

Feasibility study of electricity generation from discard coal

B. North, A. Engelbrecht, B. Oboirien

CSIR Materials Science and Manufacturing (Energy Materials), Pretoria, South Africa

Abstract

There is large electricity generation potential in discard coal, both for current stockpiles and arisings. Power stations with a combined capacity of up to 18 gigawatts electrical (GWe) could be fuelled by discard coal. Modern circulating fluidized bed combustion (CFBC) boilers, with capital costs comparable to equivalent pulverized fuel (PF) boilers, are capable of utilizing discard coal at a high efficiency while reducing sulphur dioxide (SO₂) emissions through the use of limestone sorbent for “in-situ” capture. A detailed economic assessment of the feasibility of electricity generation from discard coal, comprising material and energy balances and the construction of a discounted cash flow (DCF) table, shows that it is also potentially economically attractive. A “base case” analysis shows positive net present values (NPVs) and an internal rate of return (IRR) of 21.4%. Sensitivity analyses on critical parameters show that the economic viability is heavily dependent on parameters such as coal cost and the value of electricity. The project becomes unattractive above a coal price of approximately R300/tonne and an electricity value below approximately 59c per kilowatt-hour (kWh). Site and project-specific information such as the delivered cost of coal, location and efficacy of sorbents, effective value of the electricity produced etc. can be used as input to the economic analysis to evaluate siting options and sorbent source options for such a power station.