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## Key West High School makes alternative energy

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Cammy Clark/Miami Herald Staff/Nov. 13, 2009: Key West High School students change the battery in an old Mercedes they bought to test the biodiesel fuel they have made from used oil, methanol and potassium hydroxide.

The oil once used to fry grouper and conch fritters in Key West restaurants is now fueling an old Mercedes-Benz and soon could be powering a school bus.

At Key West High School, in the building that once housed auto shop classes, honors physics students have learned how to make small amounts of biodiesel fuel from donated grease, methanol and potassium hydroxide. Now, they're working on a system that they hope by February will produce enough fuel to flow through a gas pump and run a bus, traveling 70 miles a day at seven miles a gallon.

“It's very exciting for the students that basically grease, moonshine and drain cleaner can run a school bus,” science teacher Josh Clearman said. “And biodiesel reduces emissions by 78 percent, bio degrades quicker than sugar and is less toxic than soap.”

Three years ago, Clearman spearheaded efforts to convert the obsolete auto shop into the Alternative Energy Center, one of only a few such high school centers around the country. The school board provided \$50,000 in seed money.

The investment has paid off, and not just in the practical experience gained by the students. Last year, the center won a Hewlett Packard education grant for \$300,000 worth of computers and other equipment for the school district.

This year, the center received \$30,000 in grant money from a nonprofit group to participate in a wind turbine pilot project that will help provide power to the Alternative Energy Center.

A 53-foot high wind turbine that spins like a windmill was installed next to the softball field last week, and a rooftop wind turbine that spins horizontally like a helicopter will be installed soon. Clearman said the turbines are predicted to produce about \$800 worth of energy a year, enough to power about 20 percent of the lights and air conditioning of the 2,500-square-foot center.

Monroe County School Board member Duncan Mathewson said Key West is the first high school in the country to acquire both turbines, which the students will study as they produce

power.

## **DIFFICULT CONCEPTS**

Clearman said one of the most difficult concepts in physics to teach is electricity and magnetism. "The kids think of it as magic," he said. "With the turbine, it will help take away some of the mystery of it."

Nearly 60 students, mostly seniors, now are enrolled in the two alternative energy center classes that meet for two hours each day. Three students are working on the new design for the biodiesel system, while others are filtering used grease. One group persuaded a local auto parts dealer to donate a new battery for a 1985 Mercedes-Benz they bought for \$2,000 to test the fuel. Another group is making planters to create building shade for "passive cooling."

## **HANDS-ON LEARNING**

"They learn a lot more by doing than listening to me blabbering up at the chalkboard," Clearman said. "I don't get asked the question anymore: 'Where am I going to use this?'"

Gene Lewis, director of Tallahassee-based nonprofit Florida Green Alliance, is administering the turbine grant. Lewis said he's trying to help the school land a grant for solar panels so students can work on sun power projects.

Clearman said he saw the impact of big oil and the growing need for alternative energy while teaching at the American School of Kuwait. He and his wife arrived there just before the 9/11 attacks.

He's taught in Key West for seven years, starting the alternative energy center after a high school teacher from Miami-Dade County told him how easy it was to make biodiesel.

While the students have made small portions of biodiesel, Clearman said they are not present for large mixes because of the poisonous, flammable liquid involved.

But the students work on all other aspects of the process, including asking restaurant managers and festival vendors for used grease. With the donated oil, biodiesel costs only about \$1 per gallon to make, Clearman said.

The students like working on a "green" project. "It's really interesting," senior Peyton White said, "and something you should learn about because of global warming and all that stuff."