

Anchorage Landfill Gas to Electricity



Anchorage, Alaska



Landfill generates renewable electricity for military base

Project overview

Doyon Utility (DU) and the Municipality of Anchorage's Solid Waste Services (SWS) developed and constructed an electric power plant located at the Anchorage Regional Landfill (ARL). The plant uses landfill gas, a byproduct of anaerobic waste decomposition, as its primary fuel to produce electricity which is then sold to the Joint Base Elmendorf-Richardson (JBER). Natural gas is burned when methane is not available.

Objectives

The main objectives of this project were to provide clean electricity to JBER and use a waste product that was being flared into the atmosphere. The facility currently meets 25 percent of JBER's total electric energy demand.

Economic feasibility

The project became operational in August 2012 and by December 2014 had generated 102,881 megawatt-hours (MWh) of electricity (more than double the predicted amount), and displaced the equivalent of 9.8 million gallons of diesel fuel. In addition to fuel cost savings, the project provides a steady stream of income to the Municipality of Anchorage through the sale of landfill gas, a resource that had previously cost money to dispose of.

Project development

The project started with four internal combustion engines but just a year later they added an additional engine because of the increased amounts of landfill gas. Capacity was expanded two years prior to initial plans. There is enough room in the power plant to house one more engine (six total) should the military base, city, or landfill expand.

Quick Facts

Total project costs: \$30.6 million

Funding:

Renewable Energy Grant Fund : \$2 million
Matching Funds: \$28.6 million

Equipment

65 wells & collection points at the landfill
Engine: Five GE Jenbacher JGS 420
Generator: Caterpillar G3520CPGL
Capacity: 1.6 MW/generator, 7 MW total

Diesel equivalent gallons (DEG) displaced

Annual: 5.4 million DEG annually
Cumulative: 9.8 million DEG
(Aug. 2012–Dec. 2014)

Fuel Savings

Annual: \$2.4 million
Cumulative: \$6.5 million
(Aug. 2012–Dec. 2014)

Megawatts Generated:

47,000 MWh annually

As a result of this project, 25 percent of all energy demand at JBER is met with renewable energy.



Jenbacher JGS 420, photo courtesy of Lang Van Dommelen.

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Project benefits

The project provides benefits to all partners.

SWS receives compensation for disposing of a waste product that would otherwise be a cost. The project created a new revenue stream for the Municipality of Anchorage and delays the need to expand the existing landfill, keeping waste disposal rates and emissions low for the community.

Doyon Utilities generates and sells electricity to JBER and makes a reasonable profit.

JBER far exceeds the Energy Policy Act of 2005 requirement for renewable energy in federal facilities. The project is the largest green energy project in the US Airforce Pacific Theater. It is a win-win-win project for Anchorage, DU, and JBER.

Learning experiences/challenges

This gas to electricity project is one of the northern most of its kind. The predictive models and design standards for gas collection systems are generally developed for warmer or more moderate climates. Consequently, the operators are always tweaking their predictive model for gas generation. They also continuously experiment with the operation of the collection system in cold environments using insulated piping rather than relying on deeper burial to limit freezing of moisture carried by gas.



Methane transmission line, photo credit Loren Holmes.

Funding

The Alaska Energy Authority's Renewable Energy Fund contributed \$2.0 million and the Municipality of Anchorage contributed \$1.4 million. These funds were used to construct the gas processing system and a 6,000 foot transmission pipeline. Doyon Utility and several other organizations provided the remainder of funding for the construction of the power plant and electrical distribution system. Total project costs equaled \$30.6 million.



Landfill power plant, photo courtesy of Daysha Eaton, KSKA.

Project Contact Information

Involved Parties:

Bob Zacharski, DU
Email: info@doyon.com
Phone: 907-375-4220

Griffith (Sonny) Turpin, JBER
Phone: 907-384-2763
Email: griffith.turpin@us.af.mil

Mark Madden, SWS
Email: maddenma@ci.anchorage.ak.us
Phone: 907-343-6262

Case study author: Zoe Tressel, AEA Intern

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