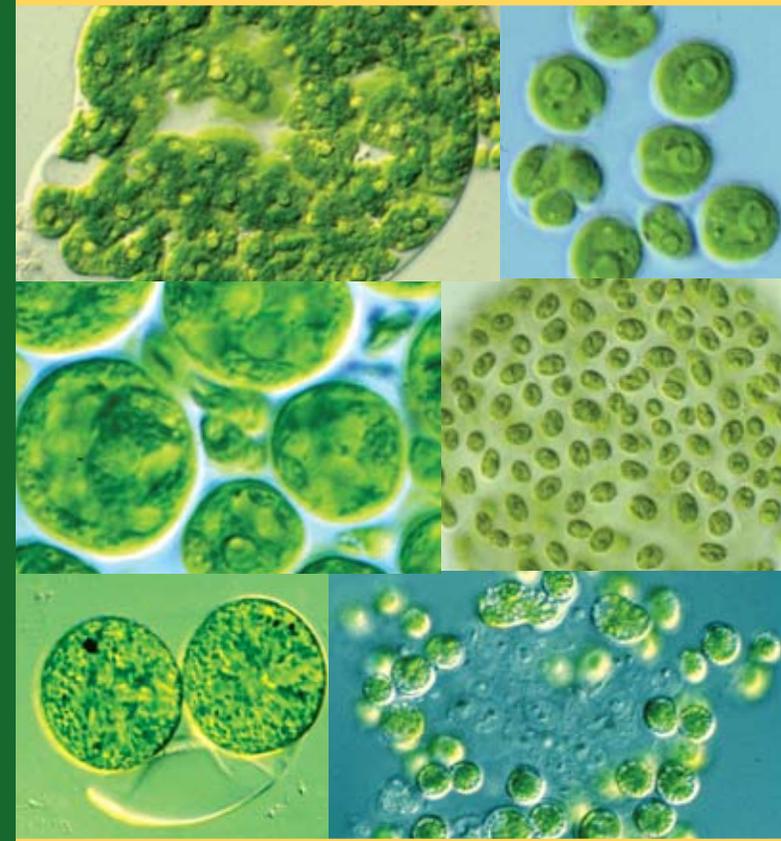
The University of Tulsa
Department of Chemical Engineering
800 S. Tucker Dr.
Tulsa, OK 74104-3189 USA
(918) 631-2226
www.utulsa.edu/ChE

Cover photos of algae courtesy of Mark Buchheim,
TU associate professor of biological science

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going Green

ALGAE BIOFUELS



Responsible Energy, Real Results

“The whole philosophy is totally different from other alternative fuel projects. This isn’t biodiesel or ethanol. It’s gasoline, just made from another source.”

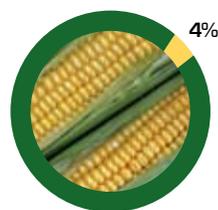
— Geoffrey Price, Chemical Engineering Professor and Chair

ETHICAL. Algae production doesn’t require large amounts of fertilizer, farmland or fresh water. It also absorbs large quantities of CO₂, creating a carbon-neutral cycle that removes an equivalent amount of greenhouse gases from the atmosphere as are emitted from cars.

EFFICIENT. With research and development, fuel made from algae is projected to produce about 50 percent of the transportation fuel requirements of the entire country — using about one-quarter of the land that is currently used to grow corn in the United States. This contrasts with ethanol production from corn, which yields only four percent of U.S. fuel requirements using the equivalent of 24 million acres of farmland.

EFFECTIVE. Gasoline made from green crude is compatible with the existing petroleum infrastructure, from refinement through distribution and the retail supply chain. Most importantly, the process works: Fuels derived from green crude were used successfully in several test flights with the commercial airlines Continental and JAL in January 2009. Green crude also fueled the Algaeus, a Toyota Prius that was the world’s first hybrid vehicle to cross the country on algae-based renewable gasoline in September 2009.

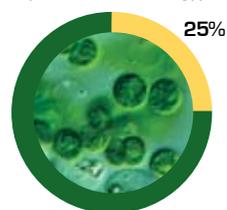
Corn to Ethanol



4% of U.S. fuel requirements met

24 million acres of prime cropland used

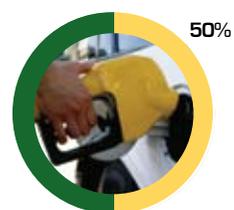
Algae Fuels (current technology)



25% of U.S. fuel requirements met

24 million acres of non-arable land used, non-potable water used

Algae Fuels (future technology)



50% of U.S. fuel requirements met

24 million acres of non-arable land used, non-potable water used

NEW ENERGY AT TU

Chemical Engineering at The University of Tulsa is uniquely positioned to usher in a new era of alternative fuels.

Sapphire Energy, Inc. has partnered with TU to produce gasoline from green crude, a crude oil equivalent derived from algae via renewable processes. Chemical engineering faculty researchers developed a patent-pending refining process for Sapphire Energy’s green crude in 2008.

WHY TU?

TU’s depth of experience in benchmark-setting technology for the oil industry made the university an ideal partner.

“We needed downstream experts in traditional fossil fuels who were used to creating viable industry solutions,” said Brian Goodall, Sapphire Energy vice president of downstream technology. “What we found at TU was an inventive, enthusiastic team with the knowledge base to help us revolutionize the way we think of energy.”

ENERGY INSIDERS

The university’s history as a petroleum research leader has given the chemical engineering department a depth of experience in downstream production and an **insider’s view** of the energy industry.

UNIVERSITY-WIDE PRIORITY

The **TU Institute of Alternative Energy** utilizes faculty researchers from the departments of chemical engineering, mechanical engineering, petroleum engineering and physics. Led by Daniel Crunkleton, the institute is supported by the TU Office of Research and a presidential initiative to expand interdisciplinary research on the TU campus.

RESEARCH FUNDING

Chemical Engineering at TU has secured substantial research funding to study algae fuels from both private and government sources. As a result, faculty have focused projects ready for students to begin **hands-on research** immediately. Contact the department for more information about graduate student and post-doctoral research opportunities in algae fuels.

EQUIPPED FOR SUCCESS

Alternative energy researchers at TU have access to **cutting-edge equipment**. The project has recently acquired microliter-, milliliter- and liter-scale catalytic cracking reactors. Other available equipment includes a new Agilent GC-MS, an FT-IR-based octane number analyzer, and a fully equipped modeling computer work-station.



Photo credit: Bree Kristel Clarke