Bowerman Power Landfill Gas-to-Energy Project

Submitted to the National Association of Counties
for consideration of NACO 2016 Achievement Award

Category: County Resiliency: Infrastructure, Energy & Sustainability

Contact Information: Julie Chay, Public Information Officer
714.834-4059 julie.chay@ocwr.ocgov.com

Program Abstract

OC Waste & Recycling (OCWR) manages three of the nation's largest active landfills and 20 closed former refuse disposal stations. The County's Frank R. Bowerman Landfill generates methane-rich gas from as many as 11,500 tons of waste that go into the landfill daily and decompose. Common landfill practice is to collect and burn the gas using flares. This approach is acceptable but does nothing to maximize the value of this gas or contribute to energy efficiency.

OCWR envisioned turning this landfill gas into renewable energy with a state-of-the-art landfill gas-to-energy facility. The County collaborated and partnered with private industry and other public/government entities to build such a facility, which became operational in March 2016. Called Bowerman Power Project, it delivers 20 megawatts of renewable energy to the City of Anaheim Public Utilities Department, which delivers enough electricity to serve 14,700 homes, offsets 86,106 tons of greenhouse gas emissions, and helps Anaheim achieve its renewable energy portfolio goals.

In exchange for hosting the facility and providing the landfill gas, the County receives revenue that will help enable OCWR to continue providing industry-leading waste management services at stable consumer rates, protect the environment and promote recycling.

Problem or Need for the Program

Decomposing waste in landfills generates methane, a potent greenhouse gas that must be mitigated for human health and air quality outcomes. Typically, the landfill gas is collected and destroyed through a process called flaring. The problem with flaring is that it is analogous to leaving money on the table – it leaves a prime renewable energy source on the table. The need was to not let this resource literally go to waste but to capture and "recycle" it into a sustainable energy source.

Description of the Program

About the Frank R Bowerman Landfill

The Frank R. Bowerman Landfill opened in 1990. At 725 acres, of which 534 acres are permitted for refuse disposal, the landfill is the ninth-largest landfill in the nation. The landfill is permitted to receive a daily maximum of 11,500 tons of waste, and must comply with numerous federal, state and local regulations. Several regulatory agencies inspect the landfill periodically to ensure compliance with these regulations, including the California Department of Resources Recycling and Recovery (CalRecycle) and its Local Enforcement Agency, as well as the California Regional Water Quality Control Board and the South Coast Air Quality Management District. This strict (and costly) regulatory environment made the prospect of a revenue-generating project desirable.

About the Bowerman Power Landfill Gas-to-Energy Project

The Bowerman Power Project is a state-of-the-art landfill gas-to-energy facility. The facility utilizes 113,000 square feet on a 2.6-acre site. The 20-megawatt project is ranked among the top ten landfill gas-to-energy projects in the U.S., delivering of renewable electricity to the City of Anaheim Public Utilities. Envisioned by the County of Orange, and developed in collaboration with Montauk Energy/Bowerman Power, the project produces 160,000 megawatt hours of electricity annually, sufficient to serve 14,700 homes, while offsetting 86,106 tons of greenhouse gas emissions.

The reciprocating engines feature emissions reduction technologies that meet the strict requirements of the South Coast Air Quality Management District. The $60 million plant was constructed in one year, without interrupting operations at the ninth largest landfill in the United States.

In exchange for providing the property for the facility and the landfill gas to fuel the power plant, the County will receive a total of $31 million in royalty payments during the 20-year contract period, and $1 million compensation annually for operation and maintenance costs related to the landfill gas collection system.

The site selected for a landfill gas-to-energy project was based on several factors: proximity to the existing flare station, the landfill gas header pipe termination point, the distance to the electrical interconnect, as well visual and noise separation from nearby residents. By using a site adjacent to the existing flare station and routing of the electrical interconnect in or above an existing roadway, environmental impacts were minimized.

The potential for the project to adversely affect nearby residents was addressed early on in the project. New neighborhoods have been built near the landfill, calling for additional study of the appearance of the facility and noise from the engines. OCWR made checked viewsheds from

several locations in the neighboring communities and found that the power plant was not visible. However, noise remained a potential concern. As a result, each engine-generator is housed in an insulated enclosure with a muffler on the exhaust stream. Compressors are covered in a sound-deadening blanket. These measures were taken to ensure that the adjacent residential communities would not have a noticeable increase in background noise during the evening.

Environmental Controls

OC Waste & Recycling performed a California Environmental Quality Act (CEQA) analysis to identify and characterize the environmental impacts of the project. After a public review and comment period, the CEQA document was approved. Below are the results of the environmental analysis:

Stormwater Control - Due to the design of the areas surrounding the equipment pad with gravel, storm water runoff is lower that before development.

Noise Control – Each engine-generator is housed in an insulated enclosure with a muffler on the exhaust stream. Compressors are covered in a sound-deadening blanket. These measures were taken to insure that the adjacency residential communities would not have a noticeable increase in background noise during the evening.

Water Use – All equipment is air-cooled, requiring no water use. Potable water consumption is limited to the operations staff restroom.

LFG Condensate Recycling – To the extent required by landfill operations, condensate is treated to meet water quality permit levels and then used for dust control. Excess condensate, such as during rainy weather, is hauled off site.

Emissions Reduction – The overall impact on human health by converting the landfill gas to electricity is positive compared to landfill gas flaring. The power plant uses advanced gas clean-up and emissions reduction technology to meet local, state and federal air quality requirements. The power plant offsets an estimated 86,106 tons of greenhouse gas emissions each year.

Regulatory Compliance

The Bowerman Landfill was designed to meet the strictest regulations. Groundwater is protected by a state-of-the art prescriptive composite liner and a leachate management system. Air quality is protected through installation of a landfill gas collection system. Gas detection probes surround the perimeter of the waste disposal area to detect landfill gas. If detected, the gas collection vacuum system is tuned to ensure no movement of landfill gas. The landfill surface also is monitored to detect the possible presence of landfill gas. OC Waste &

Recycling's reputation of excellence in managing landfill gas collection make Orange County landfills desirable partners for landfill gas energy projects.

In meeting regulatory standards, Bowerman Landfill is protecting the health of its neighbors and meeting its good neighbor commitment.

Program Costs

One great benefit of the public-private partnership that brought the Bowerman Power Project to life is that there was minimal investment needed by the County of Orange. The $60 million cost of construction of the project was borne by Montauk Energy, whose partner, Caterpillar, provided financing.

Any county-operated landfill seeking to replicate this program would need only have a landfill that flares its landfill gas.

Program Results

$31 million in royalty payments to the County of Orange during the 20-year contract period

$1 million annually to offset landfill gas collection system operation and maintenance costs

160,000 megawatt-hours of electricity produced annually, powering 14,700 homes

The power plant offsets an estimated 86,106 tons of greenhouse gas emissions each year.

Anaheim Public Utilities boosts its renewable energy resources to 25 percent.

Availability of local renewable energy ensured a stable resource to mitigate the ups and downs of solar and wind power.

Montauk Energy uses its experience in landfill gas-to-energy projects to build a state-of-the-art facility at the Bowerman Landfill.

The power purchase by Anaheim Public Utilities creates a local recycling loop: Waste from Orange County businesses and residents produces landfill gas at the Bowerman Landfill, which is used to produce electricity that powers Anaheim customers.

Worthiness of Award

Though the Bowerman project provides an additional source of revenue for the County's Waste & Recycling department, equally important is how it modeled effective public-private partnership, inter-governmental collaboration and the relentless pursuit of sustainable and environmentally sound energy programs. For the time being, the most critical results include completing the project on time and within budget.