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Call for Entries

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2014 VACo Achievement Awards

Deadline: June 2, 2014

Application Form

All applications must include the following information. Separate applications must be submitted for each eligible program. **Deadline: June 2, 2014.**

Program Information

Locality Prince William County

Program Title Prince William Landfill Gas to Energy

Program Category Environmental

Contact Information

Name Thomas J. Smith

Title Solid Waste Division Chief

Department Public Works

Complete Mailing Address 5 County Complex Court,Suite 250, Prince William, VA 22025

Telephone # 703-792-6252 Fax # _____

E-mail tsmith@pwcgov.org

Signature of county administrator or chief administrative officer

Name Melissa S. Peacor

Title Prince William County Executive

Signature _____

Prince William County Landfill Gas to Energy

Prince William garbage provides power for 5000 homes

PROGRAM OVERVIEW

The Prince William County Landfill Gas to Energy expansion project planning began in 2006. It required coordination between the County, Fortistar, the owner and operator of the landfill gas power plant and Northern Virginia Electric Cooperative (NOVEC), the local electric utility.

The County and Fortistar negotiated and received approval for amendments to the landfill gas use agreement in order to obtain bank financing. The County financed the electrical interconnect for the project, which will be paid back by Fortistar through increased revenue sharing of the electric revenue. A interconnect agreement and promissory note were negotiated and approved for this element of the project. Once the Agreements and County financing of the interconnect were approved, Fortistar was able to finalize its power purchase agreement with NOVEC and complete its financing for the energy plant.

After seven years of difficult and persistent researching, planning, navigating government processes and negotiating agreements, Prince William County Solid Waste Division, Fortistar and NOVEC were green-lighted to proceed. As a result, the project was designed, built and put into service on October 28, 2013, on time and on budget.

Fortistar owns and manages the power plant and sells the electricity it produces to NOVEC. The five engine facility generates 6.8 megawatts, meeting the electricity needs of 5000+ residents. The energy generated will meet over one percent of NOVEC's total annual requirement, a significant contribution, at a competitive price. The original two engines only generated 1.9 megawatts and served more than 1,500 households.

The landfill system is specifically designed to capture and process the gas produced by the decaying trash in the landfill. The collected gas is treated (compressed, dewatered, and filtered) and fed into engines that generate electricity. Local residents benefit from a reliable source of energy generated from refuse and a substantial reduction in methane gas being flared into the atmosphere.

Before this expansion project, approximately 25 percent of the methane gas was used by the engines. Now, about 90 percent of the gas is used and the remainder gas being flared has low methane content not suitable for energy recovery.

Prince William Energy is a great example of an ongoing successful public/ private partnership and is a win-win-win project that "electrifies" County residents.

THE PROBLEM/CHALLENGE/SITUATION FACED

The existing landfill gas to energy power plant, which was put into service in 1997, was no longer utilizing the vast majority of methane gas generated by the decomposing trash in the Prince William County Sanitary Landfill. In fact, before the expansion project, only about 25 percent of the methane gas was used by the engines. The remainder was flared in the atmosphere.

Methane is a very potent greenhouse gas that is a key contributor to global warming and climate change. Reducing methane emissions from municipal solid waste landfills is one of the best ways to mitigate global climate change.

Prince William Landfill, County solid waste staff were committed and determined to utilize more of the methane gas and divert more gas from the flare into beneficial use.

Research and planning by County staff to expand the landfill gas power plant began in 2006. The landfill engineers and Solid Waste Division Chief worked to determine optimal levels of gas output to make the expansion financial feasible and efficient. The original owner of the power plant had gone through bankruptcy and reorganization, and was unable to make definitive decisions on the future of the project. Once Fortistar became the owner of the power plant in 2008, negotiations to expand the power plant began. The County persisted in negotiating with Fortistar and finding innovative and cost effective ways to expand the energy plant.

Ultimately, the project required collaboration between the County, the owner and operator of the landfill, Fortistar, the owner and operator of the landfill gas power plant and the Northern Virginia Electric Cooperative (NOVEC), the local electric utility.

Innovative Financing and Collaboration

Negotiations and discussions to develop the necessary financing, contract arrangements, and power sales agreements were complex and intertwined. Due to the lack of high electric users around the Landfill, the cost to deliver the power via an interconnect to NOVEC's customer was higher than Fortistar was willing to pay and finance. Seeing the local benefit for this renewable power to the community, the County utilized some of its reserve account funds within the Solid Waste Enterprise Fund to finance the interconnect. The County paid

$1.6 million for the interconnect. Fortistar will pay back the County for the interconnect by providing an additional share of its electric revenues until the amount is paid back, at a 3% annual interest rate.

The County essentially invested this money in the project, rather than in its more traditional investment portfolio. The financial participation by the County in this private investment enabled Fortistar to complete its negotiation for the power sales, and obtain financing for the construction of the energy facility.

In accordance with the Agreements with Fortistar, the County is financially responsible for the improvements to the gas collection system. As part of the project, a larger blower to increase vacuum to the gas wells and additional landfill gas piping was required. To expedite the design and construction process, the County negotiated with Fortistar to have these components designed, constructed and installed by Fortistar in conjunction with the energy facility. Having one contractor construct all the required components saved the County time and money.

As part of the Agreement with the County, Fortistar provides all operation and maintenance costs for the energy facility, as well as the gas collections system at no cost to the County. Since this is a private facility, detailed costs for operation and maintenance are not available. However, according to Fortistar, the cost of the energy facility which was privately financed by Fortistar was approximately $5 million.

The Prince William Landfill Gas to Energy Project was designed, built and put into service on October 28, 2013-- less than 12 months from start to finish. Fortistar completed the power plant expansion on time and on budget.

Project Schedule

Design	February 2013
Groundbreaking	April
Equipment Installation	July
Electrical, Mechanical Controls	September
Completion/Start Up	October/November
Ribbon Cutting	December

Innovative Technology

Prince William Energy uses state of the art controls and data collection systems. This allows the facility to optimize performance and maximize output. Advance data collection allows for more "predictive" versus

"reactive" maintenance, thus use of technology optimizes operations and makes the project more economically viable.

State of the art SCADA (Supervisory Control and Data Acquisition) control systems designed for semi-unattended operation with remote telemetry allows a plant operator to monitor the functioning of the facility. Remote access via computer and mobile devices provides operators with real time information and the ability to instantly assess the operating status of the facility off site via a secure internet site. The operators can monitor and troubleshoot the plant anywhere internet service is available.

Additionally, the mating of the old and new power plants so they operate as one facility was a unique and innovative expansion approach.

Program Results

The landfill system is specifically set up to capture and process the gas produced by the decaying trash disposed in the landfill. This gas is collected, treated, and fed into engines that generate electricity that NOVEC delivers to its customers – local residents. Local residents then benefit from a reliable source of energy generated for refuse and the substantial reduction of methane gas being flared into the atmosphere. Fortistar owns and manages the power plant and sells the electricity it produces to NOVEC. The five engine facility now generates 6.8 megawatts, meeting the electricity needs of 5000+ Prince William County households, compared to the original two engines, which generated 1.9 megawatts and served about 1,500 households before the expansion project.

In fact, before this expansion project, approximately 25 percent of the methane gas was used by the engines. Now 90 percent of the gas is used by the engines and the remainder gas being flared has low methane content not suitable for energy recovery.

According to Stan Feuerbeg, NOVEC President/CEO, the energy generated will meet over one percent of NOVEC's total annual requirement, "a significant contribution, being supplied at a competitive price." In addition, the County receives a portion of the proceeds from the energy sales, which help offset the cost of landfill operations another win for Prince William County taxpayers.

The economic benefit to the County is revenue received from the project to offset some of the landfill operation costs and pay back of the interconnect costs are summarized below.

i. Base Revenue- Five percent (5%) of the electric revenue from the facility, plus up to an additional $12,000 per year for gas rights. It is

estimated that an additional $130,000 per year will be realized by the solid waste fund once the first phase of the expanded facility is fully operational.

ii. Loan Interconnect Payback – Payment for the interconnect loan will be an additional seven percent (7%) of the electric revenue, estimated to be approximately $180,000 per year. At a three percent (3%) interest rate, this loan will be paid back in approximately 11 years. Once the loan payment is completed, this additional seven percent (7%) revenue sharing payment will cease.

Prince William Energy is definitely a success. The approach used for the project was an innovative public/private partnership that provided benefit to all parties involved, especially Prince William County residents and the environment.

The Prince William Solid Waste Division manages the trash for good use. It begins with local residents throwing out their trash, which is collected by local haulers and transported to the Prince William County Landfill for disposal and this garbage is returned to citizens as electricity to heat and cool their homes, brew their coffee, and power a myriad of other electronic devices that enhance their daily lives.

SUPPLEMENTAL MATERIALS

Provided:

Prince William Energy Project Photos

Prince William Energy Program Overview (distributed at Ribbon Cutting)

Link to ribbon cutting video- http://www.youtube.com/watch?v=12L9gEh6AwU

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Prince William
Landfill Gas to Energy Facility
Project Summary
December 2013

Proud Partners

Project Team

As a nation, we are at a decision point. We must act now to promote energy conservation, as well as develop more domestic energy sources . . . I commend your innovative efforts to produce clean energy that meets the environmental challenges of today.

Mark R. Warner
United States Senator, Virginia

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Project Overview

Project:	**Renewable Landfill Gas to Energy Project**
Owner / Operator:	**FORTISTAR**
Project Completion:	**October 28, 2013**
Equipment:	**2 CAT 3516 and 3 CAT 3520 Engines**
Capacity:	**6.8 MW Gross**
Location:	**Prince William County Landfill**
Project Term:	**15 Year Power Supply Agreement to NOVEC**

Energy is both a national and international issue, but when you get down to the realities of real-life energy need and production, it is, most of all, local. Local energy projects serve local businesses and communities, like Prince William County, Virginia.

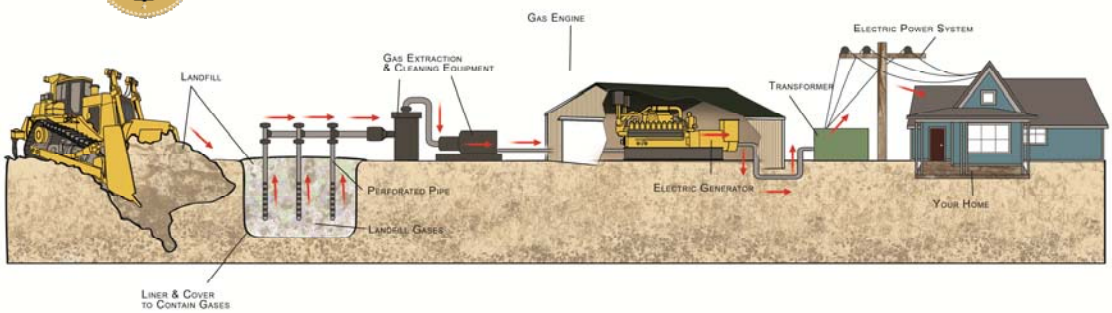
With global warming, greater environmental sensitivity, and the need to reduce imports of foreign energy supplies, we need every clean, renewable and local energy source we can find. Methane captured from landfills are a reliable contributor to the solution.

The landfill gas to energy facility, Prince William Energy, at the Prince William County Landfill, is a new facility which includes landfill gas compression and treatment systems, CAT engines and utility electrical interconnection. Landfill gas will be drawn from the landfill and supplied to the engines through gas compression and treatment equipment. The initial installation of two CAT 3516 engines has been enhanced by three additional CAT 3520 engines to generate electricity.

The Partnership

FORTISTAR

NOVEC
NORTHERN VIRGINIA ELECTRIC COOPERATIVE



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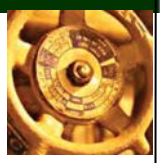

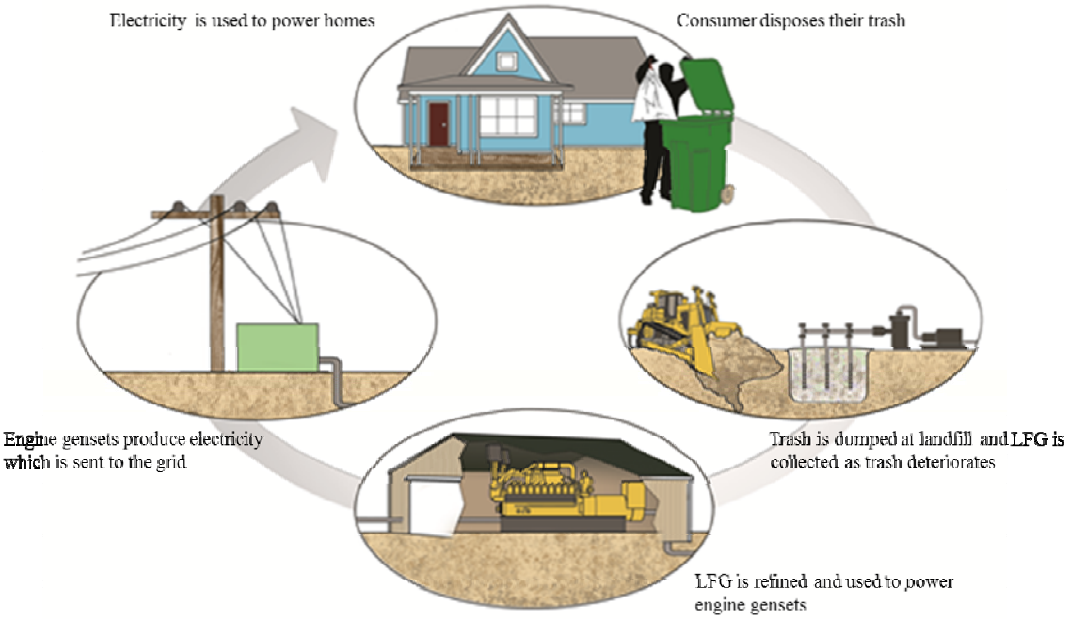

Beginning with local residents throwing out their non-recyclable trash, municipal solid waste (MSW) is hauled to the Prince William landfill and put to good use. The landfill is specifically designed to capture and process the gas produced, delivering it to five engines that create the renewable electricity for NOVEC's power supply to its customers.

FORTISTAR financed, built and will manage / operate the facility.

Prince William Energy Facility Standout Features

- ◊ Running as a "baseload" 24/7 facility and using low-emission engines, producing energy here cuts over 20,992 metric tons of CO_2 over more traditional fossil fuels.
- ◊ State of the art controls and data collection systems will allow the facility to optimize performance, maximizing output. Advanced data collection will allow for more "predictive" as opposed to "reactive" maintenance. By optimizing operations through the use of technology the project can continue to be economically viable for all parties.
- ◊ A functioning "on the ground" relationship among all parties will ensure the landfill, energy project, and utility are symbiotic, working together on environmental and generation issues ensuring consistent reliable locally produced power for Prince William County residents.
- ◊ Strong ties to the community in terms of participating in local environmental / educational programs, allowing tours and providing educational materials on the benefits of using landfill gas for energy generation.

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Enhancement to the Existing Project

Prince William Energy Landfill Gas to Energy Project Highlights

General Design Considerations

- Three CAT 3520 Engines Electrical characteristics
  - Export voltage: 12,470 VAC
  - Auxiliary MCC voltage: 4,160 VAC / 480 VAC
- Plant design life: 35 years
- Designed for maximum operating availability and minimized downtime
- State-of-the-art SCADA control systems designed for semi-unattended operation with remote telemetry
- Remote access via computer and mobile devices
- Sophisticated trending technology for facility reporting / operational troubleshooting

Project Schedule

• Design:	February 2013
• Groundbreaking:	April
• Equipment:	July
• Electrical, Mechanical, Controls:	September
• Substantial Completion/Start-up :	October/November 2013

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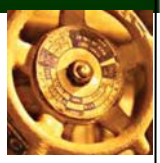

Enhancement to the Existing Project

Engine Room (2,806 Square Feet)

The engine room provides space for the generator sets. This space, being a high noise level area, will be sound insulated from the adjoining control room and outdoors. The engine room has a unique perspective as the engines are located 18" below the floor level to give better access to the working areas. This gives a clean look to the area as all major piping is under the grading removing trip hazards.

Control Room (768 Square Feet)

With a direct view of the engine room, the plant operator can monitor the functioning of the facility via the SCADA controller. The following systems reside in the control room:

- AC Lighting
- Receptacle Panels
- DC Panel
- Batteries
- IT and Communication Systems
- Uninterruptible Power Supply (UPS)
- Electrical Equipment:
    - Low Voltage Distribution Panels
    - 480-volt Motor Control Center
    - Medium Voltage Switchgear
    - SCADA (Programmable Logic Controller) Equipment

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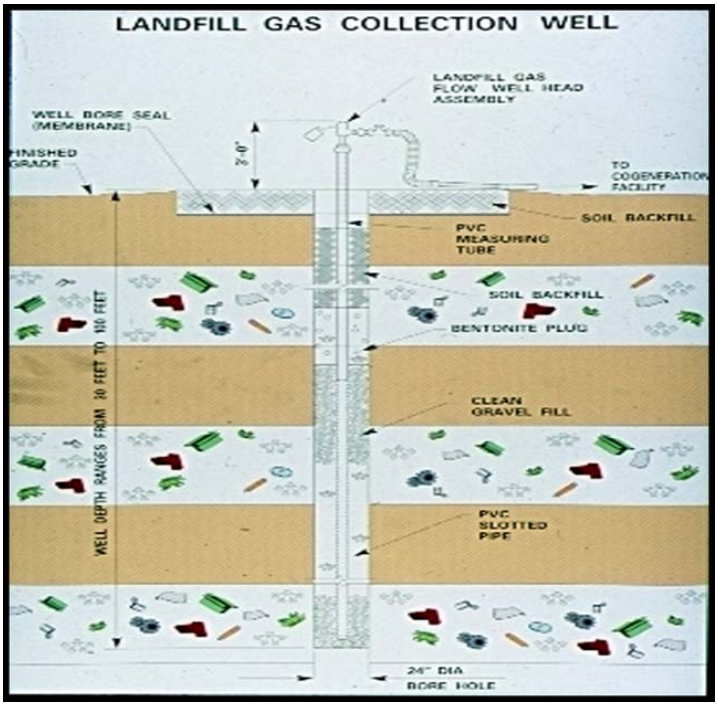

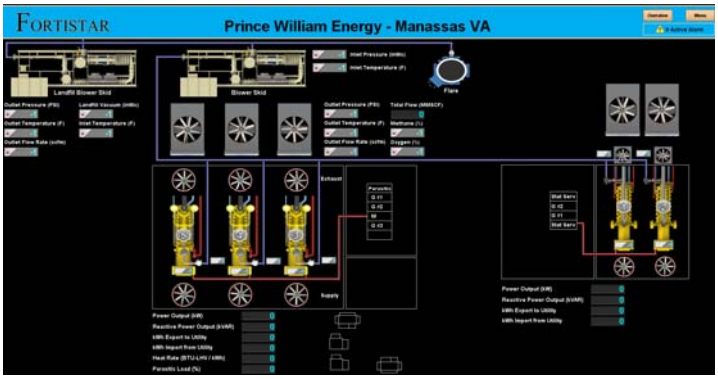

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Prince William Energy

Proud Partners

FORTISTAR

Project Team

Draper Aden Associates
Engineering • Surveying • Environmental Services

SCS ENGINEERS

MARK R. WARNER
VIRGINIA

UNITED STATES SENATOR
WASHINGTON, D.C.

December 4, 2013

Dear Friends,

I am pleased to extend my warmest greetings to all who are gathered for the Northern Virginia Electric Cooperative and Fortistar's Dedication Ceremony honoring the new Energy Facility at the Prince William County Landfill.

This event is an occasion to honor the strength of the mission that characterizes both of your organizations. As a nation, we are at a decision point. We must act now to promote energy conservation, as well as develop more domestic energy sources. In order to retain its competitive advantage in the global economy and ensure a promising future for our citizens, America must invest in research and develop new technologies and efficiency improvements across all sources of energy. I commend your innovative efforts to produce clean energy that meets the environmental challenges of today. I applaud all those who work with your organizations to help strengthen the Commonwealth and improve the lives of others.

On this important occasion, I am very pleased to join with your families, friends and community in wishing the Northern Virginia Electric Cooperative and Fortistar the very best for a successful and fulfilling event.

Sincerely,

MARK R. WARNER
United States Senator

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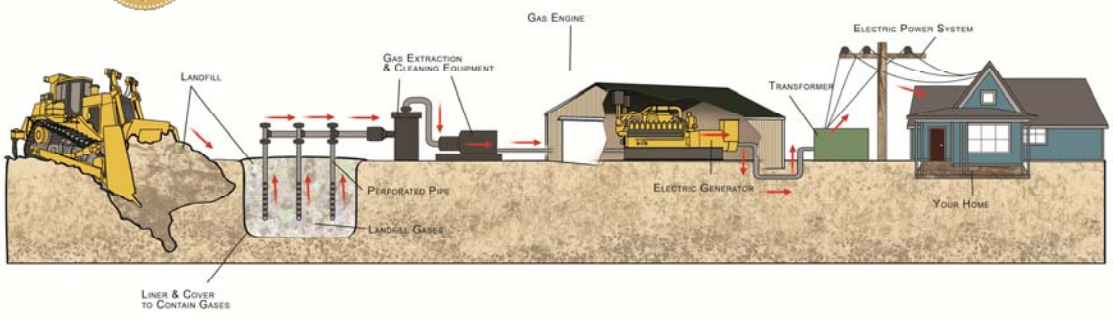

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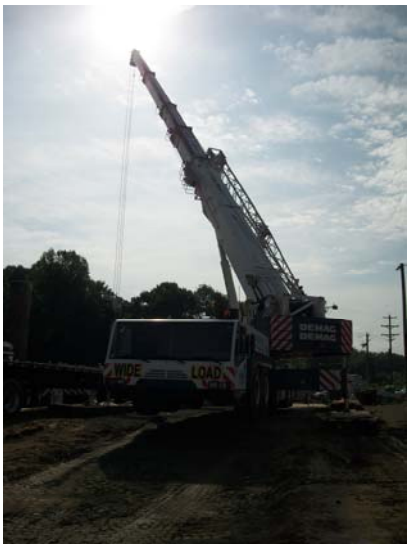

Producing power from a renewable fuel source such as landfill gas displaces the need to produce the power from traditional, fossil-fuel based sources. Based on average emissions for conventional electricity production, this entire facility will produce the same electricity with an estimated reduction of 20,992 tons of CO_2 per month.

This emissions reduction is roughly the equivalent of:

- Planting 8,504 acres of pine trees
- Removing 6,853 passenger vehicles from the road, or
- Using 4,247,425 gallons of gasoline on our roads

Prince William Fast Facts

2 x CAT 3516 and
3 x CAT 3520 engines

Producing 6.8 total MW of renewable power produced from landfill gas as a fuel source powering 4,000 to 5,000 Prince William County homes.

Average landfill gas consumed each month:	103,680,000 scf
CO_2 equivalent of methane destroyed per month:	20,992 MT of CO_2
Average monthly kWh produced:	4,076,000 kWh
Estimated number of homes powered per month:	4,000 – 5,000 homes

* Projections based on project assumptions.

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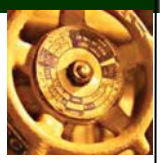

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Landfill Gas to Energy

Methane Emissions from Landfills

Adapted from information provided by the Landfill Methane Outreach Program, a division of the United States Environmental Protection Agency - www.epa.gov/lmop.

Municipal solid waste (MSW) landfills are the second-largest source of human-related methane emissions in the United States, accounting for approximately 22 percent of these emissions in 2008. Landfill Gas (LFG) is created as solid waste decomposes in a landfill. This gas consists of about 50 percent methane (the primary component of natural gas), about 45 percent carbon dioxide (CO2), and small amounts of non-methane organic compounds. Methane emissions from landfills represent a lost opportunity to capture and use a significant renewable and sustainable energy resource.

Converting Landfill Gas to Energy

Instead of escaping into the air, LFG can be captured and used as an energy source. Using LFG helps to reduce odors and other hazards associated with LFG emissions, and it helps prevent methane from migrating into the atmosphere and contributing to local smog and global climate change through greenhouse gas emissions. LFG is extracted from the landfill using a series of wells with a vacuum system. This system directs the collected gas to a central point where it can be processed and treated depending upon its ultimate use. From this point, the gas can generate electricity, replace fossil fuels in industrial and manufacturing operations, or be upgraded to pipeline-quality gas where it may be used directly or compressed into an alternative vehicle fuel.

Electricity Generation

The generation of electricity from LFG makes up about two-thirds of the current LFG operational projects in the United States. Electricity for on-site use or sale to third parties can be generated using a variety of technologies, including internal combustion engines, turbines, micro turbines, and fuel cells. The vast majority of projects use internal combustion (reciprocating) engines or turbines, with micro turbine technology being used at smaller landfills and in niche applications. Technologies such as Stirling and organic Rankine cycle engines and fuel cells are still in development.

Benefits of Landfill Gas Energy

Using LFG for energy is a win/win opportunity. LFG utilization projects involve citizens, nonprofit organizations, local governments, and industry in sustainable community planning. These projects go hand-in-hand with community and corporate commitments to cleaner air, renewable energy, economic development, improved public welfare and safety, and reductions in greenhouse (global warming) gases. Finding innovative ways to deal with their LFG contributes to the creation of livable communities that enjoy increased environmental protection, better waste management, and responsible community planning.

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Landfill Gas to Energy (cont.)

It Directly Reduces Greenhouse Gas Emissions

MSW landfills released an estimated 30 million metric tons of carbon equivalent to the atmosphere in 2008 alone. Given that all MSW landfills generate methane, it makes sense to use the gas for the beneficial purpose of energy generation rather than emitting it to the atmosphere.

Methane is a very potent greenhouse gas that is a key contributor to global climate change (over 21 times stronger than CO_2). Reducing methane emissions from MSW landfills is one of the best ways to achieve a near-term beneficial impact in mitigating global climate change.

LFG energy projects process the majority of the methane generated from the landfill, depending on system design and effectiveness. The captured methane is destroyed (converted to water and the much less potent CO_2) when the gas is combusted in a controlled manner to produce electricity.

It Indirectly Reduces Air Pollution by Offsetting the Use of Non-Renewable Resources

Producing energy from LFG reduces the need to use non-renewable resources such as coal or oil to produce the same amount of energy. This can avoid or reduce gas end-user and power plant emissions of CO2 and criteria pollutants such as sulfur dioxide (which is a major contributor to acid rain), particulate matter (a respiratory health concern), nitrogen oxides (NOx), and trace hazardous air pollutants.

Like all combustion devices, LFG electricity generation devices have some air emissions. However, LFG electricity generation projects significantly improve the environment, because of the large methane reductions, hazardous air pollutant reductions, and avoidance of the use of limited non-renewable resources such as coal and oil that are significantly more polluting than LFG.

It Creates Other Indirect Benefits

Collecting and using LFG to produce electricity improves the air quality of the surrounding community by reducing landfill odors, and reducing possible health risks from uncontrolled LFG. Gas collection can also improve safety by reducing explosion hazards from gas accumulation in structures on or near the landfill. Generating electricity from existing MSW landfills is also a relatively cost-effective way to provide new renewable energy generation capacity to supply community energy and sustainability objectives.

It Benefits the Local Economy

LFG energy projects generate revenue from the sale of the gas. LFG use can also create jobs associated with the design, construction, and operation of energy recovery systems. LFG energy projects involve engineers, construction firms, equipment vendors, and utilities or end-users of the power produced. Much of this cost is invest locally for drilling, piping, construction, and operational personnel, helping communities to realize economic benefits from increased employment and local sales.

It Reduces Environmental Compliance Costs

Current EPA regulations under the Clean Air Act require most landfills to collect and combust LFG. There are several compliance options, including flaring the gas or installing an LFG use system.

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About FORTISTAR

Operational Excellence,
Experienced Developer,
Disciplined Acquirer, and
Committed to the Environment

FORTISTAR is a highly focused independent power generation company, operating in 15 U.S. states and the Canadian Province of Alberta.

We own, manage, and develop independent power projects with well-structured contracts that provide reliable long-term cash flow.

FORTISTAR participates in opportunities across North America. The company is a fast growing, privately owned organization whose growth is coming from changing value of existing projects and an aggressive acquisition and development program.

FORTISTAR'S business model is to treat each project group as an independent business. Each project group has a dedicated staff responsible for the day-to-day management and project profitability. The home office personnel provide overall guidance and financing. By assigning experienced senior officers to manage each project group, we are better able to ensure superior results.

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Landfill gas power plant before expansion front view.

Laying conduit and high density polyethylene LFG pipes.

Prince William Energy Under Construction

Landfill gas well.

Prince William Energy showing gas skid, blower, flare, radiators, etc. after expansion.

Three Caterpillar 3520 engines.

PW Facility engine blower skid

County landfill gas blower skid.

Stan Feuerberg of NOVEC addresses a standing room crowd of community members, leaders and elected officials before the official ribbon cutting.

Officials from Fortistar, NOVEC, Prince William Board of County Supervisors, PW County Government, PW County citizens and US EPA witness the formal opening of the new energy plant.

Tom Smith, Solid Waste Division Chief "flips the switch" on an iPad to start one of the three new engines. Fortistar's Mark Comora, Tom Bruun, Director of PW County Department of Public Works and Board of County Supervisor Martin E. Nohe watch.

Link to ribbon cutting video-

http://www.youtube.com/watch?v=1