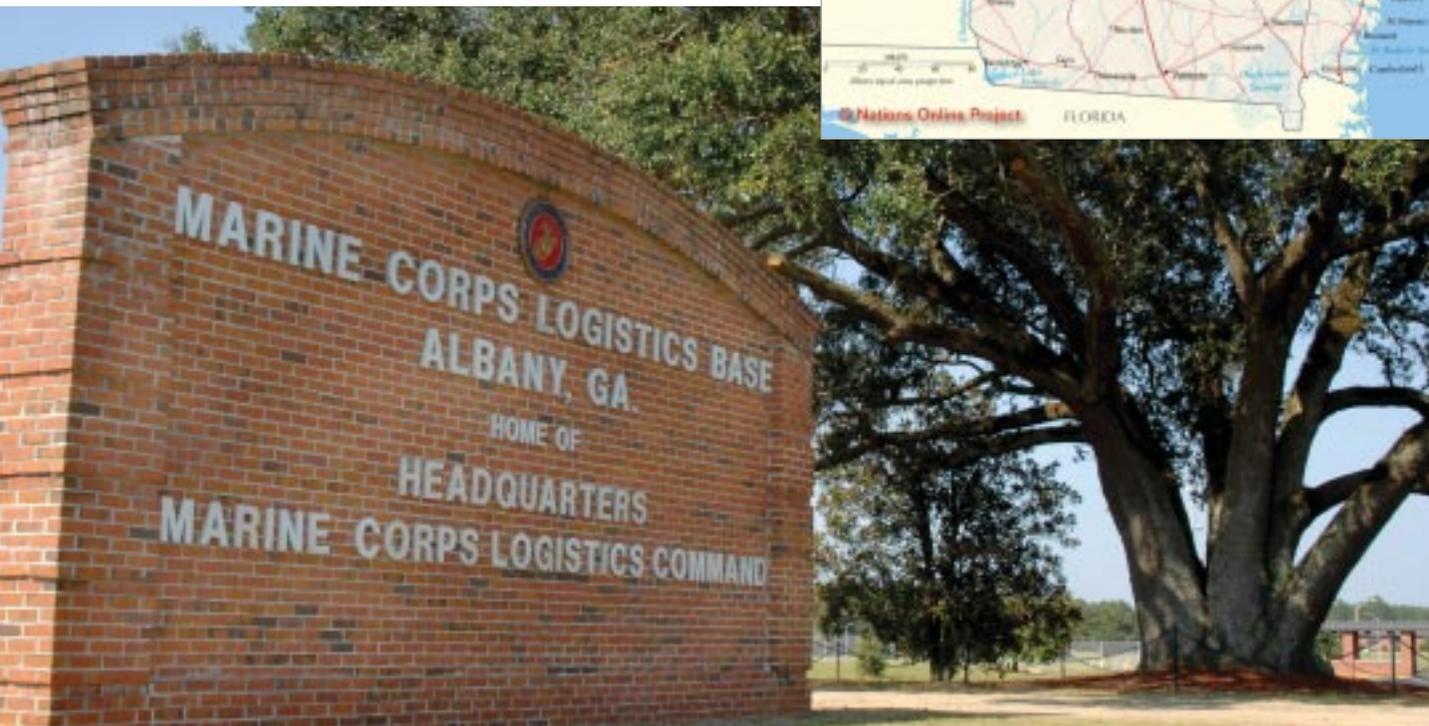


Converting Trash to Gas

Pioneering Energy Project Takes Shape at Marine Corps Logistics Base Albany

“**THE COUNTRY THAT** harnesses the power of clean, renewable energy will lead the 21st century.” These words, spoken by President Obama, are part of a 2009 speech regarding the United States’ new, responsible energy policy—a policy that he says “leverages American ingenuity to put people back to work, fight global warming, increase our energy independence, and keep us safe.”

This new energy awareness was addressed by the Commandant of the Marine Corps, General James T. Conway, at an energy summit in Washington, D.C. in August 2009. He believes energy efficiency is achievable and wants U.S. Marines to take the lead.





This garbage will one day become energy at MCLB Albany.

The base's efforts are the first gas-to-energy project in the Marine Corps.

Reacting to this challenge, the Marine Corps Logistics Base (MCLB) in Albany, Georgia, has embarked on an aggressive program to recover methane gas from nearby Dougherty County landfill to provide fuel for cogeneration of heat and electrical power. The program also positions the base for future steam generation efforts. The base's efforts are the first gas-to-energy project in the Marine Corps.

Methane as a Renewable Energy Source

Methane is emitted from a variety of both human-related and natural sources. Roughly 60 percent of global methane emissions are related to

human-related activities, including fossil fuel production, enteric fermentation in livestock and manure management, rice cultivation, biomass burning and waste management. Methane gas is a renewable energy source that is plentiful, relatively low in cost, and involves proven technology.

In the United States, landfills are the largest human-generated source of methane, accounting for 34 percent of all methane emissions. Today, methane generation at U.S. landfills is estimated to equal about five percent of domestic natural gas consumption, or one percent of domestic total energy needs.

Assistant Administrator for Dougherty County, Mike McCoy, commenting on

landfill gas stated, "Naturally occurring gas that results from the decomposition of garbage is a reliable and renewable energy source that mainly goes untapped."

In the past, as in most landfills, methane was burned off—a complete waste of a useable resource. The county was unable to efficiently use the methane gas due to the distance involved in the transport. Because of the base's proximity to the landfill, MCLB was considered the only viable source for potential use.

The Albany Plan

MCLB Albany's plan is to utilize landfill gas to offset a percentage of electricity received from the electrical



Landfill wellhead.

power grid at the base. A formal partnership agreement with Chevron Energy Solutions and Dougherty County was signed in early December 2009, establishing a 20-year gas-to-energy partnership. The recovered landfill gas will be used to operate a 1.9 megawatt heat and power generator.

“Presidential and Congressional mandates require that we reduce our greenhouse gas emissions, increase our use of alternative energy sources and reduce our energy consumption. This project will dramatically reduce our intensity and increase our use of renewable energy,” said Colonel Terry V. Williams, Commanding Officer, MCLB Albany. “Once approved and

operating, this project will bring us to 22 percent renewable energy of our total utilities use. The Congressional mandate is about seven percent.”

The program will also help the base with energy security and reliability. The landfill gas generator will be run along with the base’s utilities, which will allow for continued generation of power in the event of a local public utilities power grid failure.

Making It Happen

The county was willing to fund the extraction equipment at the landfill but the cost of piping to transfer the gas and power generation equipment had to be borne by the Marine base. The infrastructure alone would

amount to millions of dollars that MCLB did not have. As a solution, MCLB engaged Chevron in a Department of Defense (DoD) program called the Energy Savings Performance Contract (ESPC). ESPCs are widely used across DoD, enabling federal agencies to improve energy efficiency and reduce costs through private investments.

What Chevron brought to the table was the knowledge to construct the infrastructure and the expertise to successfully negotiate with Dougherty County. Chevron, in turn, would reap a percentage of the savings.

After two rounds of negotiations among MCLB, the Department of Energy, the Naval Facilities Engineering

Command (NAVFAC)—East, Headquarters Marine Corps, Dougherty County, and the Chevron corporation, NAVFAC awarded an \$18.8 million ESPC to the Chevron Energy Solutions Company of San Francisco. The contract will provide an annual cost savings of nearly \$1.8 million, and an energy savings of 66,984 million British Thermal Units (MBTU).

This joint action promotes environmentally sound disposal methods, maximizes the reuse of recoverable resources and fosters resource conservation. Solid waste facilities, such as the Dougherty landfill, are looking for new and innovative ways to exploit their closed landfill sites. Benefits from legacy site exploitation include revenue, lower maintenance costs, improved site sustainability and demonstrated environmental stewardship.

Landfill Gas Quality

Landfill gas is 50 percent methane, 49 percent carbon dioxide and one percent trace gases. A major concern for utilization of landfill gas for energy and merchant carbon dioxide is reliable, economic removal of contaminants from the raw gas. Landfill gas is similar to low-quality natural gas: expressed in heating value, natural gas will have a BTU of 1,000 and the equivalent biomethane will have a BTU of 500.

According to McCoy, the county's responsibility is to collect the gas and the base will be responsible for processing the gas. "Because this is a take or pay agreement, the county is responsible for providing a baseline quantity of 153,640 million BTUs per year. Any quantity in excess of the baseline is paid for by MCLB," he said.

and can be processed to high-purity (food grade) liquid CO₂.

Frederick Broome, director, Installation and Environment Division, MCLB Albany, said, "This is a huge day for our local community and our base. Our two agencies were finally able to enter into an agreement for the base to purchase the county's landfill gas to generate 'green' electricity."

Today there are more than 400 landfill gas plants operating in the U.S., generating more than 10 billion kilowatt hours per year in electricity. In addition to the electricity generated, the plants remove 95,000 metric tons of carbon dioxide from the environment while saving the equivalent of 220,000 barrels of oil. That equates to taking 21,000 cars off the roads.

General Conway eventually wants Marine Corps installations to

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—Colonel Terry V. Williams

According to Richard Crowdis, Dougherty County administrator, the first phase of the project, which commenced with a groundbreaking on 20 May 2010, requires an initial investment of \$1.3 million to install more equipment, ground wells to extract more gas, more system engineering, and pipes at the landfill. "In 2019, there will be another cost of \$1.1 million to add more wells because the lifespan of our landfill is estimated at 43 years," he states. "Our projected annual operating expenses will be about \$21,207 over the life of the project term, which is 20 years, with one five-year renewal."

A Promising Future

Despite its drawbacks, landfill gas—unlike natural gas—is a renewable energy resource. For the Marine Corps, this is a step to gain energy independence.

In the future, landfill gas could be converted to compressed natural gas and liquefied natural gas for use as an alternative vehicle fuel. The methane can also be converted to methanol and ethanol. The other components of landfill gas also represent a potential source of revenue. Carbon dioxide (CO₂) for example, is utilized in the oil and coal industries, wastewater treatment facilities, chemical industries,

produce as much energy as they use—a concept called "net zero." Achieving this will necessitate tapping into renewable sources like landfill gas.

"We will be more energy efficient," General Conway concluded, "We have to be." 

Photos by Art Powell

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