

EASTMAN GASIFICATION SERVICES COMPANY

Your partner in the technology of choice

COAL GASIFICATION IS ENVIRONMENTALLY BENEFICIAL

To reduce air pollution and limit CO₂ emissions, some believe America should stop building coal-based electric power plants. We do not agree.

While domestic supplies of oil and natural gas are diminishing, leading us to increasingly rely on imports of these fuels, the U.S. has abundant supplies of coal. In fact, there are more Btu's of coal in just the state of Illinois than there are Btu's of oil in Saudi Arabia and Kuwait combined.

The problem isn't coal. The requirement for unlocking the potential for coal to solve our energy needs is to use it in an environmentally friendly manner. The solution is coal gasification.

THE CLEANEST ALTERNATIVE

Thanks to coal gasification technology, first commercially adopted in the U.S. by Eastman, we no longer have to burn coal to produce electricity. Gasification converts coal to a clean synthesis gas that can be burned in combustion turbines to produce power as if it were natural gas.

How is this possible? Since coal gasification is a chemical process, it is possible to remove potentially harmful constituents such as sulfur and volatile mercury from the synthesis gas before combustion, when they are much easier and thus less expensive to remove. Because the synthesis gas is much cleaner than raw coal, it produces lower quantities of nitrogen oxides and particulate matter when it is combusted. In addition, non-volatile heavy metals can be removed in a non-leachable and usable slag co-product stream.

Gasification is also more efficient than most other coal technologies, resulting in lower usage of coal and thus fewer inherent emissions per kilowatt-hour. If capturing and sequestering carbon dioxide becomes a requirement, it is significantly more cost-effective to remove carbon dioxide from synthesis gas than from a combustion exhaust gas.

COMPARISON WITH COAL COMBUSTION

Direct combustion of coal in electric power generating facilities produces an exhaust or flue gas and a flyash by-product that together contain most of the pollutants from the coal. Although the exhaust gases can be cleaned up significantly using current technology, the cost to do so is relatively expensive and the removal technologies are not nearly as efficient or effective as those employed prior to combustion with gasification. Post-combustion clean-up technologies also usually produce other collateral wastes, such as sulfur-containing sludges (up to five

pounds per pound of sulfur removed) and additional carbon dioxide emissions (from reaction of limestone with sulfur dioxide).

Removal of volatile mercury and/or carbon dioxide from combustion exhaust gases is also much more difficult and is several times more expensive than with gasification.

The table below compares emissions from an integrated gasification combined-cycle plant (IGCC) equipped with an amine scrubber, packed activated carbon bed for Hg, and no SCR, with emissions from a supercritical pulverized coal plant (SCPC) equipped with wet flue gas desulfurization and a SCR unit. For a SCPC, mercury removal depends highly on the coal feedstock and other pollution control equipment. Achievement of high-level mercury removal for SCPC requires injection and removal of powdered activated carbon.

Pounds of Pollutant per MWh

Pollutant	IGCC	SCPC
SO ₂	0.47	1.19
NO _x	0.50	0.72
PM-10	0.06	0.16
Percent Volatile Mercury Removed		
Pollutant	IGCC	SCPC
Hg	> 90%	30-80%

1. Comparison assumes Eastern bituminous coal with 2.2% sulfur.
2. For IGCC, NO_x is corrected to 15% O₂; for SCPC, NO_x is corrected to 6% O₂.

IGCC plants have potential to reduce SO₂, NO_x, and PM-10 emissions significantly below the levels shown above (similar to natural gas combined cycle), if an enhanced sulfur removal technology such as Rectisol is used.

SUMMARY

Coal gasification is the cleanest coal technology. The principal environmental benefits associated with coal gasification are: (1) significantly lower air, water, and solids pollutant emissions today; and (2) more cost-efficient CO₂ capture and sequestration, if needed in the future.

If you're ready to initiate a gasification project or would like to learn how you can optimize an existing plant, call an Eastman representative today or visit Eastman Gasification Services online at www.gasificationservices.eastman.com.

CALL US AT 800-EASTMAN, EXT. 1740

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