

A close-up photograph of a person's hand holding a clear glass bottle filled with a bright yellow liquid, which is biodiesel. The bottle has a glass stopper. The background is a blurred outdoor setting with green trees and foliage. A green banner with white text is overlaid on the lower part of the image.

Biodiesel - Sustainable and cost effective

With the fluctuating petroleum fuels market, industrial biodiesel production is becoming more and more common in the United States. The number of production plants per state has increased considerably over the past few years. Today, most states have several multi-million gallon per year plants commissioned. Most commercial plants use some level of system automation to increase the efficiency of biodiesel production and optimize the quality of the end product. This allows for precise control of viscosity, lubricating properties and fuel value.

Dickinson College in Carlisle, Pennsylvania introduced the Environmental Science Certificate Program in 1970, which served as the foundation for a long record of activity in the area of environmental protection. After creating a Sustainability Coordinator position in 2006, the school went on to establish the Center for Environmental and Sustainability Education in 2008.

Biodiesel research

The Dickinson Biodiesel shop was founded in 2006 when two students began researching biofuels and the involved reaction processes. Just one year later the first batches of fuel were being produced.

Biodiesel is an easily biodegradable biosynthetic fuel made from plant remains. Its use results in an 80% lifecycle reduction of carbon dioxide emissions compared to fossil fuels, and therefore helps support sustained environmental protection.

"The Biodiesel project is a fundamental part of our commitment to environmental sustainability. The project makes use of waste products such as cooking oil, while reducing the campus demand for non-renewable petroleum fuel," Matthew Steinman, Technical Advisor Biodiesel at Dickinson explains. Each week, approximately 230 to 680 liters of frying oil are converted to biodiesel.

Producing biodiesel from waste using B&R technology

Dickinson works closely with B&R to obtain high-quality biodiesel fuel and optimize the production processes involved. "We use B&R components to control our semi automated biodiesel reactor. This includes a Power Panel that combines control, visualization and drive technology in a single tool, which is the perfect match for our small system. X20 mixed modules provide analog temperature measurement and high-speed data transfer," explains Steinman.

The production process involves multiple stages. The controller keeps track of the process throughout the stages while giving the user new information at each stage. The controller also tracks the temperature of the

reaction at two points in the system, and will only allow pumps if proper conditions are met or indicated by the student operator. The current program also tracks use of energy for each batch. A data file is compiled for each batch, and this is automatically emailed to the program supervisor upon completion.

"The user friendliness of the equipment allowed our students to program all the automation components in Automation Studio very quickly," explains Steinman. "The broad spectrum of control and I/O functionality will certainly be useful as we diversify the biodiesel plant."

From research project to real production

The program has grown considerably from its original concept as a student research project, and now has a dedicated staff supervisor and paid student workers. There is now also a space in the facilities management building specifically designated for biodiesel production. Special internships give students the opportunity to gain valuable experience in the field of biodiesel production.

While the fuel generated is less costly than purchased diesel fuel, the labor costs of student workers and capital investment make the project more or less a break even endeavor at present. Dickinson sees the main benefit of the program as an educational resource.

Industries that would benefit most from establishing in-house biodiesel production would be any that use a significant amount of diesel fuel,



Simple operation with a B&R Power Panel.

such as logistics firms, farms and any institution with a grounds crew. Dickinson College is making valuable contributions to the future by promoting increased production of environmentally friendly fuel in the United States. ■



Biodiesel - The environmentally friendly way to fill your tank!