

LMOP Workshop: Project Case Studies

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2012 Project of the Year: Electricity – Combined Cycle Orange County's Olinda Alpha LF, CA

- The project produces 32.5 MW of electricity with 4 combustion turbines.
- Project uses a high-efficiency combined cycle process which captures the waste exhaust heat from the turbines to create additional electricity.
- The project has an innovative reuse of water that saves 32,000 gallons of water per day.





**2012 Project of the Year:
Electricity – Reciprocating Engine
Anne Arundel County's Millersville
Landfill, Severn, MD**

- 3.2 MW LFG electricity project
- Financed with local bond sales and \$2 million in American Recovery and Reinvestment Act (ARRA) funding
- Public and private partnership created to develop energy project

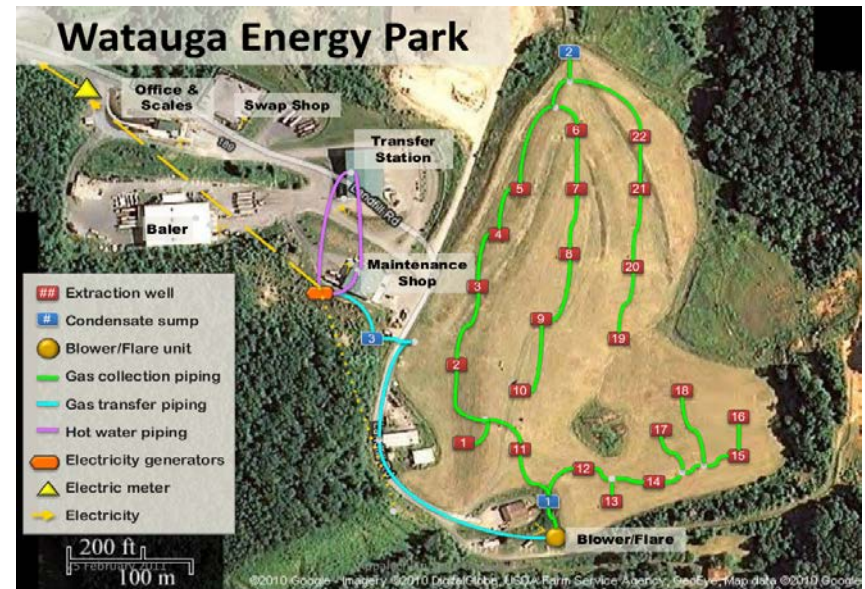


**Landfill
ENERGY
SYSTEMS**



2012 Project of the Year: Electricity – Unique Engine Type Watauga County Landfill, NC

- This community-supported project creates electricity from LFG from a landfill that closed in 1994.
- Two LFG fueled-modified automotive engines to generate 186 kW of electricity.
- Provides the county \$72,000 in profits annually.
- The project has become a model for other small-scale projects in NC and other sites as well as providing tours to the community.





Small Electricity Case Study

Golden Triangle Regional Landfill, Starkville, MS



- Regional authority (landfill owner) self-developed project
- Took advantage of TVA's Generation Partners program – pays a premium for green power
- Received \$310,000 grant from federal ARRA money

- Voluntary installation of gas collection system
- (1) GE-Jenbacher J320 engine creates ~ 1 MW
- Created 25 construction jobs and 1 permanent job

*LMOP
2011
Project
of the
Year*





Electricity Case Study Hill Air Force Base Layton, UT

- Start-up in 2005 and expansion in 2008
- Davis County Landfill
- LFG to electricity (2.25 MW) project using reciprocating engines
- Project highlights:
 - First Department of Energy Biomass Super Energy Savings Performance Contract (ESPC) Project
 - Parties involved: Ameresco, Hill Air Force Base, Davis County Landfill, Utah Power, the US Department of Energy, and State of Utah – Department of Natural Resources
 - Estimated annual savings of \$400,000, overall simple payback under 10 years.





Cogeneration Case Study U.S. Coast Guard Yard Renewable Energy Center Baltimore, MD

- Start-up in 2009
- Baltimore City owned Quarantine Road Landfill
- 1 mile pipeline
- Project highlights:
 - Largest renewable energy project in Coast Guard history
 - First co-generation plant in the State of Maryland
 - 4 LFG powered generators in the new co-generation plant (4 MW)
 - Once operational this project met the renewable energy requirements of the entire Department of Homeland Security for four years





2012 Project of the Year: Electricity – Combined Cooling, Heat, and Power Hickory Ridge Landfill & Coca Cola Conley, GA

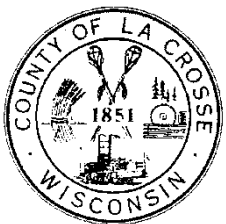
- A 6-mile pipeline and 3 CAT engines were permitted in a severe ozone non-attainment area
- LFG provides a continuous supply of renewable electricity, steam, and chilled water to the Coca-Cola Atlanta Syrup Branch facility
- Will generate 48 million kilowatt-hours annually, providing nearly all of the plant's energy needs





**2012 Project of the Year:
Electricity – Off-Site Combined Heat & Power
La Crosse County LF &
Gundersen Health System, WI**

- A 2-mile pipeline delivers LFG to Gundersen for electricity generation and on-site production of heat and hot water.
- The project simple payback is currently estimated at approximately 8 years.
- The county benefits from the revenue stream and the LF received a “Green Tier” status from the Wisconsin Department of Natural Resources.





Direct Use/CHP Case Study H₂Gro Greenhouses Lewiston, NY

- 11 engine-generator sets produce a total of 12 MW of electricity
- Provides all electrical & heating requirements for H₂Gro's Greenhouse
- Excess electricity sold to grid
- Test so successful, expanded to 7½ acres and produces 3.5 million lb tomatoes/yr





CHP and Direct-Use Case Study BMW Manufacturing Greer, SC

**LMOP 2003
*Project of
the Year***

- 9.5-mile pipeline from Palmetto Landfill to BMW
- 2003 – 4 gas turbines retrofitted to burn LFG
- 2006 – Converted paint shop to utilize LFG in oven burners & for indirect heating
- 2009 – Replace the turbines with 2 highly efficient turbines
- LFG accounts for nearly 50% of BMW's energy needs
- To date, LFG has saved BMW an annual average of \$7 million in energy costs



**LMOP 2006
*Energy End User
Partner of
the Year***





Direct-Use Case Study Seward County Landfill, KS



- Project is a public/private partnership with National Beef
- 70 scfm of LFG is piped 1,500 feet to wastewater lagoon



- LFG and gas from covered lagoon is captured and used to fuel boilers at National Beef





Direct Use Case Study NASA Goddard Space Flight Center Greenbelt, MD

- Start-up in 2003. First LFG project at a federal facility
- Sandy Hill Landfill in Bowie, MD with a 5.5 mile pipeline to the NASA Space Center
- Project highlights:
 - The LFG fuels 3 boilers and provides 100% of the facilities heating needs 95% of the time, saving taxpayers more than \$3.5 million in energy costs since operation
 - Sophisticated control system to allow the boilers to burn fuel oil, natural gas, or LFG
 - LFG produces steam to heat 31 buildings on the 1,270-acre NASA campus





Direct Use Case Study **James A Quillen VA Hospital, E. Tennessee State University Johnson City, TN**

- Start-up in 2007
- Iris Glen Landfill
- Direct use of LFG for boilers and reciprocating engine
- Project highlights:
 - 4.0 mile LFG transmission pipeline.
 - Supplies 100,000 lbs/hr of steam, 7.5 MW of power, and chilled water to the VA hospital and East Tennessee State University.
 - Saves the hospital thousands of dollars plus \$500,000 annually in revenue to the City.
 - Pipeline quality LFG, so no burner modifications were required.

LMOP 2007
*Project of
the Year*





High-Btu Case Study Univ. of New Hampshire EcoLine™ - Rochester, NH



- LFG provides up to 85% of campus electric & heat needs
- 12.7-mile pipeline from Turnkey Recycling & Environmental Enterprises LF
- Cleaned LFG fuels existing CHP gas turbine & new turbine

**LMOP 2009
Project
of the Year**





High Btu Case Study

Veolia ES Greentree LF Kersey, PA

- Largest designed high Btu LFG energy project in U.S.
- Significant cleaning of the gas required
- 7-mile pipeline from landfill to processing



- Volume of LFG flared reduced by >90%
- Expect ~2 billion cf/yr product quality gas



**LMOP 2007
Project of the
Year**



Alternative Fuel Case Study Altamont Landfill, Livermore, CA

LMOP 2009
Project of the
Year



- Project co-developed by Waste Management and Linde, LLC
- Converts about 2,000 -2,500 scfm of LFG into ~13,000 gallons of LNG

- Provides fuel for nearly 300 garbage trucks
- Received state grants from 4 entities: \$2.3 million total





2012 Project of the Year: Alternative Fuel – CNG

St. Landry Parish Landfill CNG Project, LA

- Converts 50 scfm of LFG into 250 gallons of gasoline equivalent per day of compressed natural gas.
- The CNG is used to fuel government vehicles including Sheriff department cars, light duty trucks, and the solid waste district utility trucks.
- County uses the technology developed by BioCNG and uses local LFG to create vehicle fuel.

