

# Creating Green Power from Landfill Waste

At the city landfill in Janesville, Wisconsin, an easy hour's drive from Dresser Waukesha's headquarters, three VHP 5904 LTD Waukesha engines are helping to turn waste into energy, reducing dangerous greenhouse gases, conserving scarce fossil fuels, providing revenue for the City of Janesville, and generating tax credits for other participants in the project.

Landfills may lack the glamour of other alternative renewable energy sources, but generating electricity from landfill gas is a win-win for the environment. Electricity generated from landfill gas reduces the demand for electricity from fossil fuels. In addition, combusting the landfill gas which is largely comprised of the "greenhouse" gas, methane, prevents the methane from escaping into the atmosphere where it is 21 times more damaging to the atmosphere's ozone layer than carbon dioxide.

Europe has embraced the concept for decades, but in the U.S., use of landfill gas is not so widespread and opportunities abound. For example, according to the U.S. Environmental Protection Agency (EPA) there are approximately 400 operating landfill gas to energy projects in the U.S. at present, plus another 600 sites that could become projects.

The Janesville project, which has been online for about two years, is a good example of the complex cooperative effort necessary for this type of project.

## Location

Janesville, Wisconsin landfill site

## Engines

Three Waukesha VHP® L5904LTD engines

## Story

Three Waukesha® VHP® engines equipped with the ESM® engine management system and air-fuel control are at the heart of this municipal waste-to-energy landfill power generation installation. Despite the fluctuations in gas quantity and quality, typical of landfill installations, the Waukesha engines have logged higher "up" times. That's the benefit of the engines' high tolerance for variable fuel quality coupled with the ESM that continually adjusts the each engine's operating parameters.

To the casual observer, the Janesville landfill is just a lot of trash covered with soil and grass. But, to Ameresco, a Massachusetts-based firm that specializes in developing renewable energy projects throughout North America, the estimated 3-5 million tons of garbage in the landfill are a source of energy that can be tapped for the next two decades or more.

To the City of Janesville, the site is an additional source of revenue, said Larry Buetzer, senior engineer for the city. Through a complex series of transactions, the city transfers the gas rights to a broker, which in turn, sells the rights to



*The three to five million tons of garbage in the Janesville (Wis.) landfill are a source of energy that will last for an estimated 20 years or more.*

## Case Study #1423, Janesville, Wisconsin Landfill Site

Ameresco, which actually owns and operates the power generation facility at the landfill.

Ameresco sells the electricity it generates at the site to Alliant Energy-Wisconsin Power & Light, the utility that serves the area. Alliant, in turn, has an additional source of power and receives “green power” credits for supplying electricity from a renewable energy source.

The three Waukesha engines, each powering a 4160 volt Leroy-Somer generator are rated at 1MW each and in the last several months have been running at full load, as the landfill is being capped and more gas is available. The engines now have about 12,000 operating hours each, and Ben Heuiser, director of plant operations for Ameresco reported that “the engines have performed very well with only shutdowns for scheduled maintenance.

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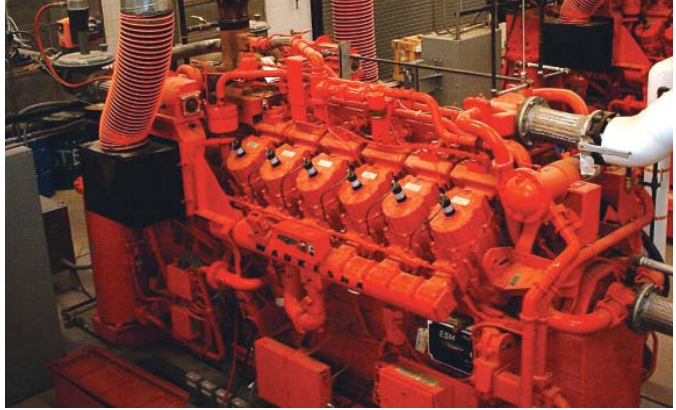
... the ESM® has been connected to a remote monitoring system that enables technicians to monitor key engine functions via the Internet...

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Landfill sites pose a unique set of challenges for engine operation. When the power generation system first goes online, the engines sometimes run for months at less than rated load, until the amount of gas generated by the decomposing garbage is sufficient for 100 percent load. In addition, the quality and quantity of gas available fluctuates by time of day, time of year and amount of precipitation – more precipitation causes the garbage to decompose faster and that means more gas.

Waukesha engines are known for their tolerance of wide variations in fuel quality, but the engines at the Janesville site have an added advantage – they are equipped with Waukesha’s ESM® engine control system operating in combination with Waukesha’s Air Fuel Module, which continually adjusts the engines’ operating parameters to compensate for the fuel variations. On average, the Janesville gas is rated at 500-550 Btu/cu. ft.

Because the site is not staffed, the ESM has been connected to a remote monitoring system that enables technicians to



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monitor key engine functions via the Internet, said Bob Conway, vice president of Charles Equipment, who was the general contractor for the project and handles plant maintenance for Ameresco. The result has been greater uptime for the engines. Conway noted that the ESM-equipped engines have more uptime than the same engines without ESM installed at another landfill.

### THE JANESVILLE LANDFILL PROJECT BY THE NUMBERS

3  
MW rated capacity of the three Waukesha engines

3,000,000 -  
5,000,000  
Tons of garbage in the site

475  
Btu per cu. ft. of gas

3,000  
Homes powered by electricity produced by the site

26,400  
Number of cars that would need to be removed from the road for an equivalent reduction in carbon dioxide emissions

36,000  
Acres of trees required for an equivalent reduction in carbon dioxide