

ADVANCED FUEL PROCESSING FOR ADVANCED POWER GENERATION. D. H. Archer, D. Berg.  
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The use of coal (and possible residual oil) for power generation in the United States will increase threefold in the next 20 years. Advanced power plants are being developed to reduce the environmental and economic impact of this growth. Emissions of SO<sub>2</sub>, NO, and particulates and discharge of heated water are minimized. Capital costs of equipment and construction are reduced; operating efficiency in fuel usage is increased over that of conventional steam power plants. Such plants involve the processing of coal (or oil) under pressure to produce either clean, pressurized fuel products by means of a fluidized bed gasification system or clean, pressurized combustion products by means of a fluidized bed combustion boiler system. Power production is carried out by combined cycle generation. Gas turbines burn the fuel gases and/or expand the combustion products; steam turbines expand steam provided by heat recovery and/or fluidized bed boilers. Combined cycle plants are low in cost because their standardized components are shop fabricated. High cost engineering, field assembly and erection are minimized. Such plants are also high in efficiency because the gas turbine directly and effectively utilizes high temperature combustion gases. And fluidized bed combustion boilers appear capable of economic producing steam at temperatures and pressures higher than conventional boilers. Several variations of coal (or oil) processing can be combined in various configurations with combined cycle generation equipment, boilers, and gas cleaning apparatus. Overall power plant capital cost reductions greater than 20% and operating efficiency increases greater than 25% appear feasible.