

EPA Coalbed Methane Outreach Program Technical Options Series

USING COAL MINE METHANE TO HEAT MINE VENTILATION AIR



Coal mine methane-fueled heaters at a mine in the Rocky Mountains
(Photo courtesy of Raven Ridge Resources, Incorporated)

BENEFITS OF USING COAL MINE METHANE TO HEAT VENTILATION AIR

- ◆ Reduces costs by displacing other fuels that are used to heat ventilation air
- ◆ Uses a fuel that is readily available at gassy coal mines while reducing emissions of methane, a greenhouse gas, to the atmosphere
- ◆ In winter, increases worker comfort and productivity, and reduces equipment problems

Use of coal mine methane on-site for heating ventilation air at gassy mines is potentially profitable

CMOP can provide technical and financial modeling support to coal companies interested in a site-specific analysis

Use of coal mine methane reduces emissions of this greenhouse gas to the atmosphere

Why Consider Using Coal Mine Methane to Heat Ventilation Air?

Coal mines must force large quantities of air through their workings to dilute methane for safety reasons. During the winter months, this ventilation air can become very cold, causing discomfort to miners, lowering worker productivity, and resulting in mechanical problems. In cold climates, such as that of the Russia's Kuznetsk Basin, heating of ventilation air is essential. Even in mild climates, such as the southern United States, heating ventilation air during the winter months can be beneficial in terms of comfort and productivity.

The use of coal mine methane, rather than other fuels, to heat ventilation air can be an economical choice for gassy mines interested in this opportunity. Rather than purchasing natural gas, propane, fuel oil or diesel to heat mine ventilation air, it may be cheaper for the mine to use recovered methane. Some coal mines (for example, those in the Kuznetsk Basin) currently use coal-fired boilers to heat their ventilation air. Replacing some or all of this coal with coal mine methane would allow the mine to sell more coal. Use of coal mine methane is also beneficial to the environment, in that it reduces emissions of methane, a greenhouse gas, to the atmosphere.

Gassy coal mines that currently drain methane and wish to recover it for heating mine ventilation air could accomplish this goal in several ways. The mine could use direct-fired heaters installed in the ventilation duct or mine shaft. An alternative approach would be to burn the coal mine methane in some type of combustor containing a flue for venting combustion products, and use a heat exchanger to heat the ventilation air. The financial analysis below assumes the use of a direct-fired heater.

Following are two examples of coal mines which currently use coal mine methane to heat ventilation air, but for different reasons.

Case Studies

Rocky Mountain Mine Uses CMM to Heat Mine Ventilation Air

A gassy mine operating in the Rocky Mountain region is now using gob gas recovered from sealed areas through in-mine horizontal wells to heat mine ventilation air. The gas is collected underground and pumped to the surface with centrifugal blowers. The gas is then transferred approximately 1/2 mile to the heater facility by pipeline and distributed to four combustors using a 50 hp positive displacement blower for each combustor. Designed by Northwest Fuel Development (photo courtesy of Raven Ridge Resources), the combustors consume approximately 900 cfm (~1,037 mcf/d of methane) of the ~5,100 cfm collected from the in-mine boreholes. The concentration of the gob gas is currently approximately 80% methane. Currently, the flares increase the temperature of the mine ventilation air at the bottom of the intake shaft by approximately 65 degrees Fahrenheit. This benefit allows for much more favorable working conditions in the mine, as well as a reduction in labor required to start cold equipment underground.

The project is scheduled to operate through the Spring of 2004, and resume again in the fall when cold temperatures return to the Rocky Mountains.

CMM Use at Jim Walter Resources to Heat Mine Ventilation Air

Jim Walters Resources in Alabama have been using coal mine methane to keep their ventilaiton shafts at three of their mines free from ice since 1999. Ice can form in the ventilaiton shafts during the winter months, which are typically from December through March. During warmer days in winter, the ice cycles began to melt from the top down, breaking loose and falling into the shaft, often causing damage to the shaft. The gas used to fuel the heaters is drawn from a metering point in their gathering line, prior to injection into the pipeline, and is a mixture of coalbed methane from pre-mine drainage wells and coal mine gas from gob wells. Currently, about 5 million cubic feet of methane is used annually.



Coal mine methane-fueled heater at one of the Jim Walter Resources mines in Alabama (Photo courtesy of Jim Walter Resources, Inc.)

For More Information...

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