

Performance of Coals

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Abstract

Coal is a complicated material. Off-design boilers and coals cost the US utility industry billions of dollars per year. Today, successfully burning coal requires a great deal of technical knowledge to generate low cost electricity and meet emission standards. Most of the properties of coals that affect boiler performance are poorly known. The best that can be hoped for is general knowledge that allows selected coals to be screened for use in particular boilers. Insufficient basic chemical and physical data is available from systems that can be related to operating or new boilers to develop general empirical relations or to attempt modeling of most aspects of the performance of coals in boilers. What is required is data, and most will have come from operating boilers, on performance of a large number of different coals. This poster reviews the status of what we know on the practical performance of coals in operating boilers and suggested areas where additional information is needed and suggests techniques to acquire that data.

This poster reviews data from laboratory analyses, laboratory equipment, pilot scale combustors, and commercially operating boilers. The information from small-scale experiments often requires so much interpretation and extrapolation as to make its application to operating boilers questionable. Some controlling features of operating boilers can be scaled to the pilot scale, but not all. Taking data in operating boilers is difficult and often the data cannot be interpreted. Finally, insufficient information is usually available on coal performance to develop reliable correlations. There is almost never sufficient information to justifying mathematically modeling of boiler performance.

In spite of the problems, boilers operate. What can be done is to judiciously use results from laboratory analysis and experiments, pilot scale combustors, limited correlations, and for some simple problems, models to screen coals for specific boilers. This must always be done with the highest level of verification possible and knowledge of the potential errors.