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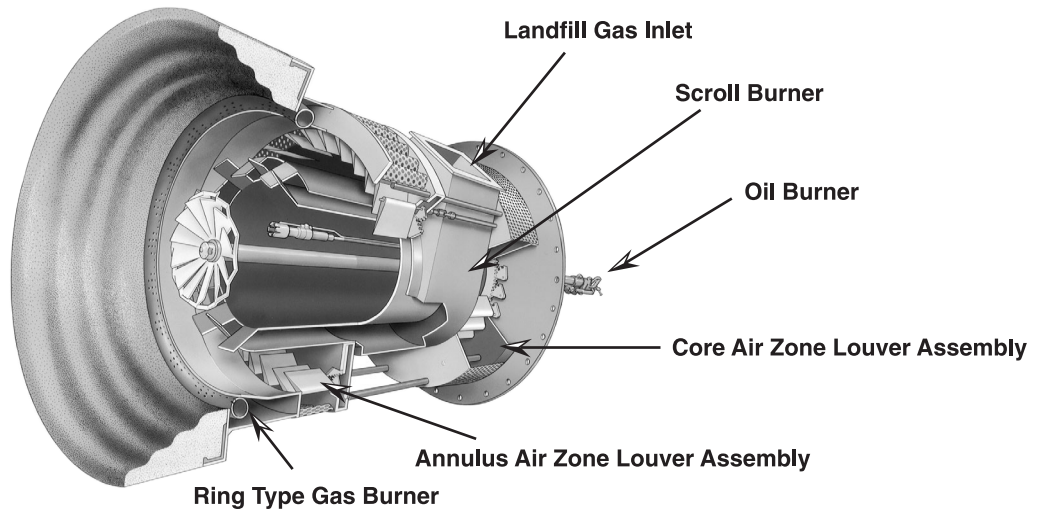
COEN PILOT

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CASE HISTORY

Coen Burners Convert Landfill Gas to Energy



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Two Coen Interzone Scroll burners were key elements in allowing Cone Mills White Oak Plant in Greensboro, North Carolina to convert waste landfill gas (LFG) to a clean source of energy. Designed to tackle the problems associated with firing landfill gas, the burners were successful in making LFG firing an effective means of cutting the Plant's operating costs and lowering their emissions.

In 1995, the City of Greensboro was investigating a strategy to convert landfill gas to energy to offset environmental concerns. At the same time, Cone Mills was looking for a way to reduce their energy costs, so they agreed to utilize LFG firing in their boiler house. The Plant then decided to modify one of their four boilers to allow for landfill gas firing. Consequently, the Coen Interzone Scroll register was chosen for installation because of its proven effectiveness in this type of application.

These burners were specifically designed to handle the problems associated with low Btu gas combustion. The lower heating value meant that higher volumes of gas were required for the same heat input as conventional fuels, like natural gas. Since LFG is typically available at very low supply pressures, the problem is compounded.

The Interzone Scroll burner handled this problem by introducing the LFG into a large scroll annulus situated between two counter rotating streams of combustion air. (See Figure above)

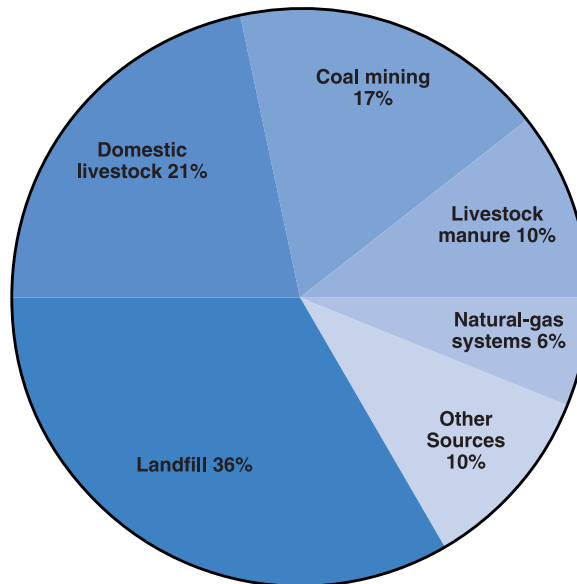
Another problem with firing LFG is particulate contamination, which can clog typical gas spuds or ring type burners resulting in frequent shutdowns and cleanings. The large openings in the gas scroll allow passage of particles that are sometimes found in LFG. The mixing action of the two counter rotating air streams surrounding the Interzone Scroll provided extremely stable combustion throughout a wide turndown range of 8:1. This eliminated the need for any supplementary firing to maintain stability.

Finally, the ability of the Interzone Scroll burner to channel large volumes of gas with a very low pressure drop meant that expensive gas boosters or compressors were not required. Not only was the capital cost of high pressure equipment and piping avoided, but the operating cost was also reduced.

Cone Mills is now producing 30,000 lb/hr of saturated steam from burning landfill gas, and the project was recognized with the "Osprey Award for Environmental Excellence." This success is evidence that the Coen Interzone Scroll burner is the superior choice for landfill gas applications.

Did You Know? Fast Facts About Landfill Gas

Sources of Manmade Methane Emissions



- Typically when the landfill solid waste decomposes it generates LFG for approximately 30 years.
- LFG generates less NOx than natural gas due to its lower flame temperature.
- Landfills are the largest source of manmade methane emissions in the U.S., constituting 36% of these emissions each year.
- Landfill gas is generated from the decomposition of solid waste and is about 50% methane and 50% carbon dioxide. It causes ozone depletion, air quality problems, odor, and other hazards.
- The EPA estimates that over 700 landfills across the U.S. could install economically viable landfill gas energy systems, yet only about 115 energy recovery facilities are in place.
- By collecting and utilizing landfill gas, it is estimated that greenhouse gases would be reduced up to an equivalent of 4 billion gallons of gasoline per year or taking 6.8 million cars off the road.
- Methane is a potent greenhouse gas that has 24.5 times the warming effect of carbon dioxide.
- Landfill gas can displace natural gas in essentially all applications and other fossil fuels in most applications.
- By controlling LFG with collection systems and energy recovery or combustion systems, the U.S. is estimated to reduce methane emissions from solid waste by six million tons.
- Landfill gas-to-energy products have grown nearly 50% since 1991, spurred by environmental regulation, tax incentives, and competitive pressures.

UNIQUE APPLICATIONS

Burning Western Coal Made Possible with Coen Duct Burners

“The system designed by Coen is in operation 7 days a week, 24 hours a day, and I have never heard one complaint in the 7 years it has been operating.”

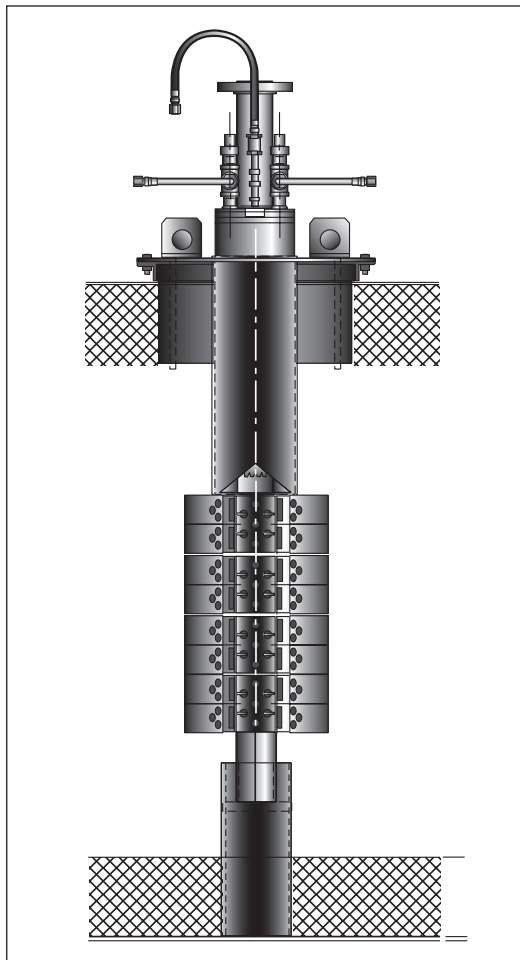
Tom Spelman, Plant Engineering Manager

Plant operating costs and emissions can be effectively reduced by firing western coal in place of eastern coal.

Specifically, the advantages of burning western coal are:

- Low sulfur—1/2% or less (1% in “compliance grade” eastern coal, and up to 6% for some types of eastern coals)
- Lower cost—about 20% savings over the cost of eastern coal

COEN Duct Burner Assembly



- Lower NO_x—reduction of thermal NO_x due to lower flame temperatures

However, the following factors must be considered:

- High moisture content, 15% to 25% compared to 5% to 8% with eastern coals
- Lower heating value (8,500-9,500 Btu/lb) compared to eastern coal (11,000-14,000 Btu/lb)
- Higher ash loading in the boiler
- Added equipment for soot blowing, ash handling, mill inerting, and coal blending

Because of these challenges, it is impractical to burn 100% western coal on existing units. Typically, a blend of western and eastern coals is burned, consisting of anywhere from 30% to 70% western coal. When pulverized, western coal requires an improved air preheating system for proper mill operation due to its high moisture content. Coen has successfully designed systems utilizing gas-fired duct burners to supply the additional air preheat required when burning western coal.

Four of Coen’s air preheating systems have been installed in the B.C. Cobb Plant in Muskegon, Michigan. This plant burns a mix of Powder River Basin coal and eastern coal in their operations.

Tom Spelman, the Plant Engineering Manager, says: “The system designed by Coen is in operation 7 days a week, 24 hours a day, and I have never heard one complaint in the 7 years it has been operating. We can always rely on the Coen system to work properly.”

Besides reliability, there are many other benefits in using Coen duct burners. These benefits include:

- Piping, burner management system, and DCS interface all provided
- Rugged construction withstands tough powerplant environment
- Low air side pressure drop
- Excellent turndown capabilities (better than 10:1)

With the right operating system, western coal can be an excellent alternative for reducing both operating costs and emissions. Coen’s proven air preheating design is an effective solution to the challenges of burning western coal.

COEN's Delta-NOx Burner

Destined to be the new standard for industrial & utility markets.

¥ Low NOx (<80ppm) without FGR and even further reductions with FGR (<30ppm).

¥ Compact flame for high space heat release applications.

¥ Simple, rugged design for easy installation and start up.

For more information contact
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The worldwide leader
in combustion technology

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