



Landfill Gas: An Alternative Fuel for Boilers in NC



Landfill gas (LFG) is a mixture of gases generated by the natural decomposition of organic waste in landfills. LFG contains about 40% to 60% methane with the remainder mostly carbon dioxide. Both methane and carbon dioxide are greenhouse gases. Greenhouse gases are compounds in the atmosphere that absorb and emit radiation in the thermal infrared range. According to the U.S Environmental Protection Agency (EPA), landfills account for 17% of methane emissions in the United States.

Modern landfills are required to have gas collection systems. The collected gas can be vented or flared, or it can be used to generate energy for a variety of applications. These applications include steam and electricity generation at industrial facilities. The EPA estimates that over 70 steam boilers are using LFG in the United States.

Using LFG to generate energy has several benefits. First, the LFG is generally provided at low or no cost to the facility, which substantially lowers operating costs. Second, combusting LFG reduces methane emissions that would have been directly vented into the atmosphere. Third, LFG replaces the fossil fuel that would have been combusted which decreases overall emissions of greenhouse gases and other air pollutants.

A good example of a facility using LFG in North Carolina is the Cone Denim White Oak plant in Greensboro NC. The facility received an energy assessment partly funded by the North Carolina Department of Environment and Natural Resources (DENR) through a grant with the EPA. The facility has 2 boilers that use LFG: a 1927 Heine boiler and a 1968 B&W boiler. The facility's boilers were originally stoker coal fired and were later converted to oil and natural gas. The boilers were retrofitted to fire LFG by installing two new multi-fuel burners. The boilers now use about 205,909 MMBtu per year (MMBTU/yr) of LFG supplied from the Greensboro's White Street landfill, which is located nearby. The facility also co-fires about 20,083 MMBtu/yr of natural gas.

By switching to LFG, the facility has reduced gas emissions by 223,751,732 pounds per year (as CO₂ equivalent) and reduced fuel costs by \$937,000.

As seen with the Cone denim plant, virtually any commercial or industrial boiler can be retrofitted to use either LFG alone or with other fuels. The equipment required to retrofit a boiler is commercially available and widely used. Boiler retrofitting will vary with facility's preferences, engineering designs and facility's ability to fund the project. The EPA encourages the recovery and use of landfill gas through its Landfill Methane Outreach Program (LMOP). The LMOP provides services like:

- Technical assistance, guidance materials, and software to assess a potential project's economic feasibility.
- Assistance in creating partnerships and locating financing for projects.
- Informational materials to help educate the community and the local media about the benefits of LFG energy.
- Networking opportunities with peers and LFG energy experts to allow communities to share challenges and successes. More information about the program can be found [here](#).

Benefits of Using Landfill Gas

- Fuel cost savings
- Reduced greenhouse gas emissions
- Improved local air quality

Landfill Projects in North Carolina

- [Ajinomoto USA LFG Energy Project](#)
- [Cargill North Carolina Landfill Gas Energy Project](#)
- [Catawba County Landfill Gas Energy Project](#)
- [Cone Mills LFG Energy Boiler Project](#)
- [EnergyXchange Renewable Energy Center](#)
- [Henderson County LFG Boiler Project](#)
- [Jackson County NC Green Energy Park](#)
- [Mallinckrodt, Inc. Gas Energy Project](#)
- [Pitt County Memorial Hospital LFG Project](#)

In addition to burner modification requirements, there are other factors that need to be considered in retrofitting a boiler to fire LFG. These include contaminants such as siloxanes fouling the water tubes and corrosion from acidic gases. There are modular, skid-mounted pretreatment systems now available to condition the LFG prior to firing. Also there are right of way and piping design requirements associated with transporting the landfill gas to the facility. These factors are discussed in detail in the EPA's informational document, "Adapting Boilers to Utilize Landfill Gas: An Environmentally and Economically Beneficial Opportunity". Click [here](#) for more information.