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THERMAL SCIENCE

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SELECTION OF SUSTAINABLE TECHNOLOGIES FOR COMBUSTION OF BOSNIAN COALS

ABSTRACT

This paper deals with optimization of coal combustion conditions to support selection a sustainable combustion technology and an optimal furnace and boiler design. A methodology for optimization of coal combustion conditions is proposed and demonstrated on the example of Bosnian coals. The properties of Bosnian coals vary widely from one coal basin to the next, even between coal mines within the same basin. Very high percentage of ash (particularly in Bosnian brown coal) makes clear certain differences between Bosnian coal types and other world coal types, providing a strong argument for investigating specific problems related to the combustion of Bosnian coals, as well as ways to improve their combustion behaviour. In this work, options of the referent energy system (boiler) with different process temperatures, corresponding to the different combustion technologies; pulverised fuel combustion (slag tap or dry bottom furnace) and fluidized bed combustion, are under consideration for the coals tested. Sustainability assessment, based on calculation economic and environment indicators, in combination with common low cost planning method, is used for the optimization. The total costs in the lifetime are presented by General index of total costs, calculated on the base of agglomeration of basic economic indicators and the economic indicators derived from environmental indicators. So, proposed methodology is based on identification of those combustion technologies and combustion conditions for coals tested for which the total costs in lifetime of the system under consideration are lowest, provided that all environmental issues of the energy system is fulfilled during the lifetime. Inputs for calculation of the sustainability indicators are provided by the measurements on an experimental furnace with possibility of infinite variation of process temperature, supported by good praxis from the power plants which use the fuels tested and by thermal calculations of the different options (different temperature in the boiler furnace) of the referent energy system.

KEYWORDS

sustainability, combustion, coal, indicator, slagging, emission

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