Environmental Benefits of UCG

Underground coal gasification (UCG) is a proven technology that harnesses the energy potential of coal in the ground while avoiding the environmental risks and hazards of coal mining. It represents a promising opportunity to meet our energy needs using coal, one of our most abundant natural resources, in a responsible manner. UCG offers many environmental benefits over conventional coal mining and natural gas extraction, including a lower carbon footprint and options for carbon capture and sequestration (CCS). UCG combined with carbon capture could become an important bridge technology that can help the United States transition from its unsustainable high-carbon economy based on imported oil to a more sustainable economy that relies on domestic energy resources, and ultimately to a clean renewable energy future.

Underground coal gasification represents a drastic shift away from conventional coal mining.

With UCG, coal is gasified through a controlled process that requires a series of wells drilled several hundred feet apart. Site operators inject air into one set of the wells and start a carefully- controlled combustion reaction that converts into syngas that is produced through a second set of wells. The above-ground landscape remains largely untouched. There are no open pits, mountaintop removal or tailing piles because there is no conventional mining and the environmental and health hazards associated with mining are virtually eliminated. Because little above-ground infrastructure is needed, the natural landscape is easily restored upon project completion.

UCG has a smaller carbon footprint.

With UCG, syngas is synthesized from the coal and can be used for power generation or piped to nearby locations, reducing the carbon and other emissions from handling, transportation and waste management associated with coal mining beyond extraction and burning. UCG eliminates the need for miles of conveyor belts pulling coal to rail or shipping lines. There are no clouds of coal dust polluting the environment. UCG produces clean, local, reliable energy.

The UCG process leaves most pollutants underground where they belong.

According to the Lawrence Livermore National Laboratory, UCG results in no production of criteria pollutants including SO_X and NO_X. Many other pollutants, including mercury, particulates and sulfur species, are greatly reduced and easier to handle. Likewise, UCG leaves the coal ash and other process wastes deep underground, eliminating the cost and risk of handling and disposing of dirty surface ash.

UCG syngas burns more cleanly than coal and even natural gas.

Burning UCG-produced syngas with pre-combustion carbon capture can result in lower CO_2 emissions than a combined-cycle natural gas power plant, the cleanest of all fossil fuel plants. UCG-produced syngas also significantly reduces or eliminates SO_X, NO_X, mercury, particulates, coal ash and other pollutants.

UCG lends itself easily to carbon capture and sequestration.

The UCG process also produces syngas at temperatures, pressures and CO_2 concentrations that enable relatively simple, low-cost carbon removal, prior to use.

There are well-established scientific methods for dealing with the remaining environmental risks of UCG syngas production. The two main environmental risks associated with UCG–surface subsidence and groundwater contamination-are easily managed by careful site selection, project design and project monitoring. Subsidence is a downward shift in the earth's surface into the cavity created in the reactor zone. UCG operations cause less subsidence than underground mining, and this subsidence can be minimized or even eliminated with proper site selection, reactor zone pressure and temperature management. Likewise, the risk of groundwater contamination can be virtually eliminated by selecting a site well below the fresh-water aquifer and with the proper type of impermeable overburden strata. The process chamber pressure is carefully managed to keep it below the hydrostatic pressure in the coal seam to keep water in flux and pollutants in the process cavity.