GE
Energy

creative energy solutions are in your hands

using coal mine gas in Jenbacher gas engines

ecomagination℠
a GE commitment

GE imagination at work

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Energy

coal mine gas as energy source

Coal mine degasification was originally developed to improve worker safety in the mines. If not captured, the methane-laden mine air is vented to the atmosphere by exhaust fans. In recent years, international studies have determined that 30% to 40% of all coal mines produce gas that can be effectively used for power generation with gas engines.

creation of coal mine gas

Coal mine gas (firedamp) is a problematic phenomenon associated with pit coal mining, as the gas can form explosive mixtures together with air. The main component of the primary coal seam gas is methane in a concentration of 90% to 95%; the gas develops during the geochemical conversion of organic substances to coal (carbonization). Coal seam gas is present both as liberated gas in fissures, faults and pores and as adsorbed gas on the inner surface of the coal and neighboring rock.

three different types of coal mine gas

- primary coal seam gas from unmined coal beds (Coal Bed Methane/CBM)

CBM consists of over 90% methane and can be harvested independently of coal mining in some locations. The gas composition is normally stable, meaning that the gas can be fed directly into the natural gas network or a gas engine.

- coal mine gas from active mining (Coal Mine Methane/CMM)

CMM, a methane/air mixture released during coal mining, must be ventilated for safety reasons. CMM typically has an oxygen content of 5% to 12%. The methane content ranges from 25% to 60%. However, the methane/air proportion can change suddenly, thus complicating its use in gas engines.

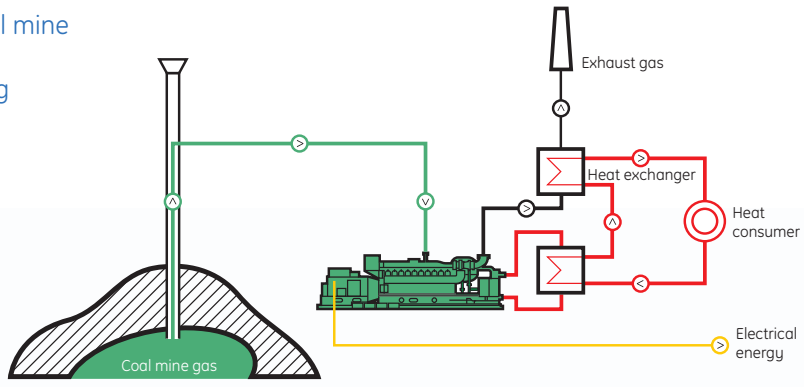
- coal mine gas from abandoned mines (Abandoned Mine Methane/AMM)

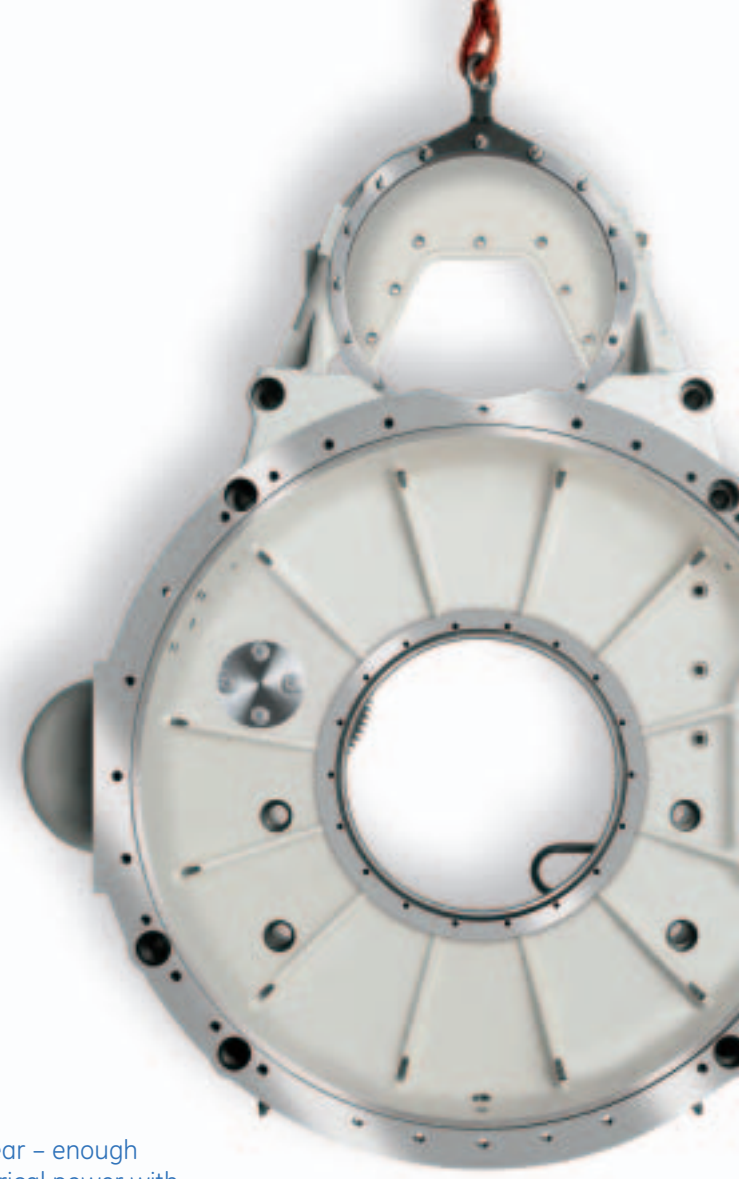
Even after coal mines are shut down, coal mine gas continues to be released. Coal mine gas from abandoned mines typically contains no oxygen, and its composition changes slowly. The methane content ranges from 60% to 80%.

the Jenbacher concept

The composition of CBM and AMM presents no technical difficulties for combustion in gas engines. Although the sudden changes in the composition of coal mine gas from active mining (CMM) put greater demands on engine design. GE offers specially modified gas engines that make efficient use of this gas for power generation.

The electrical energy generated can be used in the coal mine to meet electricity requirements or fed into the public power grid. The thermal energy can be used for heating purposes on site or fed into a district heating system.





advantages

- Alternative disposal of a problem gas while simultaneously harnessing it as an energy source
- Extreme profitability with overall efficiency of up to 90%, in the case of combined heat and power, and 43.4% in the case of power generation alone
- Smooth operation despite fluctuations in gas pressure and methane content and impurities in the gas
- Depending on gas composition, full output down to the lowest calorific values with 25% methane content
- Avoiding liberation of methane into the atmosphere, which has 21 times the global warming potential of CO_2

our competence

The first Jenbacher systems using coal mine gas were installed in Germany and Great Britain in the mid-1980s. Today, nearly 100 units, with a total electrical output of more than 200 MW, run on coal mine methane worldwide.

These plants generate about 1.5 million MW-hours of electricity a year – enough to supply about 430,000 EU homes. Generating this amount of electrical power with coal mine gas could save approximately 367 million cubic meters of natural gas a year. In addition, using coal mine gas in Jenbacher engines can reduce the release of methane into the atmosphere by about 85% compared to venting the gas, which corresponds to CO_2 savings of about 30,000 to 40,000 tons per year and MWel.

Due to their cost-effectiveness, high output and measurable benefits to the environment, Jenbacher coal mine gas engines have been certified as GE “ecomagination” product by an independent agency. Ecomagination is a GE commitment (www.ge.com/ecomagination) to use and develop new technologies to help customers around the world meet escalating environmental challenges.