



Landfill Gas Facility



MRWMD Landfill Gas Renewable Energy Program Benefits

- Landfill Gas Most Controllable of Green House Gases
- Captures > 9,000 tons of methane per year, removing emissions equivalent to 33,760 vehicles
- CO2 Offset from avoiding use of fossil fuels > 27,000 tons per year
- Project Revenue, Expenses, Tax Credits
- California Energy Commission Renewable Energy Credits
- U.S. Department of Energy Renewable Energy Production Incentives

History of the MRWMD Landfill Gas-to-energy Project

In 1983, the Monterey Regional Waste Management District (MRWMD) began capturing approximately 864,000 cubic feet of gas per day. The methane gas was used as the sole source of fuel for two Waukesha engine generators that delivered an average of 1200 Kilowatts (kW) of electrical energy to Pacific Gas & Electric Company.

EMCON Associates designed the well field and promoted the project. Perennial Energy, Inc. designed and installed the original engine generator system. The project was developed by Palmer Capital of Chicago and financed by the Bank of New England.

In 1986 the MRWMD acquired the engine system, and EMCON purchased the gas rights and collection system.

In 1994, the project was expanded. A new 3,200-sq.-ft. building was constructed to house up to four engine generators and switchgear equipment. A third generator was installed, enlarging the overall production capacity of the facility to 2,100 kW. The expansion of the project enabled the District not only to produce enough power to meet all of its own needs but also to generate a greater surplus of electricity to sell to PG&E.

The 1994 expansion of the project was designed by District staff, the Paul

Davis Partnership, and Applied Power. It was constructed by Daniels and House Construction.

The Caterpillar engine was supplied by Quinn Caterpillar. Financing was provided through Monterey Regional Waste Management Authority bonds.

In 1998 the landfill gas building was named after Michael N. Coulias, retired District Equipment Maintenance Supervisor, who was primarily responsible for the successful operation of the LFG facility from 1984-1997.

Instruments monitor each well and collect data to allow maximum production and ensure minimum gas emissions from the landfill to the environment. As part of the District's environmental monitoring program, probes have been installed to detect migrating landfill gas.

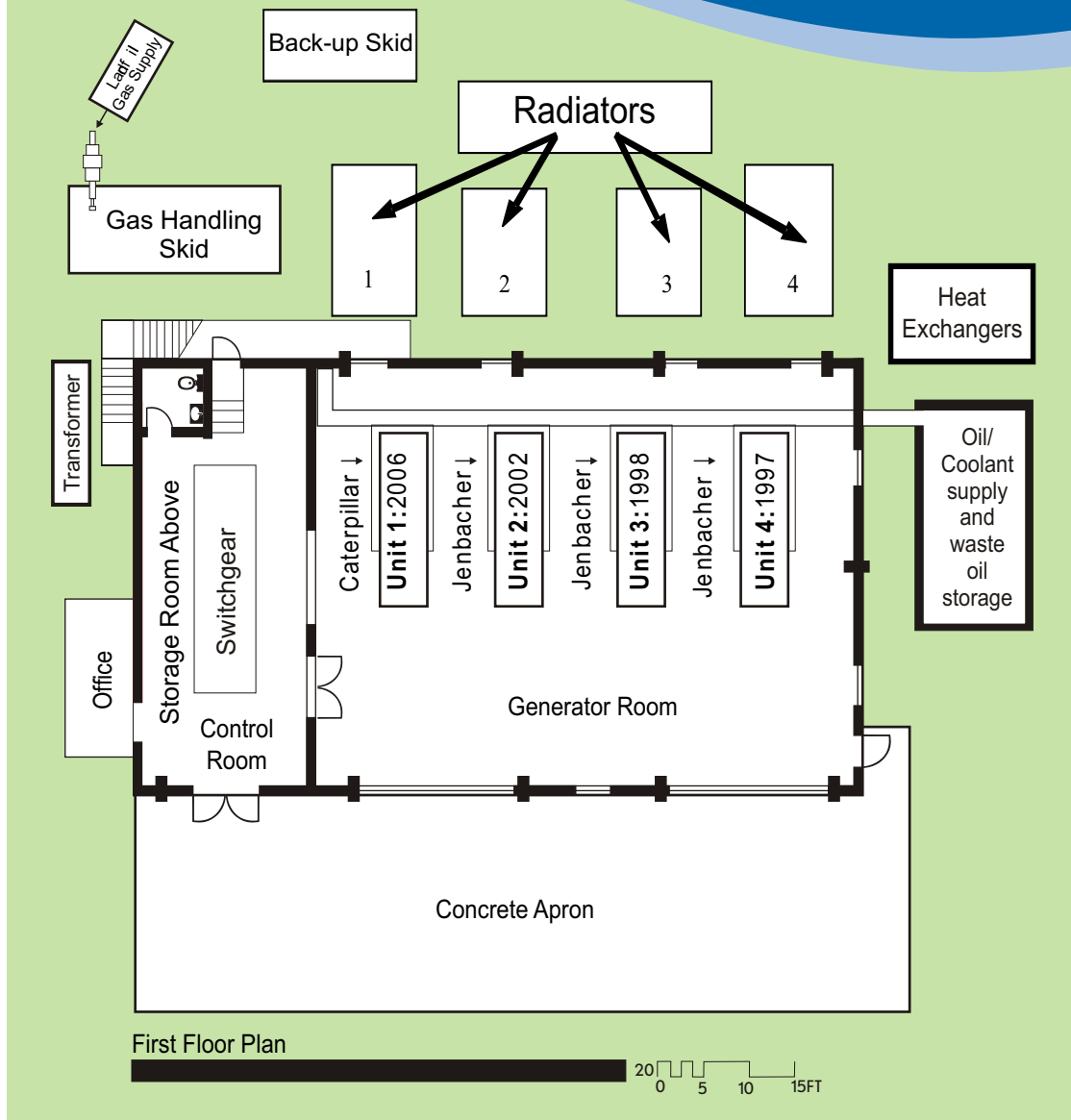
The Monterey Peninsula Landfill was the first in the U.S. to use Austrian-made Jenbacher engines. They were installed in 1997, 1998 and 2002. These engines are designed to burn landfill gas and are used extensively in Europe and other parts of the world.

Currently, the system collects 1.5 million cubic feet of gas per day from a 100-acre area containing refuse buried for nearly 40 years. It includes 41 horizontal and vertical gas wells in the active areas of the landfill.

Monterey Regional Waste Management District

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MRWMD Landfill Gas-to-Electricity Facility



Engine Specifications:

H1 Caterpillar 3520C (2006)
 V-20, 5,263 Cubic Inches
 1600 kW @ 1,200 RPM
 20 Cylinders
 Fuel Consumption: 370 cfm

1 Jenbacher JGS 320 with KATO Alternator (2002)
 2,970 Cubic Inches
 1,060 kW @ 1,800 RPM
 20 Cylinders
 Fuel Consumption: 370 cfm

2 Jenbacher JGS 320 with AVK Alternators (1997 & 1998)
 2,970 Cubic Inches
 987 kW (2) @ 1,500 RPM
 20 Cylinders
 Fuel Consumption: 370 cfm

Building Size: 3,700 s.f.

Equipment:
 1 Caterpillar 3520C 1.6MW
 3 Jenbacher 320 1,000kW ea.

Costs:
 Building: \$1,500,000
 Switchgear: \$400,000
 Engines (4) and Installation: \$4,000,000

Total: \$5,900,000

Other Equipment Data

Blower/Compressors Hoffman 2000 SCFM (1)
 Gas Filter 3 Tier, 1 Micron Upright
 Radiators 4 Amercool, 15 H.P. Units
 Heat Transfer 3 Heat Exchanger Closed Loop System
 Overhead Crane 10-Ton Crane Pro
 Switchgear Enercon

Project Staff

William M. Merry, P.E., DEE General Manager
 Tim Flanagan Assistant General Manager
 Richard Petitt Site Manager
 Mario Van Cleave Power System Supervisor
 Ernie Mangubat Power Systems Maintenance Technician
 Bryan Wynn Power Systems Technician