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Technical Analysis of Hydrogen Co-firing: Case Study in Indonesia Power Plant

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Abstract

Hydrogen co-firing is a promising strategy for reducing carbon emissions in the power sector. It involves the mixture of a percentage of hydrogen with the primary fuel in combustion systems to reduce greenhouse gas emissions. The process has gained considerable attention in recent years due to its potential to achieve significant emissions reductions without requiring major modifications to existing power plants. While the environmental benefits of hydrogen co-firing are clear, there is still much to be understood about the technical and performance aspects of the process. This study would explore the technical and performance analysis of hydrogen co-firing implementation, including the challenges and opportunities associated with the process, especially in Indonesia. In this research an overview of the technology behind hydrogen co-firing, including the different methods of co-firing and the benefits of using hydrogen as a fuel will be provided. This study also delves into the technical challenges associated with the implementation of hydrogen co-firing, including the impact of hydrogen on the combustion process, potential equipment modifications required, and the effect of co-firing on plant operations in Indonesia. Next, the authors will discuss the performance analysis of hydrogen co-firing, including the evaluation of the combustion process and its effect on plant efficiency and emissions. The analysis considers the different types of combustion system used in power plants. The paper also presents a review of recent research on the performance of hydrogen co-firing, including its impact on combustion efficiency, emissions reduction, and operational stability. The authors discuss the results of experimental studies and computational simulations that provide insights into the effects of hydrogen concentration, fuel blending ratios, and other key parameters on performance. The technical and performance analysis presented in this paper provides a comprehensive understanding of the potential benefits and limitations of hydrogen co-firing implementation. It offers insights into the technical and operational requirements of this approach and provides recommendations to optimize its performance in power generation applications. Overall, this paper contributes to the growing body of knowledge on hydrogen co-firing implementation, helping to inform decisions on the use of this technology in the transition to a low-carbon energy system.